

Regulatory Framework and Operational System of Urban Bus Transportation in Yangon, Myanmar

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Word count: 6,230 words plus five tables

Abstract. This paper reviews the regulation framework and reports the current practices of urban bus operation in Yangon. The main actors such as the local bus regulators, bus control committees, bus companies, individual bus owners, and bus driver/conductors, were interviewed in 2008 for collecting the data. First, information regarding the urban bus regulation system, including the permission system for bus operations and fares, control of service frequency, presentation of service information to the public, regulation of importing bus vehicles, and regulation of fuel consumption, is reported. Further, the activities of bus operators and owners are surveyed. The types of bus vehicles, operating facilities, bus network, service frequency, salary system, process of purchasing the bus vehicles, and business conditions in the bus industry comprising bus companies, bus control committees, and bus owners are summarized. Finally, we present the problems in urban bus transportation in Yangon. These problems include the poor condition of bus vehicles, inadequate bus network, unsatisfactory provision of service information, lack of financial support system, and deficiencies in the bus regulation system.

INTRODUCTION

Yangon is the former capital of the Union of Myanmar. It is the country's largest city and the most important commercial center. Note that the Myanmar government relocated the capital to Naypyidaw since March 2006. Under the military government, Yangon City is now controlled by the Ministry of Home Affairs and Yangon City Development Committee (YCDC). As of 2007, Yangon City has approximately 4.1 million people in an area of 598.76 km² (1). The City's population continues to increase at an annual growth rate of 15.1% (1). The population of the entire City, including the suburban areas, is around 6.7 million and it also increases at an annual growth rate of 18.7%. Most urban residents reside or work in the central area called the central business district or Yangon's urban area. The central business district is located at the City's southern part, adjacent to the confluence of Yangon River and Bago River. Administratively, the City is divided into four districts and 33 townships. The districts are called the North, East, West, and South.

Four main types of transportation modes are available in Yangon: private car, rail, taxi, and bus. Zhang et al. (2) indicates that the modal share of bus transport is 84 percent, while only six percent is by rail and two percent by private cars. According to the local government's data (3), the car ownership per capita in Yangon is about 0.025 in 2003. The low car ownership in Yangon is mainly because most local people cannot afford to purchase a private car owing to their low income. Even though most motor vehicles in the city are secondhand, their price substantially exceeds the income level of most local people. Further, although there is a circular rail network in the City, which has a length of 45.9 km with 39 stations and which connects Yangon's satellite towns, it has not been well utilized by the public because of its low service quality. The actual average running speed of rail services is less than 20 km/h and its service frequency is every 60 to 120 minutes (4). Since the fare of rail services (10 Kyats¹ per ride as of November 2008) is much cheaper than that of bus services (the minimum fare is 50 Kyats per ride as of November 2008), the rail is used mainly by low-income people. Furthermore, the rail stations are not equipped with park and ride facilities, and feeder bus services are unregulated and infrequent. Motorcycles and bicycles are banned in most urban areas in Yangon City. This means that the local people cannot use motorcycle taxis or para-transit services, including cycle rickshaws, in the central business district. Because of the difficulties in car ownership, poor quality of rail services, regulations constraining motorbikes and para-transit services in the central business district, and high taxi fares, most people who commute from suburban areas to the central business district use the bus transport service.

Although bus transportation is critically dominant in Yangon, its regulatory system and implementation have hitherto rarely been reported or analyzed. This is mainly because of the difficulty in data availability. In our research, we survey urban bus transportation in Yangon in cooperation with the Government of Myanmar. Our research is a part of a study formulated in the Urban Public Transport Policy Framework (5). This paper reviews the regulation system of urban bus transportation and reports the current bus service in Yangon by surveying the local bus market. We interviewed the bus-industry regulators, bus control committees, individual bus owners, and bus workers to collect the data regarding the bus regulation framework and its operation in Yangon. The local interview surveys were made during September 15 to 23 and November 9 to 21, 2008.

This paper is organized as follows. The next section reviews the bus regulation framework in Yangon. Then, Section 3 reports the current situation of bus services as described by local bus operators. Section 4 presents Yangon's current problems of urban bus transportation on the basis of the survey results. Finally, the achievements are summarized and future research topics are presented.

REGULATION SYSTEM OF URBAN BUS SERVICES IN YANGON

Statutory framework of urban bus regulation

In Myanmar, two laws are implemented for regulating bus transportation: the Road Transport and Inland Water Transport Law 1963 and Motor Vehicles Law 1964. The Motor Vehicles Law 1964 covers the registration of motor vehicles, license of owning motor vehicles, insurance of motor vehicles, driving license, control of traffic speed, and offenses and penalties for violation. Motor Vehicle Rules 1989 were enacted under Section 33 of the Motor Vehicles Law 1964. These rules include the registration of motor vehicles, vehicle maintenance, driving license, driving training school, terms and conditions of hired motor vehicles, and traffic rules for vehicles, pedestrians, and cyclists.

According to these laws, there is no general definition of *bus*. However, Motor Vehicles Rules 1989 prescribe that an *urban bus* is included in the category of "Hired Motor Vehicle." The regulations related to "Hired Motor Vehicles" are shown in Chapter 6 of Motor Vehicle Rules 1989 and in Section 1 (Preliminary) of

¹ 1 Kyat is equal to 0.1 JPY and 0.0011 US Dollar as of November 2008.

the Road Transport and Inland Water Transport Law 1963. The “Hired Motor Vehicles” include not only bus vehicles or trucks, but also taxis or other small-capacity vehicles. However, motor cycles are not included in the “Hired Motor Vehicle” category. This means that taxi services by motor cycles are prohibited in Myanmar. Although there is no rule regarding the process to determine the bus fare, Section 108 of Motor Vehicle Rules 1989 defines the authorities for determining the rates of transport fares. To operate the “Hired Motor Vehicle,” the operators are required to conduct business by law (Section 102, Motor Vehicle Rules 1989). Note that there is no law/act regarding the exception of antimonopoly or fair trade in Myanmar.

Bus Transportation Regulation: Implementation in Yangon

Main actors of urban bus service market in Yangon

There are two types of local bus services in Yangon: bus services provided by bus companies and those managed by bus control committees (BCCs). The bus companies are large-scale private bus operators who own the buses, hire the drivers/conductors, and operate urban bus services in Yangon. Two bus companies currently provide bus services in Yangon: the Golden City Link Co. (GCL) and the Union of Myanmar Economic Holdings Limited (UMEHL). The BCCs are nonprofit organizations that control small-scale individual bus owners. The individual bus owners have their own buses, which are leased to the drivers and conductors. The individual bus owners must belong to one of the BCCs. There are numerous individual bus owners in Yangon. Bus operations and fares are approved by the Yangon Division Peace and Development Council (YDPDC). However, the Government does not provide any subsidy program for bus operations. Furthermore, no official strategic urban transportation plan has been devised so far.

Permission system for bus operations

To operate a public transportation service in Yangon, bus operators are required to possess an operating license “B.” When an application for an operating license is submitted to the Transport Planning Department (TPD), the TPD requests the Road Transport Administration Department (RTAD) to inspect the vehicle for operation. The RTAD will inspect the vehicle in accordance with the regulations. Then, it will report the results to the TPD. If the vehicle is approved, an operating license B is issued to the applicant. Operating license B is valid for a year. The annual registration fee for operating license B is 350,000 Kyats. The buses are inspected by government officials annually.

Anyone who possesses operating license B can apply for starting a new bus service. In order to do so, a bus company or a BCC must submit its application to the YDPDC first. Then, the YDPDC presents the application to the Yangon Division Supervisory Committee for Ensuring Secure and Smooth Transportation. Although individual bus owners are also allowed to apply for new bus services, they are required to discuss such application with their corresponding BCC before submission. There are no regulations about the minimum fleet size to start a new bus service. However, at least ten vehicles should be operated on any permanent bus route per day. Therefore, for example, an individual bus owner is not allowed to withdraw his/her bus service from a bus route if it would result in ten or fewer vehicles being operated on the route by other operators. When bus operators terminate a bus service, they are required to notify the Government at least one week in advance. If they change the service, they are required to notify the Government of this change and obtain the necessary approval.

Permission system of fare

Bus fares are strictly controlled by the YDPDC. When a bus company or a BCC wants to change its fare system, it must submit its plan to the YDPDC and obtain their permission. The decision making process for the bus fare system in the YDPDC is not clear. However, apparently, the YDPDC has some criteria for accepting the proposals, which include demand for the bus service, the existing supply, and the mobility of lower-income individuals.

There are two types of fare systems in Yangon: a distance-based fare system and a fixed fare system. First, the distance-based fare system is introduced to bus routes controlled by the BCCs, except for certain special bus routes. A unique distance-based fare system is shared among all the BCCs: the minimum fare is 50 Kyats; the fare rises by 50 Kyats for every five miles after the first five miles traveled, and the maximum fare is 250 Kyats. Second, the fixed fare system is followed by the GCL. The fare in this case is 300 Kyats per ride. Third, two types of fare system are used by the UMEHL. One is the fixed fare system, which is applied to routes on which an air-conditioned city bus service is provided; the fare for this service is 200 Kyats per ride. The other one is the distance-based fare system, which is the same as that used by the BCCs. Generally, the bus fares are

collected at the entrance of the vehicle or by the conductors in the bus. Note that the GCL alone operates a ticket system, in which the bus conductor sells tickets upon collection of the fare.

Control of service frequency

The service frequency of buses operated by the bus companies is self-controlled, whereas that of the buses owned by individual bus owners is controlled by the BCCs. The BCCs monitor passenger demand as well as service quality on each bus route of individual bus owners. To monitor the bus service, the BCCs install control gates with a small office at each origin and destination of the bus routes. BCC officers are allocated to each gate, and they record the time of arrival and departure of the buses at the bus terminals. The BCCs occasionally change the service frequency flexibly on the basis of collected data. The individual bus owners are obliged to follow the BCC's requirements about the service frequency. In practice, each bus operator is allocated a fixed cycle time for bus operations on the bus route. Penalties are imposed on individual bus owners and drivers if they do not adhere to their given cycle operation times. Note that bus drivers are not allowed to work for more than eight hours a day.

Presentation of service information to the public

Apart from a few exceptions for some bus routes operated by bus companies, no timetables for bus services are available in Yangon. There is no legal obligation for the bus operators to notify the public about the daily service frequency, schedule for the first and last buses, and expected journey times between stops. However, information about the fares, routes, and names of the stops must be presented inside the bus.

Regulation of importing bus vehicles

The import of buses is strictly controlled by the Government of Myanmar. There are two ways to import a new bus vehicle. First, with regard to the Yangon Division Bus Control Committee (YDBCC), an owner submits an application for importing a bus vehicle to a local authority via the Yangon Division Traffic Rules Enforcement Supervisory Committee. Then, the local authority submits it to the Trade Council for its permission. After gaining permission, bus vehicles are imported as per the arrangement of the Union of Myanmar Economic Holding Limited (UMEHL). The buses are sold to the owners by the management of YDBCC. Second, for Parami Bus Transport Service, UMEHL submits the application for importing a bus vehicle to the Trade Council. After gaining permission, the bus vehicles are imported under the arrangement of UMEHL.

Regulation of fuel consumption

In 2005, the Government of Myanmar started to promote the introduction of compressed natural gas (CNG) engines for buses. This can be attributed to the fact that CNG is cheaper than other fuels in Myanmar because the country produces considerable amounts of CNG since recent times. As most buses in Yangon used diesel engines, they were converted into CNG-powered buses. To convert their vehicles, many individual bus owners borrowed money from local banks. There are five banks in Yangon, including four government-controlled banks and a private bank, that loan funds to bus owners for introducing CNG engines. According to our interviews, the cost to convert to a CNG engine from a diesel one is about four million Kyats. Many individual bus owners borrowed four million Kyats from a bank under the condition that the loan would be repaid within two years at an annual interest rate of 15 percent.

As of November 2008, the Government regulates the amount of daily diesel consumed for all vehicles. However, it does not regulate the amount of CNG consumed. According to our interviews, some BCCs impose an additional regulation of CNG consumption on buses. Further, some BCCs issue a "slip" to control CNG consumption. The bus drivers are required to receive the slips at the control gate for the bus terminals and to use them to purchase the CNG fuel. This means that the slip represents the BCC's permission for the bus drivers to purchase the CNG tanks at CNG stations. The amount of CNG permitted by the slip varies among the BCCs. For example, one slip may permit the purchase of four CNG tanks per vehicle in the Eastern District BCC, while a slip issued in the Northern District BCC may permit the purchase of five tanks, comprising four regular tanks and one spare tank. Furthermore, the UMEHL introduced regulations prohibiting bus drivers from purchasing unnecessary CNG tanks. However, it allows them to purchase spare tanks if their costs are borne by their own fare revenues. Although the GCL has not introduced any regulations on CNG consumption, it monitors the amount of CNG used by each bus driver. The GCL has introduced an original book for recording CNG consumption.

ACTIVITIES OF BUS OPERATORS IN YANGON

Types of bus vehicles in Yangon: General

Bus services in Yangon City are currently provided by both the public and private sectors, which operate a fleet of buses, pick-up trucks, converted light trucks, and mini buses. There are six types of buses in Yangon: air-conditioned city buses, non-air-conditioned city buses, mini buses, Dyna/Canter, Hilux, and others. TABLE 1 shows the capacity and photographs of these buses. As shown by the photographs, the Dyna/Canter and Hilux vehicles are basically trucks that have been slightly redesigned for passenger use by adding roofs and seats to the body. They are commonly known as “truck buses” in Yangon. TABLE 2 shows the distribution of bus vehicles

TABLE 1 Types of buses in Yangon (2008)







| Vehicle type | Vehicle capacity | Photos |
|--------------------------------|---------------------|--|
| City bus (air-conditioned) | 50 passengers |  |
| City bus (non-air-conditioned) | 45 to 52 passengers |  |
| Mini bus | 30 passengers |  |
| Dyna/Canter | 25 to 35 passengers |  |
| Hilux | 12 to 20 passengers |  |
| Other type | 25 to 35 passengers |  |

TABLE 2 Types of bus vehicles in Yangon (2008)

| Type of vehicles | Number of operating vehicles | Percentage |
|------------------|------------------------------|------------|
| City Bus | 2008 | 29.4 |
| Mini Bus | 364 | 5.3 |
| Dyna/Canter | 2256 | 33.0 |
| Hylux | 942 | 13.8 |
| BM | 463 | 6.8 |
| KM | 11 | 0.2 |
| WII | 430 | 6.3 |
| Jeep | 276 | 4.0 |
| Mazda | 75 | 1.1 |
| Ford | 14 | 0.2 |
| Total | 6839 | 100.0 |

Source: Road Transport Administration Department, Ministry of Rail Transport

by type that are operated by local bus operations in Yangon. These truck buses, including Dyna/Canter and Hilux, constitute 46.8 percent of all buses in Yangon, while city buses account for 29.4 percent. The number of buses has been increasing at a rate of two to three percent in Yangon.

Types of bus vehicles used by organizations

Bus vehicles controlled by the BCCs and operated by the bus companies

The types and number of buses controlled by the BCCs and operated by the bus companies are shown in TABLE 3. This information was collected from interviews with representatives from four BCCs, namely, the Western District BCC, the Northern District BCC, the Than Myan Thu BCC, and the MaThaTha BCC, and with two bus companies, the GCL and UMEHL. In the first instance, most buses were made in the 1980s or earlier. Although the Government prohibits bus owners in Yangon from purchasing buses that are more than ten years old, our interviews reveal that a number of buses that are over ten years old are used in Yangon. Next, the two bus companies only operate “city buses.” UMEHL owns both air-conditioned and ordinary city buses, while GCL only owns city buses. According to UMEHL, the cost of a city bus is around 16 million Kyats. The vehicles controlled by the BCCs are mainly smaller buses, including Mini bus, Dyna/Canter, and Hilux. The share of these truck buses is dominant amongst BCCs. The BCCs do not operate any air-conditioned city buses.

Bus owned by individual bus owners

The types and the number of buses owned by individual bus owners are shown in TABLE 4. This table reflects the results of our interviews with 22 individual bus owners under the four BCCs. This shows that the type and number of vehicles owned by individual operators vary among owners. Interestingly, in general, individual bus owners tend to own a single type of bus. This is mainly because they face difficulty in maintaining two or more types of buses from the technical perspective. The majority of interviewed owners have one to four vehicles each. This means that most individual bus owners under the BCC run a small-scale business.

Operating facilities

There are no regulations governing bus-operating facilities. This means that bus operators have no obligation to establish a depot, vehicle garages, or facilities for drivers to take rest. Nevertheless, the BCCs and bus companies usually have parking facilities and a headquarters office. TABLE 5 shows the parking facilities and/or depots, as reported by the BCCs and bus companies that were interviewed. First, no BCC has adequate

TABLE 3 Bus vehicles controlled by interviewed bus control committees and operated by private companies

| Type of bus | Western District BCC | Northern District BCC | Than Myan Thu BCC | Ma Tha Ta BCC | Golden Link | City Union of Myanmar Economic Holdings |
|--------------------------------|----------------------|--------------------------|-------------------|---|---------------------------|---|
| City bus (air-conditioned) | 0 | 0 | 0 | 0 | 0 | 116 |
| City bus (non-air-conditioned) | 45 1988-95 model | 123 (81.3%) 10 years* | 37 4 years* | 1103 (75%) 1987-89 model | 80 (80%) 1991-92 model | 375 1986 model |
| Mini bus | 35 1988 model | 20 (75%) 10 years* | 11 12 years* | 161 (75%) 1986-89 model | 0 | 0 |
| Dyna/Canter | 856 1988 model | 218 (82.6%) 10 years* | 436 12 years* | 530 (75%) 1982-83 model | 0 | 0 |
| Hilux | 209 1978-87 model | 366 (82.0%) 10 years* | 2 12 years* | 178 (75%) 1978-80 model | 0 | 0 |
| Other type | 262 1974-75 model | 41 (73.2%) 10 years* | 47 12 years* | 413 (75%) 1970 model, 1947-48 model | 0 | 0 |

Note 1: The upper figure shows the number of vehicles; the lower one shows the age of vehicles.

Note 2: () means the number or the share of vehicles used for daily operation.

Note 3: * refers to the age of vehicles used in Yangon City.

TABLE 4 Number of bus vehicles owned by interviewed individual owners

| No. | BCC | Number of owned vehicles | Number of vehicles in use |
|-----|---------------|--------------------------|---------------------------|
| 1 | Northern | 2 (Dyna) | 2 (Dyna) |
| 2 | Northern | 4 (Dyna) + 3 (Canter) | 4 (Dyna) + 3 (Canter) |
| 3 | Northern | 1 (Dyna) | 1 (Dyna) |
| 4 | Eastern | 1 (Dyna) | 1 (Dyna) |
| 5 | Eastern | 1 (Canter) | 1 (Canter) |
| 6 | Than Myan Thu | 2 (Dyna) | 2 (Dyna) |
| 7 | Than Myan Thu | 1 (City bus) | 1 (City bus) |
| 8 | Than Myan Thu | 1 (Dyna) | 1 (Dyna) |
| 9 | Than Myan Thu | 2 (City bus) | 2 (City bus) |
| 10 | Than Myan Thu | 4 (Dyna) | 4 (Dyna) |
| 11 | Western | 4 (Dyna) | 3 (Dyna) |
| 12 | Western | 1 (Mini bus) | 1 (Mini bus) |
| 13 | Ma Tha Ta | 20 (City bus) | 16 (City bus) |
| 14 | Ma Tha Ta | 3 (Mini bus) | 3 (Mini bus) |
| 15 | Ma Tha Ta | 1 (Hilux) | 1 (Hilux) |
| 16 | Northern | 5 (City bus) | 4 (City bus) |
| 17 | Northern | 4 (City bus) | 4 (City bus) |
| 18 | Ma Tha Ta | 4 (City bus) | 4 (City bus) |
| 19 | Ma Tha Ta | 1 (City bus) | 1 (City bus) |
| 20 | Ma Tha Ta | 5 (City bus) | 5 (City bus) |
| 21 | Ma Tha Ta | 8 (City bus) | 8 (City bus) |
| 22 | Ma Tha Ta | 17 (City bus) | 17 (City bus) |

TABLE 5 Bus parking facilities owned by interviewed bus operation committees and by private companies

| BCCs/Companies | Parking facilities | Notes |
|------------------------------------|--|--|
| Western District BCC | No parking facilities | Individual operators park their buses near their home |
| Northern District BCC | Parking facilities which accommodates 10 buses at the origin and destination terminals of each route | Individual operators park their buses near their home |
| Eastern District BCC | Parking facilities which accommodates 10 buses at the origin and destination terminals of each route | Individual operators park their buses near their home |
| Than Myan Thu BCC | No parking facilities | Individual operators park their buses near their home |
| Ma Tha Ta BCC | 20 parking facilities which accommodates 30 city buses in total. | Individual operators park their buses near their home |
| Golden City Link | 5 acre parking facilities | Parking available for an additional 30 city buses |
| Union of Myanmar Economic Holdings | 17 parking facilities which accommodate 800 buses in total | The parking facilities are used not only for the buses operated in Yangon City |

parking facilities to accommodate all vehicles operated by them. Although the Northern District BCC, Eastern District BCC, and MaThaTa BCC have their own parking facilities for each route, these facilities are not large enough. Thus, most individual bus owners under the BCCs park their vehicles at their residential garage or on the road near their residence. According to our interviews, the parking depots used by some BCCs were provided by the Government. Although other BCCs purchased the land for parking facilities, the details were not available. Next, the two bus companies have their own parking facilities. On one hand, the UMEHL apparently has parking facilities in the city that are large enough for parking their vehicles (Photo 4.3), but its details were

not available. According to the interviews with the UMEHL, the land used for their parking facilities was provided by the Government free of charge. On the other hand, GCL has enough depots for parking its vehicles. Note that the parking facilities used by GCL are owned not by the bus company, but by its associated company, which runs a construction business. According to interviews with the GCL, this company did not pay any money for the parking facilities when it commenced its business operations. Subsequently, both the BCCs and bus companies have their own headquarters offices. Some BCCs obtained their offices from the Government free of charge. Further, GCL has constructed a new headquarters.

Bus network

The average length of a bus route is about 32 km. Note that the distance from the northern to the southern ends or from the eastern to the western ends of Yangon City is around 30 km each. Most bus routes directly connect the suburban areas and the central business district. In other words, the bus network in Yangon is characterized as a “point-to-point” network.

Service frequency

On many bus routes, the service frequency during the morning or evening peak hours is higher than that during off-peak hours. For example, according to our interviews, the MaThaTa BCC operates its bus services every five minutes from 5:00 a.m. to 7:00 a.m., every three minutes from 7:00 a.m. to 9:00 a.m., every seven minutes from 10:00 a.m. to 3:00 p.m., and every three to five minutes from 5:00 p.m. to 7:00 p.m.

Salary system

There are two types of salary systems amongst urban bus operators: achievement-based salary system and fixed salary system. The achievement-based salary system is mainly adopted by individual bus owners, while the fixed salary system is adopted by the bus companies.

Individual bus owners operate their bus services directly and/or they lease the vehicle to drivers and conductors for bus operations. When hiring drivers and conductors, most individual bus owners pay their drivers' and conductors' wages on the basis of the achievement-based salary system. The drivers and conductors receive their salary as a fixed percentage of their total fare revenue. This means that the higher the fare revenue earned by the drivers and conductors, the greater is their salary. It should be noted that individual bus owners usually pay a minimum salary to their drivers and conductors. This is sufficient to cover the minimum expenditure for their daily lives, even though the passenger numbers may not be high enough. The achievement-based salary system provides both drivers and conductors with the incentive to earn more, while also providing bus owners with the incentive to earn better returns from their bus operations by encouraging the drivers and conductors to work harder. This may be a factor behind the tough competition among drivers. The bus companies use the fixed salary system in conjunction with the achievement-based salary system for the wages of all workers, including drivers, conductors, and office workers. According to the interviews with the bus companies, they need to make considerable efforts to maintain their employees' motivation to work.

Process of purchasing bus vehicles

As stated earlier, individual bus owners, except those under the MaThaTha BCC, cannot import buses. Therefore, To enter the bus operations business, they need to procure buses from the domestic market. The bus owners can follow either of the two main approaches to acquire a new bus: The first one is to purchase buses at the local bus market in Yangon. Since UMEHL does not usually sell imported vehicles directly to individual bus owners, those who want to purchase a bus need to negotiate with the bus dealers in the market. The price of a bus offered by these dealers is about thirty percent more than the original selling price from UMEHL. As there are no commercial or governmental banks to lend such funds to individuals for business in Yangon, the most popular way to gain such funding is to borrow money from relatives. The second way is to acquire the buses that were previously owned by one's parents or family members.

Business conditions in bus industry

There were two conflicting responses from interviewees about the profitability of the bus industry. On one hand, some interviews with individual bus owners revealed that the bus business has become less profitable, particularly after the introduction of CNG as the fuel source for buses in 2005. Additionally, the bus industry has

been seriously impacted by the failure to increase the bus fare in 2007. The industry faces difficulties in improving its buses or increasing its fleet because of the lack of profit. On the other hand, other interviewees indicated that there are still business opportunities for securing more profit because passenger demand is expected to increase in the future. Furthermore, bus drivers indicated that they face very tough competition. This is because their profit is highly dependent on bus fare revenue, and they make more profit by attracting more passengers. Finally, individual bus owners complain about difficulties in securing funds for conducting business. This is mainly because of the lack of a financial support system, including loans from commercial banks.

PROBLEMS OF URBAN BUS OPERATIONS IN YANGON

On the basis of the results of our survey, the current problems of urban bus services in Yangon can be summarized as follows.

Poor condition of bus vehicles

The bus vehicles used for urban services are so old that they have many technical problems. They have been used for many years because of the difficulty faced in introducing new vehicles. Some buses are over 60 years old. This leads to frequent engine trouble, failures in machinery, and damage of vehicle parts. Further, the bus vehicles are not properly maintained. In many bus vehicles, the entrance door is broken or missing. Passengers may face the risk of falling off a moving bus because of this hazard. Although the regulation requires regular vehicle inspection, the quality of maintenance is very low. This factor also leads to the aforementioned problems. In fact, we have frequently come across broken-down buses on the city roads. This can be chiefly attributed to the lack of expertise of technical staff or skills for maintenance. The high rate of bus vehicle failure worsens bus service frequency, while it leads to traffic congestion in the city. The service quality of bus vehicles is also poor. Only a few buses are air-conditioned. Many buses do not have any windows or doors. The space inside the congested vehicle is intolerably humid and hot, particularly in the summer or rainy season. The number of seats in the bus vehicle is limited. Therefore, many passengers are forced to remain standing for several minutes during the bus ride.

Inadequate bus network

The point-to-point bus network in Yangon leads to overlapping of many bus routes along the major roads connecting suburban areas with the central business district. Numerous buses for various routes plying on the same main roads particularly cause an increase in the traffic during peak hours, which results in serious traffic congestion. Furthermore, their point-to-point network leads to excessive competition among bus drivers using the same route. Although bus services are monitored by the BCC, the bus-service-monitoring of one route is quite independent from that of another route. Therefore, the bus drivers running on one route often race with other bus drivers running on other routes so as to reach the next stop earlier than the competitors. Such driving may be hazardous for passengers and pedestrians.

Insufficient control of bus operation

Bus operations are not appropriately controlled in Yangon. In practice, only the buses' cycle times are monitored by the BCCs at the control gates. This poor control of bus operations affects the driver's behavior in the following two ways. First, as stated earlier, bus drivers rush to the next bus stop to tackle tough competition from bus drivers of different routes. However, they are controlled so as to maintain the overall cycle time. Thus, the bus drivers may wait at the bus stops only to waste time to adjust their cycle timing. Second, bus drivers are motivated to maximize their passenger numbers by waiting at the stops as long as possible. This is because their revenue depends on the number of passengers. This leads to high-speed driving to reach the next bus stop as soon as possible to maximize the waiting time at the stops. The consequences of these two motivations are that the buses are driven at dangerous speeds between bus stops, where they halt for the longest possible time. The result is a very poor quality of bus services. Additionally, the prolonged waits at bus stops/terminals make the situation there even more chaotic, particularly during peak periods. Although traffic controllers or policemen often direct buses at bus stops and terminals, they are not very effective in this regard. The extended parking of many buses at bus stops and terminals causes bottlenecks in the road network. Further, excessive competition at busy bus stops and terminals has hazardous consequences for passengers.

Unsatisfactory provision of service information

Very little information regarding the bus services is provided to bus passengers. The lack of providing appropriate information to the public deteriorates the quality of bus services not only for the local travelers, but also for the visitors. For example, a timetable of the bus services is not provided.

Although the general information about the service frequency is widely known by the local people, it is not presented explicitly anywhere. Thus, the bus passengers are often forced to wait for the next bus at the stop for a long time. As there is no information about the schedule of the day's first and last bus service, the passengers are not guaranteed about any service. Therefore, the bus passengers cannot ascertain whether the last bus for the day has departed in the late evening. Moreover, the route map is presented only at a few bus stops. Thus, it may be impossible for visitors to know whether they can reach a specific destination by boarding the bus. As the bus number is written only in Myanmar language, it is almost impossible for the people who have no experience at using the bus to identify the destination. Since no information about the bus stop is displayed, the visitors have no means for knowing the name of the bus stop. Additionally, no information about the fare table is presented at the bus stops. Visitors can ask the conductors about the price only after boarding the bus.

Lack of financial support system

The financial support system for lending funds to individual bus owners or bus companies is insufficient for meeting the needs of the debtors. Although individual bus owners or bus companies want to improve their fleet, it is difficult for them to invest because of lack of funds. As stated earlier, individual bus owners can only prepare funds by borrowing money from their relatives. This hampers investment of bus operators and owners to upgrade their vehicles and/or facilities. Additionally, it should also be pointed out that the Government has no subsidy scheme to support bus operations. Even if the Government had a policy to guarantee mobility or accessibility in the city, the policy would be difficult to realize because the bus operators do not have any incentive to provide bus services in areas where the bus demand is not high enough to earn a profit.

Deficiencies in bus regulation system

The following deficiencies are found in the current bus regulation system in Yangon. Firstly, the import of buses is poorly regulated by the Government. In fact, the company that imports buses holds a monopoly. Additionally, some bus owners have the privilege of importing vehicles via this monopolistic company. These factors may bias the domestic bus market and the price of buses. Secondly, the bus organizations are not well regulated. The vast majority of bus services are operated by a number of small-scale individual bus owners. This causes the following problems: (i) Since small-scale individual bus owners are unable to make major investments in buses or bus systems, the quality of bus services cannot be improved. (ii) As small-scale bus operators only have a few bus routes, it is difficult to introduce cross-subsidization between profitable and unprofitable routes. This leads to difficulties in operating bus services in areas where demand is low. (iii) Since economies of scale do not benefit small-scale operators, the operating costs for small-scale operators are higher than those for their larger competitors. This compels users to pay higher costs for their bus services. Thirdly, the process for obtaining permission to operate bus routes is not appropriately regulated. As the bus routes are not coordinated as a part of a total bus network, many bus routes overlap on the same roads. This causes excessive competition among bus drivers.

Poor perception of safety

Safety is not regarded as a critical service factor by some bus operators. This is firstly because the aggressive competition among operators on main roads negatively affects their perceptions of safety. The second reason is that the drivers are poorly educated about safety. The third reason is that the buses are in a poor condition. The fourth is that the bus stops and terminals are not controlled appropriately enough to improve safety.

CONCLUSIONS

This paper reviewed the regulation framework and reported the current practices of urban bus operation in Yangon. The main actors, including the local bus regulators, bus control committees, bus companies, individual bus owners, and bus driver/conductors were interviewed in 2008 for collecting the data. First, the urban bus regulation system, including the permission system of bus operation and fare, the control of service frequency, the presentation of service information to the public, regulation of importing bus vehicles, and regulation of fuel consumption are reported. Then, the activities of bus operators and owners are surveyed. The types of bus

vehicles, the operating facilities, the bus network, the service frequency, the salary system, process of purchasing the bus vehicles, and business conditions in the bus industry comprising bus companies, bus control committees, and bus owners are summarized. Then, we pointed out the problems in bus transportation in Yangon. The problems include the poor condition of bus vehicles, inadequate bus network, unsatisfactory provision of service information, lack of a financial support system, and deficiencies in the bus regulation system. These problems lead to traffic congestion on the main roads, low traffic safety, low quality of bus services, high bus operation costs, and poor accessibility to low-demand areas.

The topics for future research are summarized as follows: the first topic is to survey the local bus industry in more detail. Collecting the data that was unavailable in our interviews is necessary to understand the bus market more accurately. The number of interviewees is also limited mainly because of the constraints of our survey process. The scope of interviewees should be extended to further comprehend the bus market. The second topic is to determine the solutions for the problems presented in this paper. For example, many problems are caused by the point-to-point type of bus network. The hub-and-spoke type of transit network may be more suitable for more efficient transportation services. The third topic is to develop a future urban transportation plan in Yangon by focusing on bus transportation. Although there has been no official planning system for urban transportation in Yangon, it is inevitable to consider a long-term strategy for urban transportation development. In this long-term urban transportation strategy, it may be necessary to consider the feasibility for introducing the bus rapid transit or mass rapid transit systems in the City.

ACKNOWLEDGEMENTS

The survey was conducted under the support of the Urban Public Transport Policy Framework in Japan-ASEAN Transport Framework through the financial support of the Government of Japan. Professor Khin Than Yu (Yangon Technological University), Mr. Tadashi Nishimura and Mr. Ryo Masutomo (Japan Transport Cooperation Association), Ms. Phyo Thet Thet Htun (Yokohama National University), Mr. Maung Maung Sue, and Mr. Ko Yan Aye Tun (SM Tours & Transport Co., Ltd) supported our local surveys. We sincerely thank them for their kind support.

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