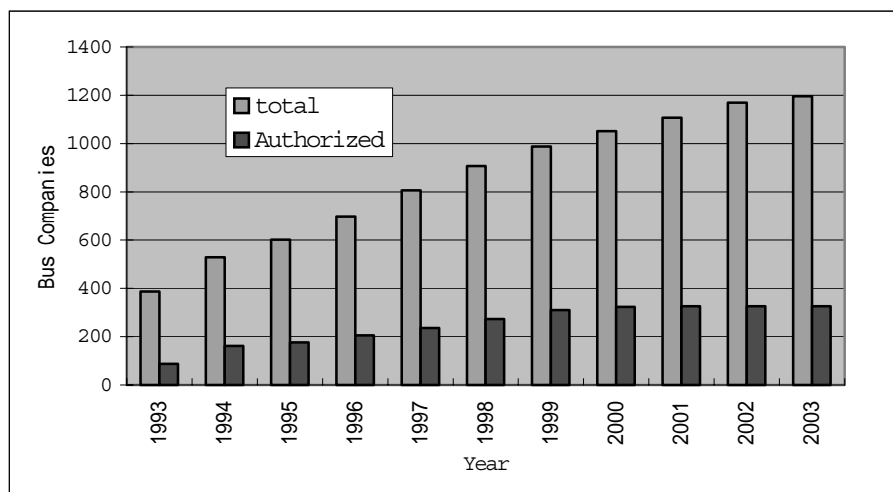


5.3.6. BUS COMPANY

(1) Lima

Figure 5.3-34 shows the number of registered bus companies since 1993. The figure in 2003 is 1,196 companies, which are composed of three categorized bus companies. One is the company that operates on the authorized bus routes. The second is the one that operates on the unauthorized bus routes. The last is the one that is only registered in municipality, but operates a bus. This company awaits a bid for a bus operation on a route required by the company. If not registered, the company cannot enter the bid. The number of companies, which actually operate on the authorized route, is 326 companies, equivalent to 27% of the total.

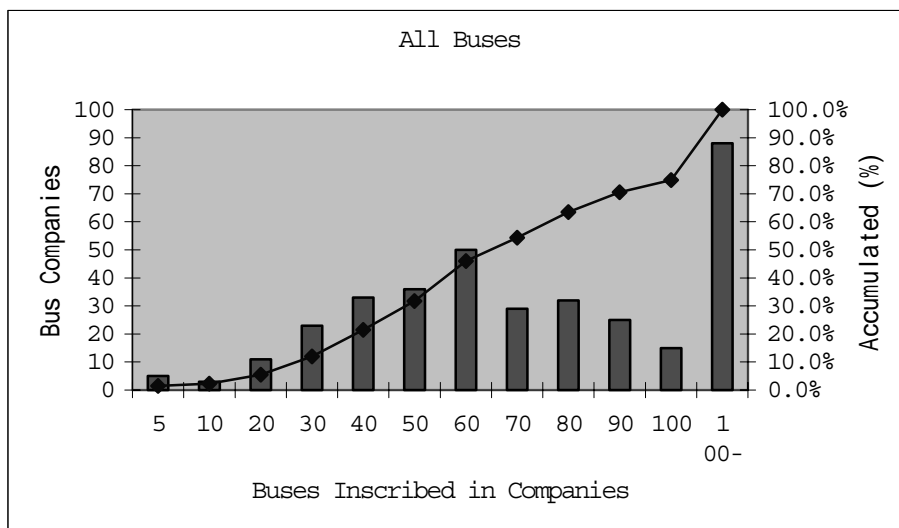
As it can be seen, the yearly increase ratio of the authorized companies is approximately 14% per annum since 1993. However, the authorized companies since 2000 have barely increased. Its increase ratio is as low as 4% per annum.



(Source: DMTU/Lima)

Figure 5.3-34 Number of Registered Bus Companies Since 1993 to 2003

The average number of registered bus fleets (Omnibus, Minibus, and Camioneta) is approximately 85 vehicles. These registered buses are owned by bus owners who have 2-3 bus fleets, they are not owned by companies. Figure 5.3-35 shows the distribution of the number of bus fleets registered by companies in Lima. As it can be seen, the number of companies with an owned bus fleet of 60 vehicles is the most. The companies with 100 vehicles or more account for 25% of the total.

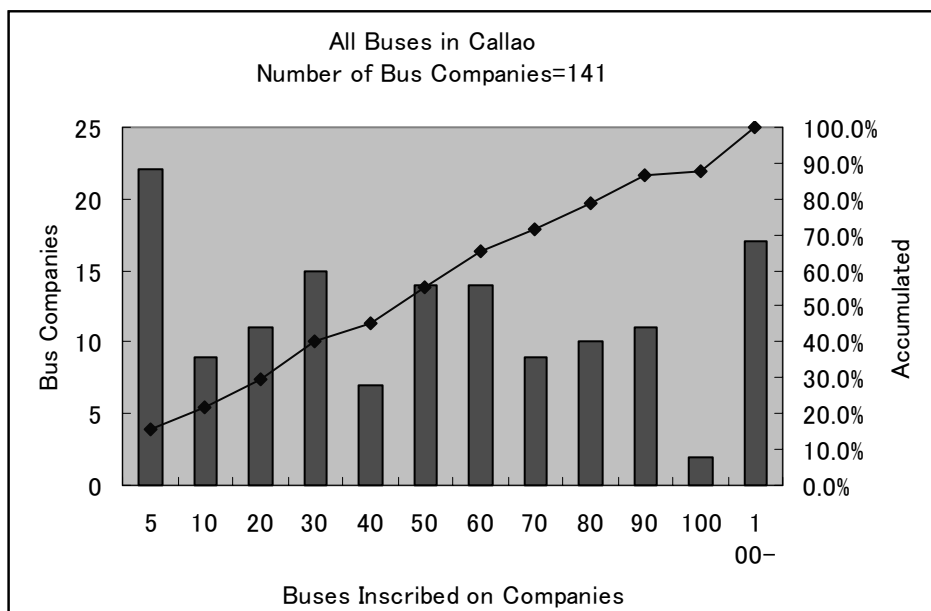


(Source: DMTU/Lima)

Figure 5.3-35 Distribution of the Number of Bus Fleets registered in Companies in Lima

(2) Callao

The number of bus companies in Callao is 141 companies, in which the average number of registered bus fleets (Omnibus, Minibus, and Camioneta) is approximately 33 vehicles, in contrast to 85 vehicles in Lima. Figure 5.3-36 shows the distribution of the number of bus fleets in Callao. As it can be seen, the number of companies with an owned bus fleet of 50 vehicles is the average. The companies with 100 vehicles or more account for 12% of the total.



(Source: GGTU/Callao)

Figure 5.3-36 Distribution of the Number of Bus Fleets Inscribed in Companies in Callao

(3) Relationship between the Bus Company and the Bus Owner

Figure 5.3-37 shows the organization chart of the bus company and the bus owner. The bus company requests a bus route to operate a bus and enters a bid for it and then obtains an authorization for a bus route. This company gets the concession of a bus operation on the authorized route from the DMTU. There are currently 326 authorized companies. After obtaining the concession, the company recruits a bus owner who has a bus fleet that allows the bus operation.

The bus company and the owner are different organizations. The bus owner owns two or three bus fleets, hires a driver and conductor and operates a bus after payment of the operation fee (Quota).

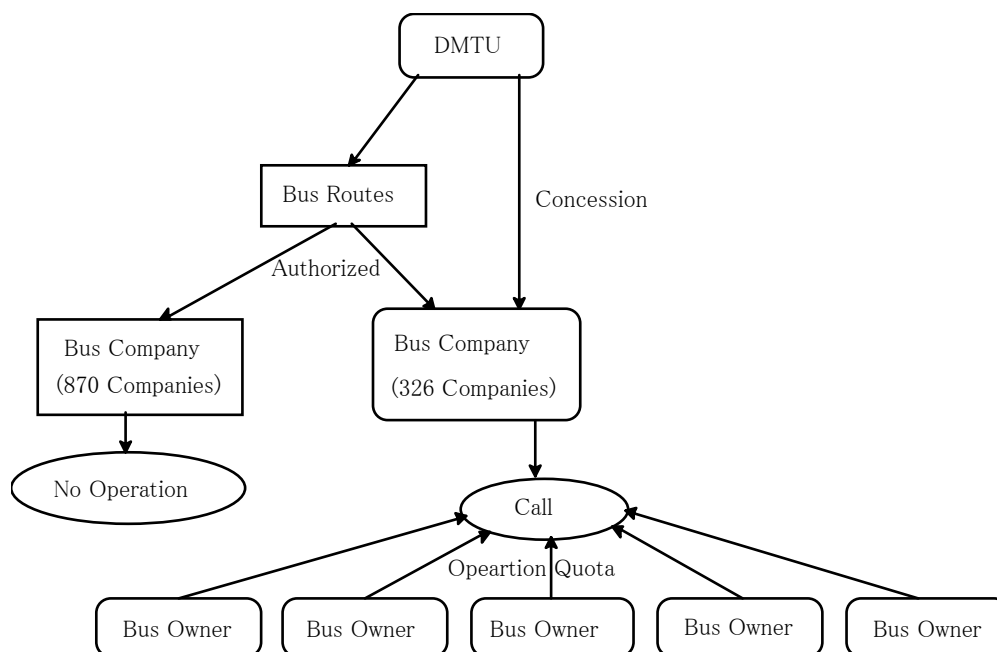


Figure 5.3-37 Bus Company Organization

(4) Bus Association

There are seven (7) bus associations organized by region as shown in Table 5.3-3. Since the associations cannot unite to form one association, the large association conformed by many union members has the political power to carry out important negotiations.

Table 5.3-3 Bus Associations in Lima

No	Association Name	Abrivation
1	ASOCIACION DE EMPRESAS DE TRANSPORTE URBANO DEL PERU	ASETUP (*)
2	CONFEDERACION GENERAL DE TRANSPORTE	CGT
3	CONFEDERACION NACIONAL DE EMPRESAS DE TRANSPORTE PUBLICO	CONATRAP
4	ASOCIACION DE EMPRESAS DE TRANSPORTE	ASETROP
5	CORPORACION DE EMPRESAS DE TRANSPORTISTAS URBANOS DEL PERU	CEMTU - PERU
6	ASOCIACION METROPOLITANA DE EMPRESAS DE TRANSPORTE URBANO	AMETUR
7	ASOCIACION DE EMPRESAS DE TRANSPORTE URBANO MASIVO DEL PERU	ASETUM

Note: * indicates the representative association for DMTU

(Source: DMTU/Lima)

5.3.7. BUS ADMINISTRATION

(1) Municipal Direction of Urban Transport in Lima: DMTU

Public transport is operated under the jurisdiction of the Municipal Direction of Urban Transport (DMTU) in Lima under the Municipal Ordinance of Lima (No. 104) enacted on January 28, 1997, and the General Management of Urban Transport (GGTU) in Callao.

Figure 5.3-38 shows the organization of the DMTU of the Municipality of Lima, which is composed of the administration of public transport (bus and taxi) and roadways. As for the administration of bus transport, the DMTU permits the registration of a bus and a bus route and monitors the bus operation such as dispatch and service frequency on the authorized bus routes by a registered bus company, but on the unauthorized route. On the other hand, a traffic signal, a road sign and use of a road, etc. is administered by the road administration section.

The planning office in the DMTU collects bus operation data, such as the dispatch and service frequency of a bus, and administrates a request of a bus route to operate a bus based on the analysis of the bus transport data and the identification of present issues, besides carrying out future public transport planning.

The Division of Records, Studies and Authorization in the DMTU currently has jurisdiction over taxis while the SETAME carries out the registration of taxis prior to being transferred to the DMTU.

(2) General Management of Urban Transport in Callao: GGTU

The bus administration in Callao is based on the following ordinance.

- a) General Law of Ground Transport and Transit; No. 27181
- b) Organic Law of Municipalities; No.27972
- c) National Regulation of Transport Administration; DS040-2001-MTC

d) Supreme Decree; 055-2000-MTC

Figure 5.3-39 shows the organization of the GGTU of the Municipality of Callao , which is composed of 3 sections: the administration of public transport under the General Direction of Urban Transport, the administration of traffic offences under the Direction of Transport and Traffic and the management of judgment of traffic offences under the Direction Coactive Executions.

As for the administration of public transport, the GGTU permits the registration of a bus and a bus route, a taxi, a moto-taxi, a school bus, a sightseeing bus, as well as the control of public transport data and the issuing of license related to transport.

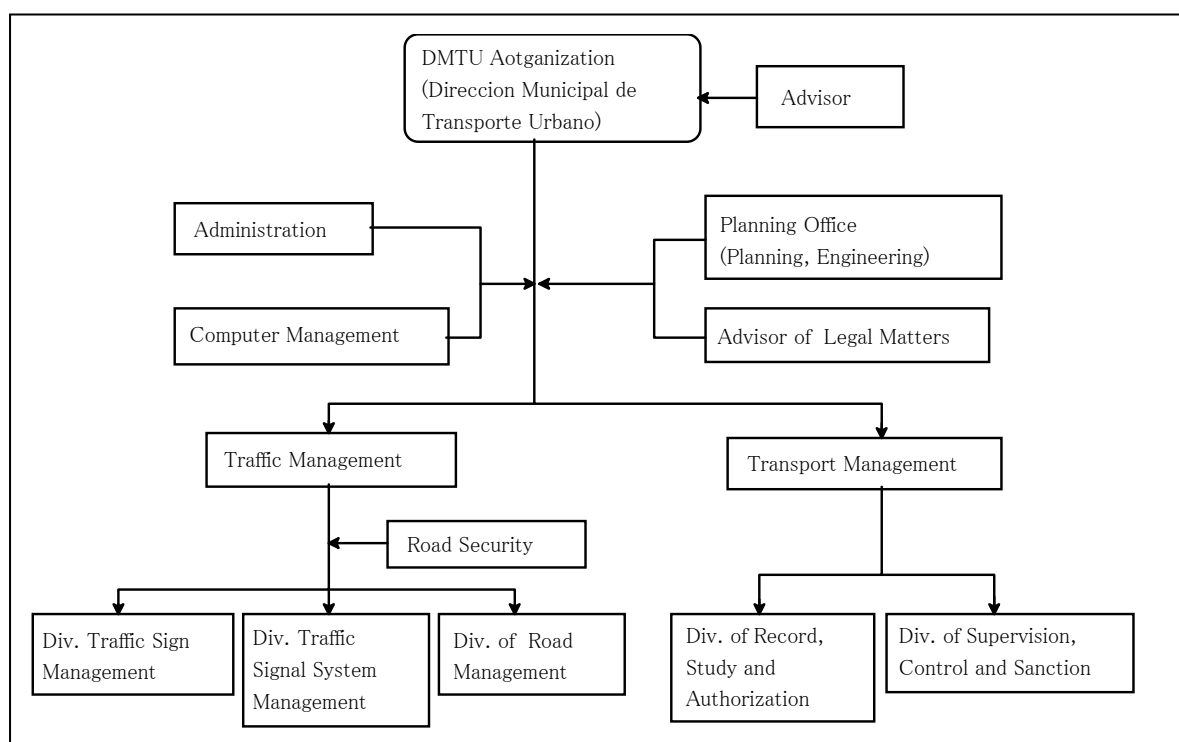


Figure 5.3-38 Organization of the DMTU of the Municipality of Lima

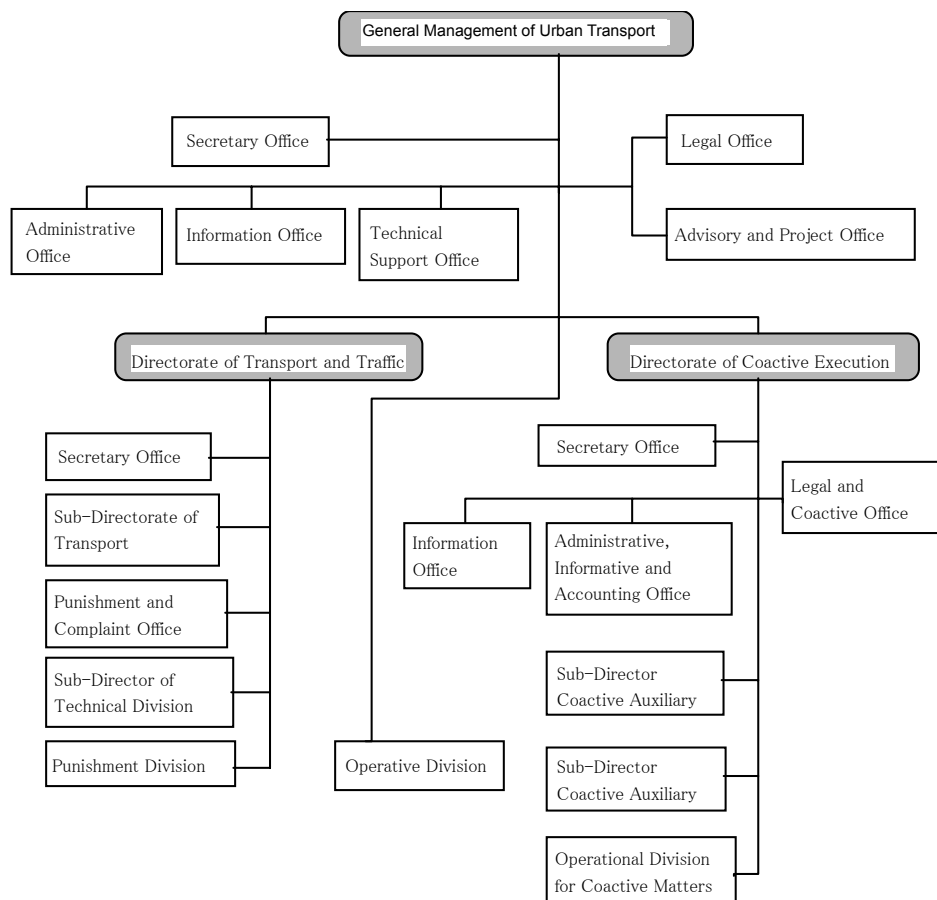


Figure 5.3-39 Organization of the GGTU of the Municipality of Callao

5.3.8. BUS USER CONDITIONS

In the bus passenger interview survey, the general public transport user conditions in the morning peak hour were collected. From the analyses of the collected data, such as trip purposes of user, frequency of public transport use, type of bus used more frequently and reasons of public transport use, it was found that buses are an important public transport mode in the metropolitan area. The detailed analysis is shown in the following sections.

(1) Trip Purpose

Figure 5.3-40 shows a composition ratio of trip purposes in the morning peak hour, which are composed of “to work”, “to school” and “others”. The ratio of “to work” and “to school” purposes account for approximately 90% of the total of which 70% are “to work” and the remaining 20% are “to school”. As it can be seen, it is obvious that the bus is an important public transport mode in the morning peak hour.

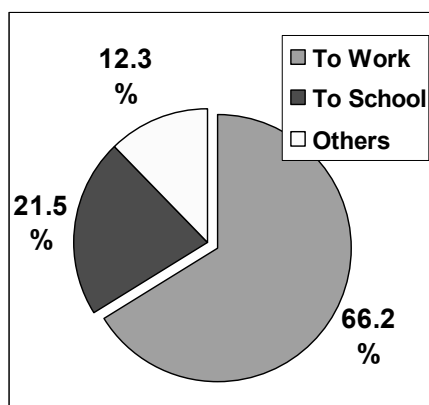


Figure 5.3-40 Composition Ratio of Trip Purposes

(2) Frequency of Public Transport Use

Figure 5.3-41 shows a composition ratio of the frequency of public transport use per week, which is composed of “1-2 times”, “2-3 times”, “4-5 times” and “everyday”. The ratio of passengers who use the bus everyday accounts for approximately 70% of the total. Almost all passengers use the public bus transport everyday.

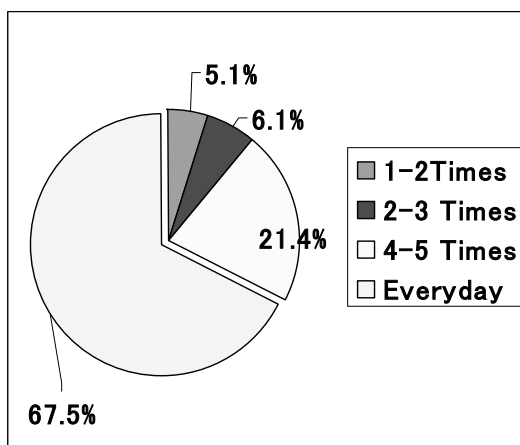


Figure 5.3-41 Composition Ratio of the Frequency of Public Transport Use

(3) Type of Bus Used Most Frequently

Figure 5.3-42 shows a composition ratio of the type of bus used most frequently, i.e., Omnibus, Microbus and Camioneta. In the whole study area, Camioneta (41% of the total) takes the highest ratio of type of bus, followed by Microbus (36%) and Omnibus (24%). In the west area (mainly Callao), the use of Camioneta is more popular than in other areas. Its figure reaches approximately 55% of the total. This is because the Camioneta in Callao is operated at a higher ratio. Incidentally, the Center is as low as 25% in the ratio of the Camioneta.

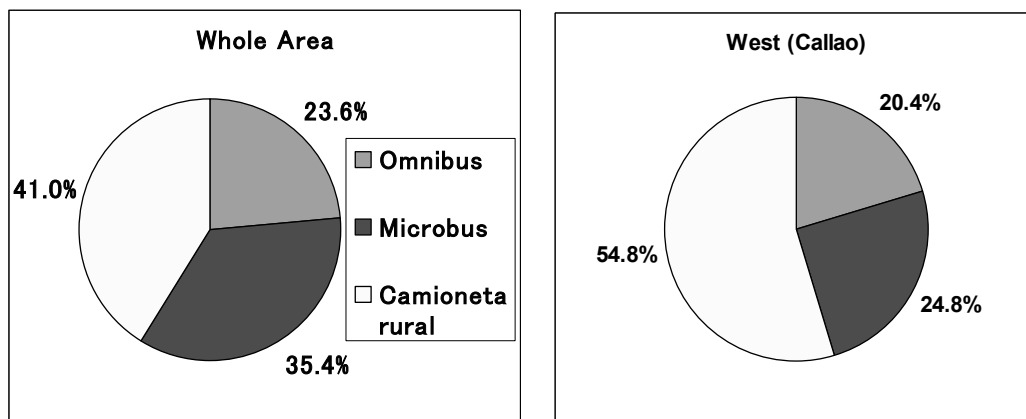


Figure 5.3-42 Composition Ratio of Types of Buses Used Most Frequently

(4) Reason of Public Transport Use

Figure 5.3-43 shows a composition ratio of reasons of public transport use, which are composed of “No other alternative modes”, “Security”, “Low fare rate” and “Others”. “No other alternative modes” (62% of the total) takes the highest ratio of the reasons, followed by “Low fare rate” (23%), “Others” (11%) and “Security” (5%). The ratio of “Low fare rate” for bus transport is the second highest.

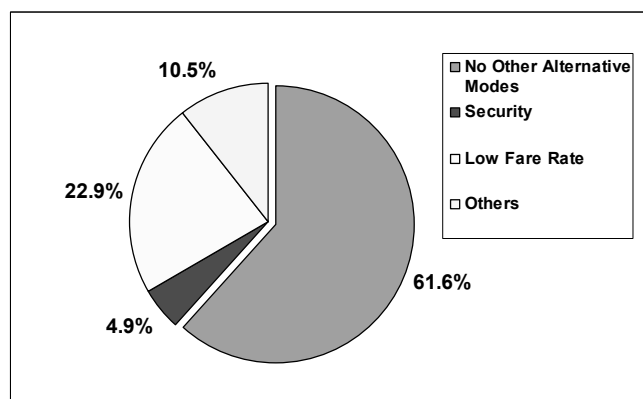


Figure 5.3-43 Composition Ratio of Reasons of Public Transport Use

(5) Other Public Transport Use

Figure 5.3-44 shows a composition ratio of other public transport uses when passengers do not take buses. As it can be seen, the Colectivo takes the highest ratio at 45% of the total in use in the whole area. The second highest ratio is the taxi. Its figure is approximately 30%. In the Center area, the use of the Colectivo is slightly reduced from 45% to 42% in the whole area, while the taxi use considerably increases from 30% to approximately 35% in the whole area.

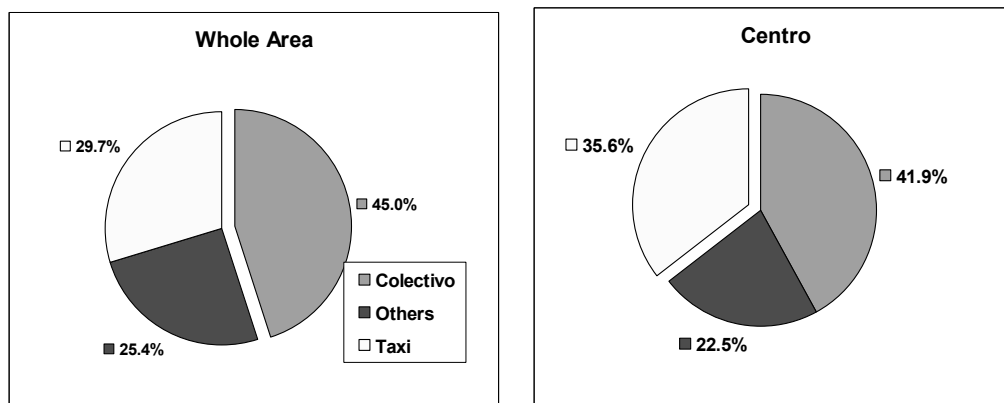


Figure 5.3-44 Composition Ratio of Other Public Transport Uses

(6) User's Opinion for Current Public Transport Problems

The bus passenger's opinion was surveyed for the current bus transport problems in the whole area. The ten (10) items of the current problems were prepared beforehand in the survey sheet. The survey results based on multi-answers are summarized in Figure 5.3-45. The problems of driver and conductor's manner, security and long waiting time take the higher ratios. Those figures are 17%, 15% and 14% to the total, respectively. Those problems must be considered in future public transport plans.

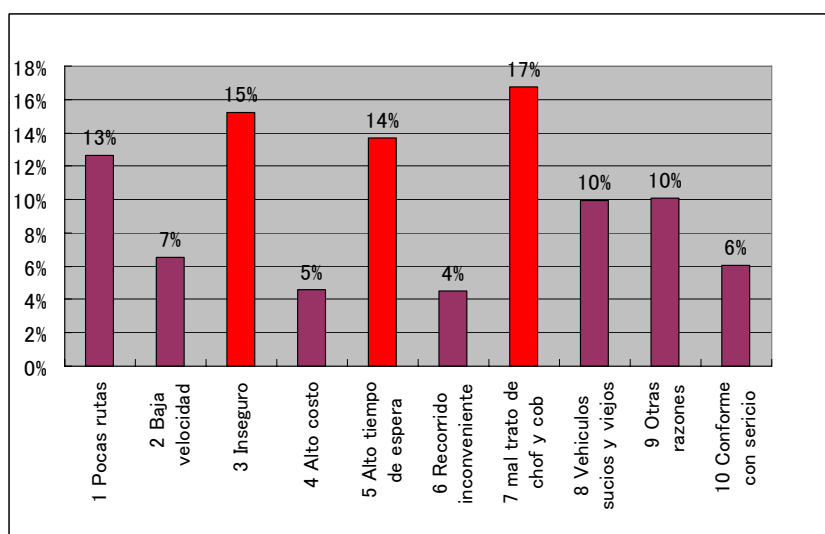


Figure 5.3-45 Distribution of User's Opinion for Current Public Transport Problems

5.4. OUTLINE OF RAILWAYS

5.4.1. SUMMARY OF THE RAILWAY CONDITIONS IN PERU

(1) Railway Network

Peru was the first country in South America to implement a railway in 1851, linking the city of Lima to the Callao port (15 km). Railway network in this country is divided in three: one in the North, another in the Center and the third in the South with no interconnection between them. Said railway network was a private enterprise and was nationalized in 1972.

Rail width is mostly 1,435mm and in auxiliary lines of the north and south-center of the country, narrower rails of 914 mm width are used. Previously, railways was the only transport mode both for passengers and cargo, however with the diffusion of road and air transport, transport of passengers was reduced and today it is used basically for cargo transport, even so the number of trains is not significant. In 2000, Peru adopted a railway privatization policy with the purpose of improving and modernizing railways, by keeping the installations while private companies would be responsible for the administration through concession contracts.

The railway net concerning urban transport in Lima is the Central Railway (East-West line) starting at the Callao Port in direction to the Andean Plateau crossing the mountains; at La Oroya Station (222km from the Callao port) the line ramifies into the North and to the South, being the main line this last, towards the Huancayo Station (345km).

At this point the main line ramifies again to Chaucha Station (80km), while from La Oroya Station the railways stretches towards the north to Cerro De Pasco Station (131km), totaling 55 8 km of railway network. In this section rail width is 1,435mm and the highest capacity is 18.5 ton. Even today at the Andean Plateaus, 914mm narrow width rail stretches for 33 km, but this section has not been privatized. Figure 5.4-1 shows the Central Railway network.

The main products transported in this railway line are minerals such as iron and copper from the interior and oil and its derivates from the Coast. The volume transported in 1998 was 1million and half tons. After privatization, productivity increased to 2 million tons today. Presently, cargo trains operate once or twice a day. During winter weekends (July and August) a tourism train for passenger operates to San Bartolomé (75km from the Callao port).

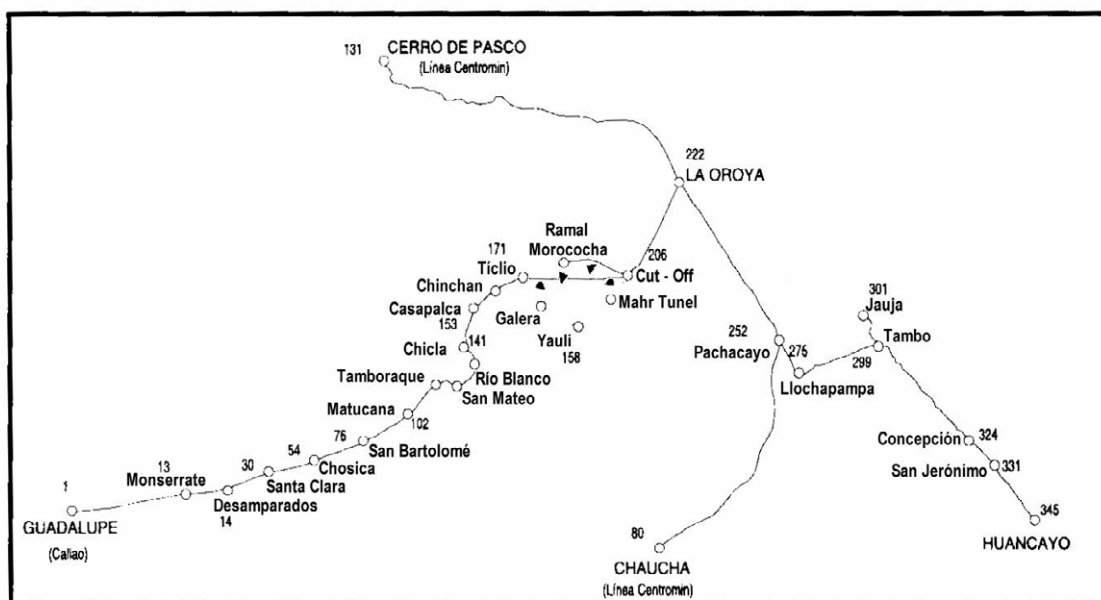


Figure 5.4-1 Central Line (East – West Line)

(2) Conditions of Railway Installations

Conditions of railway installations between Callao and Chosica are described below.

- 1) Chosica Station (54km from Callao). Leaves at 10 : 10 arriving at 12 : 40 in Callao Station (average speed 22km/ h).
- 2) The town of Chosica has a population of around 60,000 inhabitants and gives the impression of a quiet little town in the border with the city of Lima. In the surroundings of the train station there is a concentration of small shops and there are people commuting to Lima from this town.
- 3) The rail standard is 50kg/m and sleepers are of 2 block concrete, the same as the Line 1 sleepers, under responsibility of AATE. In some sections cobblestones are applied but in general it is not sufficient so that the continuity of its application in the future is necessary.
- 4) Security devices are old and some luminous signals can be seen, however they are out of operation now. Parts of communication cables can also be seen, but as the signals, they are currently out of operation. For train operation communications, cellular phones are used.
- 5) Legally, there are 10m of restricted area for the use of the railway, but due to a deficiency in the control of restricted areas, there are roads running parallel to the railway and there are also some barrack type popular housing inside these areas. There are no security devices such as fences to control the access to the rails.
- 6) There are no crossing facilities. The train blows its horn when it passes, however vehicles cross the rails until almost the moment the train comes. In the Vitarte crossing (30 km from Callao), an oil tanker crossed the railway and an accident could only be avoided because the train braked just at the right moment. At this point there is a panel showing a truck that clashed with the train, however, traffic manners concerning railway crossings are not followed. Approaching Callao, there are persons controlling the crossings at zones of intense traffic.
- 7) In 2003 passenger trains started to operate between Callao and Chosica but, since there were no rules concerning vehicle crossings, operation stopped within a month.

5.4.2. ANTECEDENTS OF TRAMS IN LIMA

The Lima tram connecting Callao (North) to Magdalena Del Mar (Center) to La Herradura (South) started operations in 1904, the service was suspended after 60 years in 1965 to improve the situation of road traffic, with the premise of constructing a subway.

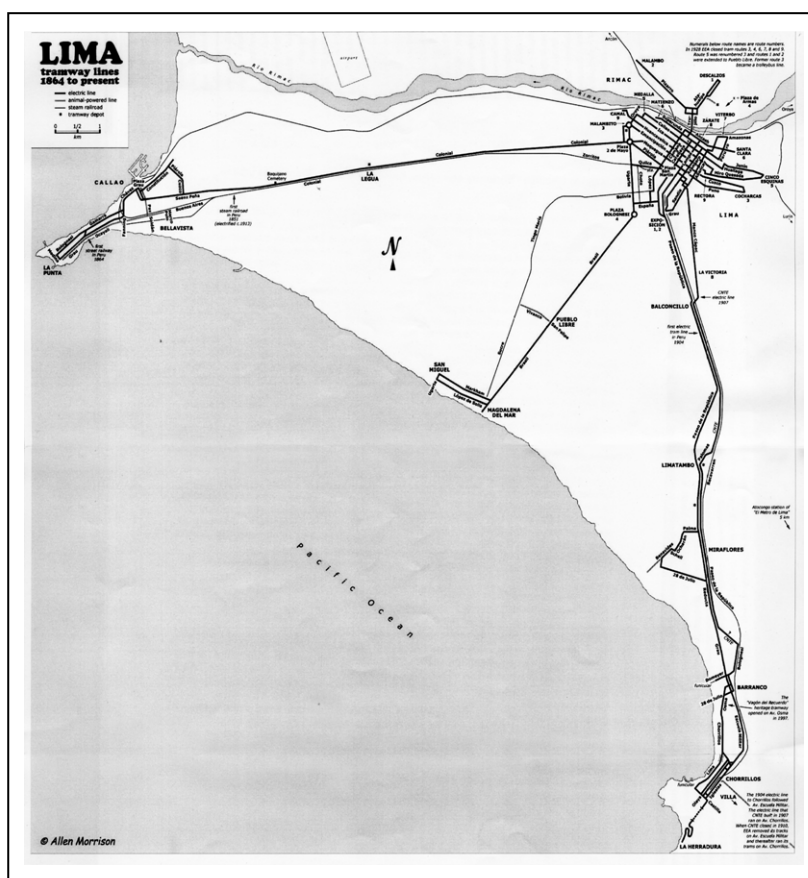


Figure 5.4-2 Railway Network

5.4.3. CONDITIONS OF RAILWAY LINE 1 SOUTH - NORTH

In order to improve the transport conditions in Lima, the Government of Peru designated the urban train project as a special project and created AATE under the responsibility of the Ministry of Transport and Communications, deciding to execute the South North line project, considered the one with highest priority.

During 1988 the government estimated a cost of US\$ 169,500,000 dollars for the project and in October launched the construction of the elevated viaducts for the urban train in Av. Aviacion. In 1989, the Italian government decided to cooperate with the project and granted a US\$ 100,000,000 loan under the modality of a tied loan (purchase of equipment against the loan grant) under the following conditions: interests of 1.5% per year, 10 years grace, and repayment in 10years. It also donated US\$ 22,000,000 as capital to execute the design and in this way the urban train project started. The target year of completion was 1992, but by 1995 only a section of 9.8 km between Villa El Salvador and Atocongo was finished and after that the project stopped due to lack of funds, until today.

(1) Civil Works Regulations

Accordingly to the Civil Works Regulations of Peru. In case there are no regulations, the following are considered:

- 1) AREA Specifications
- 2) RC Bridge ACI (American Concrete Institute) , AASHTO(American Association of State Highway and Transportation) Specification

- 3) Earthquake resistant structure: ATC(Applied Technology Council) standard
- 4) Geological classification and test methods: AASHOT standard Specification
- 5) Railway structure UIC(Union Internationale des Chemins defer: the international Union of Railway.) standard, AREA(*) specification

(*) American Railway Engineering Association

(2) Construction Regulations

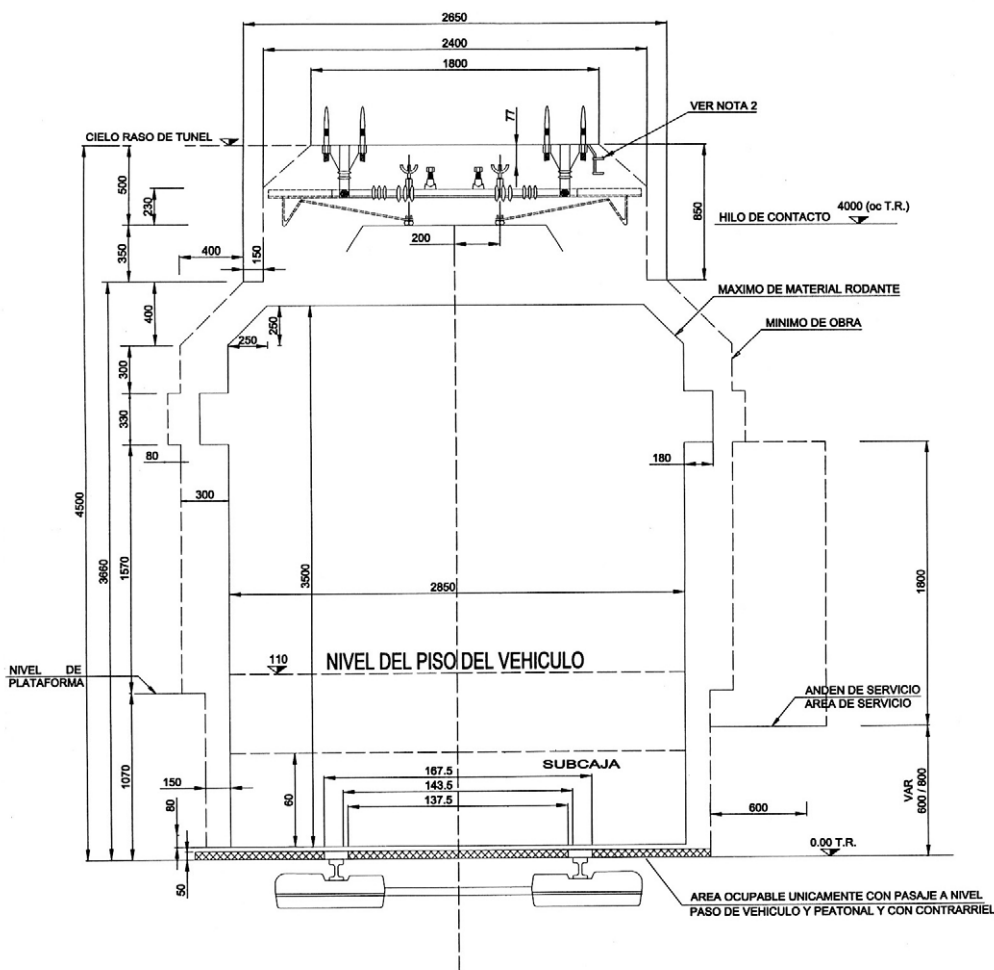
Maximum wagon clearance is 2.85m, vertical clearance: 3.5m. Construction regulations are shown in Figure 5.4-3.

(3) Railway Structure

The Structure of rails is shown in Table 5.4-1.

Table 5.4-1 Rail Structure

Item	Main line		Garage
	Between stations	Station	
1. Line shape			
Minimum radius	250m	400m	70m
Sharpest inclination	35‰	2‰	2‰
2. Railway			
Rail width	1435mm	1435mm	
Rail (long rail)	50kg/m (more than 400m)	50kg/m (more than 400m)	36kg/m
Sleeper	RC (2 blocks)	RC (2 blocks)	Wood
Joint equipment	Band Roll	Band Roll	Spike
Road floor	25cm	25cm	20cm
Ramification equipment		1 : 12 (proportional)	1:8 (proportional)



NOTA: PARA LA COLOCACION DE LAS SUSPENSIONES EN TUNEL, SE PREVE EL DESDOBLAMIENTO DE LAS CUERDAS DE TIERRA, LA PRIMERA ESTARA COLOCADA CERCA DEL ANCLAJE DERECHO, LA SEGUNDA CERCA DEL ANCLAJE IZQUIERDO.

Figure 5.4-3 Construction Clearance

(4) Route Outline

Villa El Salvador station has a total length of 8.960km close to the wagon yard. An outline of this route is shown in Table 5.4-2. Figure 5.4-4 shows a route outline map.

Table 5.4-2 Route Outline

Station	Extension (km)	Structure Type
1. Villa El Salvador Station	0.362	Ground station
2. El Sol Station	1.775	Elevated station
3. Pumacahua Station	3.585	Elevated station
4. Villa Maria Station	5.060	Elevated station
5. Miguel Iglesias Station	6.060	Elevated station
6. San Juan Station	7.350	Elevated station
7 Atocongo Station	8.960	Elevated station

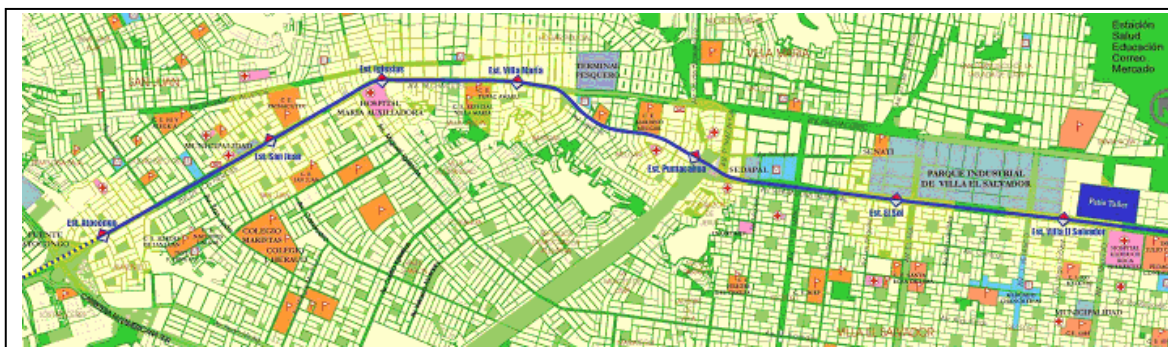


Figure 5.4-4 Route Outline Map

(5) Wagons

Wagons presently in operation are EMU (Electric Multiple Unit) type (M+T+M) and the dimensions of each wagon are shown in Table 5.4-3.

Table 5.4-3 Dimensions of Wagons

Item	M1	M2	T	Note
Material	Alloy Aluminum			
Size (LengthxWidthxHeight)	17.84m x 2.85m x 3.47m			Total length of 6 wagon convoy: 107m Floor height: 1.1m
Empty wagon weight	30.9ton	31.3 ton	20.6 ton	-----
With cargo	45.7ton	46.9 ton	36.2 ton	
Seated passengers	32	36	40	
Standing passengers	214	224	220	-----
Total	246	260	260	
Number of motors	4units	4units		-----
Power/unit	250Kw	250Kw		
Electric supply equipment	Pantograph			1500V DC
Control equipment	Full Chopper			VVVF Inverter (IGBT Type)
Brake equipment	Electric control brake, air brake with hand brake			-----
Communication system	Microphone (driving panel), amplifier, speakers (in each wagon)			-----

M1: Motor-car 1 M2: Motor-car 2 T: Trailer car

(6) Wagon Yard

1) Wagon Yard 144,000 m² Capacity for 220 Wagons

Capacity for 220 wagons considering 164 wagons to attend the demand projection for 2040 (operation interval each 2 minutes) and the South-North line operation start.

2) Functioning of the Yard

Maintenance inspection and repairing of wagons, rails and electricity, facilities for equipment inspection

3) Operation of 32 Wagons in 9.8 Km Section Only During Weekends

Presently, the section in operation is located in the outskirts of Lima, therefore it is not fulfilling its function of urban public transportation, thus it operates only during the

weekends with 6 wagons, each 10 minutes from 10 : 00 ~ 17 : 40 to serve the local population, only for maintenance purposes. The fee is 50 Céntimos (about 16 yen)

4) Operation Contents

In order to prevent wearing out, corrosion and other problems, preventive maintenance is carried out under the orientation of Italy to prevent accidents. Works at the repair shop consist mainly in:

- 1) Current Maintenance
- 2) Overhaul

However, in the existing installation, only overhaul is carried out partially, so additional investment is needed for proper operation. Figure 5.4-5 Layout of the Wagon Yard shows the layout of the existing wagon yard. A list of tools and equipment necessary for the maintenance of wagons as well as the existing equipment and tools are shown in Table 5.4-4.

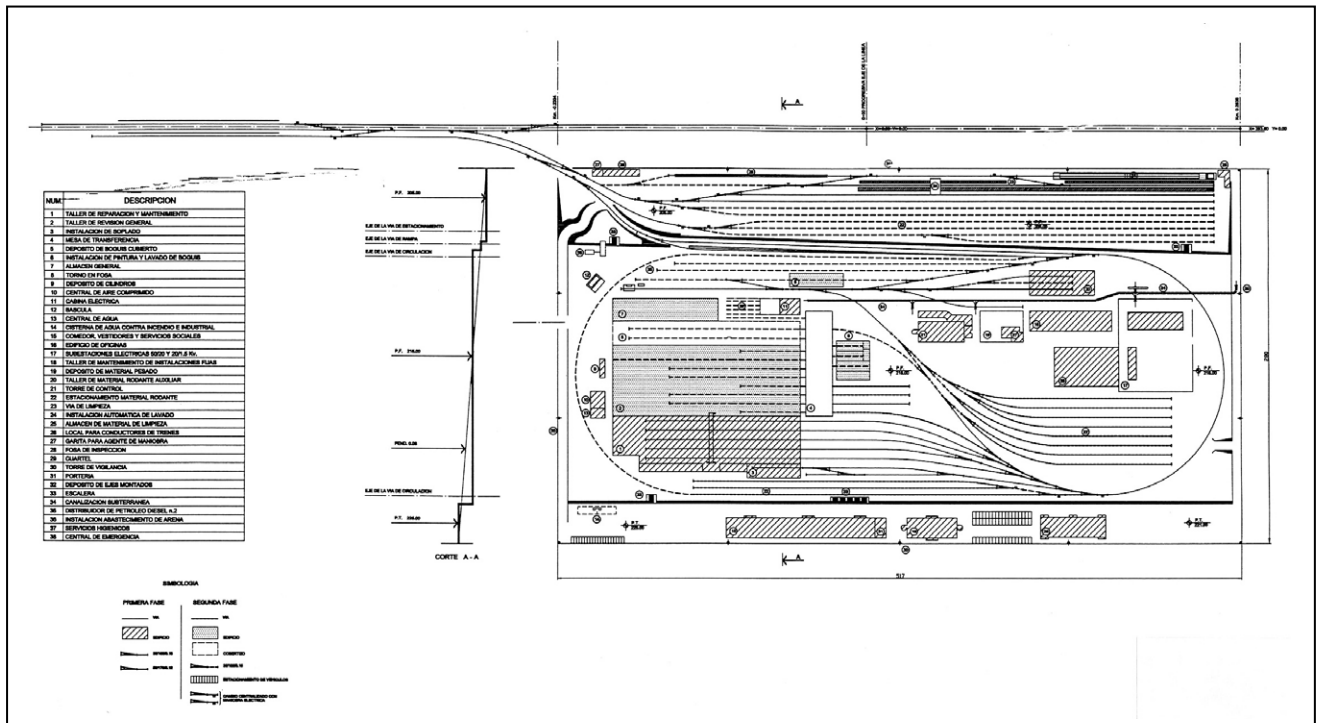


Figure 5.4-5 Layout of the Wagon Yard

Table 5.4-4 List of Yard Equipment

Installation	Existence
1. Shop for regular car maintenance and minor repairs (running repair)	Yes
2. Shop for general overhaul and major repairs of cars	No
3. Under-floor blowing cleaning	Yes
4. Transfer Table	No
5. Covered bogie yard	No
6. Cleaning and painting of bogies	No
7. General storage	Yes
8. Underground wheel lathe	Yes
9. Store area for cylinders	No
10. Compressed air center	Yes
11. Electric cabin for the yard	Yes
12. Platform scale	No
13. Hydraulic center	Yes
14. Reservoirs for industrial and fire-fighting water	Yes
15. Dining room, dressing room and social service	No
16. Office	No
17. Electrical substations 60/20 and 20/1.5 Kv	Yes
18. Fixed installations maintenance shop	partially
19. Storage area for heavy material	Yes
20. Auxiliary vehicle maintenance shop	Yes
21. Control tower	yes
22. Storage tracks	partially
23. Cleaning track	partially
24. Washing machine track	No
25. Store for cleaning material	No
26. Train drivers room	Yes
27. Yard drivers	Yes
28. Inspection track	Yes
29. Plant protection barracks and office	No
30. Watch tower	No
31. Drive's lodge	Yes
32. Mount shafts deport	No
33. Staircase	No
34. Underground cable duct	Yes
35. Sand supply installation	No

(7) Safety Facilities

1) Signaling

- 1) Tracks : Automatic signaling system for AF tracks have devices to detect the presence of the existing trains and shall be considered for the wagons to be increased in the future to allow speed control by signaling inside the wagons.
- 2) Locker devices : inside the stations luminous signaling, between stations system of automatic lockers in the tracks, setting Circuit of Way to reduce the operation interval. Locker signals will not be installed in the future since the speed control system by signaling inside the wagons will be used.
- 3) Continuous equipment : concentrated control
- 4) Central Train Control system (CTC): Installation of a control panel and a video display unit at the central control room of the wagon yard to visualize the operation conditions of the trains, controlling by computer the synchronization and speed

control devices of each station.

- 5) Automatic Train Protection System (ATP): From the superficial coils installed in the signals, it sends information to the train so in case the train crosses a signal by mistake; automatically the emergency brake enters in operation.

2) Communication devices

- 1) Automatic telephone device: Network of automatic telephones in each stations, at the wagon yard, control room, AATE headquarters and connection to public telephones.
- 2) Train wireless device: Network of wireless telephones interconnecting the train, the control room and security room.
- 3) Emergency telephone device: Magnetic type emergency telephones are installed at each station to establish a connection with the control room.
- 4) Announcement devices inside the stations: In the platforms of each station there are speakers to transmit messages from the control room or the station.

5.5. TAXI SERVICE

This section focuses on the taxi service, in which authorized and unauthorized taxies, company taxies, Colectivos and Moto-taxies are operated in the metropolitan area. The taxi services supplement and compete with bus transport services. However, the present conditions of those services, especially unauthorized taxies, Colectivos and Moto-taxies are unavailable with regards to the number of taxies, trip characteristics, driver's working conditions, etc., as well as taxi users' conditions.

Therefore, the information was collected based on the taxi interview survey carried out between August and September 2004, as well as data from related administrative organizations. Figure 5.5-1 shows the relation between the survey data and others, in which taxi company information, trip characteristics, taxi users' information, and drivers' information were collected on the taxi interview survey. On the other hand, the information regarding the number of taxi vehicles and taxi station facilities was collected from the concerned agencies of Lima and Callao. The following sections show the results of the detailed analyses.

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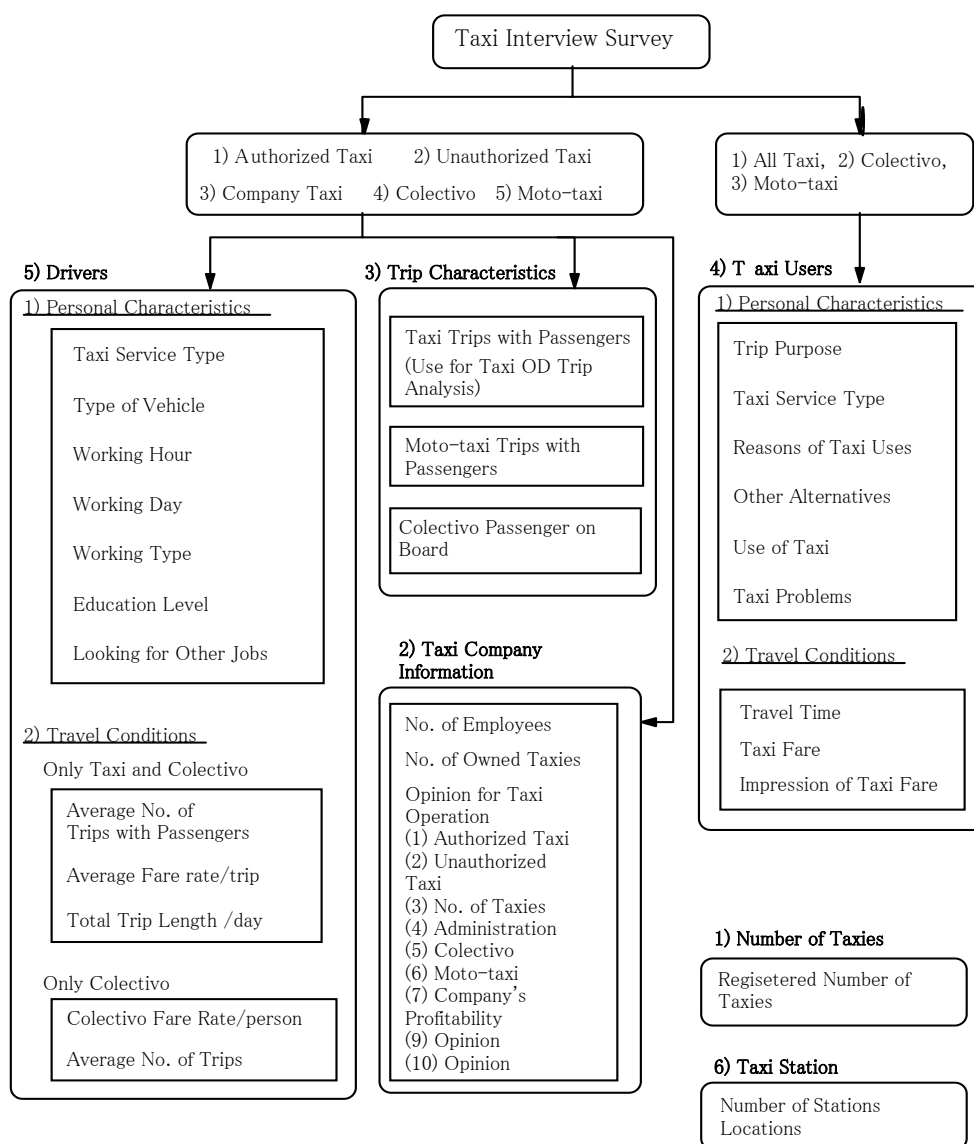


Figure 5.5-1 Study Contents of Taxi Services

5.5.1. TAXI

(1) Number of Registered Taxis

1) Lima

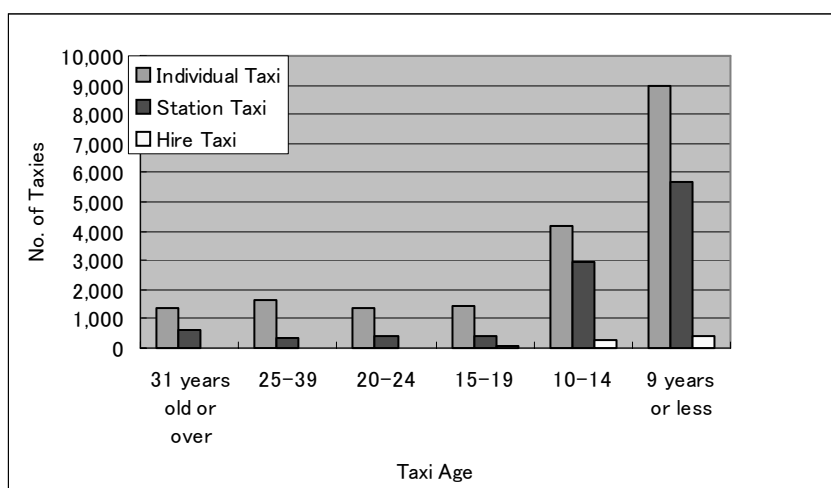
The taxi service operates under the Municipal Ordinance of Lima (No. 196) enacted on December 21, 1998. The taxi is classified into two: a taxi registered in the Municipality of Lima and a taxi that is not registered. The registered taxi is also classified into an individual yellow colored taxi and a company taxi marked with the logo of a company with a taxi radio. The company taxi is divided into two types: a station taxi waiting at a taxi station (i.e., hotel, hospital, etc.) and a taxi for hire. The individual taxi, which is an ubiquitous form of transport, can use the taxi terminal, of which there are approximately 100 locations, while the company taxi cannot.

Figure 5.5-2 and Table 5.5-1 show the registered number of taxis as of February 2004 and the age distribution of taxis in Lima. The number of taxis is approximately 30,000

vehicles, of which 18,900 vehicles are for the individual taxi, 10,400 for the station taxi and 740 for the hired taxi. The individual taxi stands for 60% of the total. The ratio of all taxies, which is an age of 10 years or less to the total, reaches 50%, while the ratio of the company taxi with the same years is approximately 50 – 60%. This means that the company taxies are somewhat new-fashioned.

On the other hand, there are many taxies that are not registered in the DMTU, whose figure is not identified. These undocumented taxies mainly operate as a part-time job and cannot use the taxi stations to pick up passengers.

Since the taxies do not have taximeters, the taxi fare is decided through a negotiation with the driver. The minimum taxi fare of one trip is approximately S/.4.00-S/.5.00.



(Source: DMTU/Lima)

Figure 5.5-2 Age Distribution of Taxies in Lima

Table 5.5-1 Number of Taxies by Age in Lima in February 2004

Unit: vehicles

Case	Type	Taxi Age						Total
		31 years old or over	25-39	20-24	15-19	10-14	9 years or less	
Individual	Individual Taxi	1,360	1,651	1,346	1,415	4,198	8,939	18,909
	Compostion	7.2%	8.7%	7.1%	7.5%	22.2%	47.3%	100.0%
Company	Station Taxi	609	329	409	432	2,934	5,666	10,379
	Compostion	5.9%	3.2%	3.9%	4.2%	28.3%	54.6%	100.0%
	Hire Taxi	0	0	11	41	248	443	743
	Compostion	0.0%	0.0%	1.5%	5.5%	33.4%	59.6%	100.0%
	Total	1,969	1,980	1,766	1,888	7,381	15,049	30,033
	Compostion	6.6%	6.6%	5.9%	6.3%	24.6%	50.1%	100.0%

Source: DMTU/Lima

2) Callao

The taxi is classified into two: a taxi registered in the Municipality of Callao and a taxi that is not registered. The registered taxi is not defined by color. Table 5.5-2 shows the number of taxies registered in Callao, which are 225 taxies. On the other hand, the undocumented taxies not registered in the GGTU reach 925 taxies, and they are equivalent to 80% of the total. The taxi is also classified into an individual taxi and a company taxi. The latter stands for approximately 40% of the total taxi number in Lima and Callao. The area of operation is within the Municipality of Callao. The operation in Lima is not permitted by Callao.

The average age of the registered taxi is approximately 13 years for the company taxi and 15 years for the individual taxi. Its figure is the same as that of the undocumented taxi.

Table 5.5-2 Number of Taxies in Callao

Items	No. of Taxies	Composition	AverageTaxi Age
Authorized Taxi		---	
Company	37	---	13
Individual Taxi	188	---	15
Subtotal	225	0.20	---
Unauthorized Taxi		---	
Company	447	---	13
Individual Taxi	478	---	15
Subtotal	925	0.80	---
Total Taxies	1,150	1.00	---

(Source: GGTU/Callao)

3) *Unauthorized (undocumented) Taxi*

As mentioned above, there are many unauthorized taxies that are not registered in the DMTU. The operation conditions of those taxies are not identified. However, this study obtained many unauthorized taxi data available from many field surveys. In the section, the number of operated unauthorized taxies was estimated based on the taxi field survey data.

According to those data of which the detailed discussion is shown in the next section, the authorized and unauthorized taxi operations are considerably similar in the travel conditions such as taxi traffic volume in the whole study area, number of average trips with passengers, working days of drivers, empty car ratio and empty travel distance. Those data closely relates to the taxi operation.

The number of operated unauthorized taxies is estimated at approximately 27,000 vehicles in 2004, while the authorized taxies are registered at approximately 30,000 vehicles in operation in the Study area. Total taxi operation is approximately 57,000 in number. Those figures are adjusted to the number of taxi trips obtained from the Person Trip survey data.

(2) **Taxi Company**

1) *General*

There are 286 taxi companies in Lima, of which 226 are for the station taxi, 39 for hire taxi such as hotel and hospital and 21 for both station and hire. From the taxi companies, a big scale company has a taxi fleet of 300 or more, while a small company has no taxies but only registration. In order to see the general conditions of the taxi companies, ten (10) taxi companies were selected randomly and surveyed in the manner of an interview. In the survey, a general opinion for operation and administration, to reflect a future public transport plan, was collected as well as the general conditions of the company.

There are no taxi associations in Lima.

2) *Number of Employees, Drivers and Taxies*

The outline of the surveyed companies such as employees, drivers and taxies is shown in Table 5.5-3. As it can be seen, the average number of hired drivers is approximately 75. The number of taxies owned by the companies is few, in contrast to that of contracted taxies. In general, a taxi is operated under the condition that a taxi company rents a taxi to a driver at a fee of S/.120/day. A taxi owner works with the company to get a taxi

operating license as an authorized taxi and operates his taxi. Therefore, there are many fired drivers, and at the same time there are also many hired taxis.

Table 5.5-3 Average Number of Employees, Drivers and Taxis from the Survey

Items	persons or vehicles
Employees	3
Drivers	75
Owned Taxis	6
Contracted Taxis	68

3) Fuel Type

Figure 5.5-3 shows a composition ratio of taxis according to the type of fuel by surveyed company. Approximately 66% of the total are taxis with a diesel engine. The composition ratio of gasoline engines is approximately 27%. This is related to the operation costs.

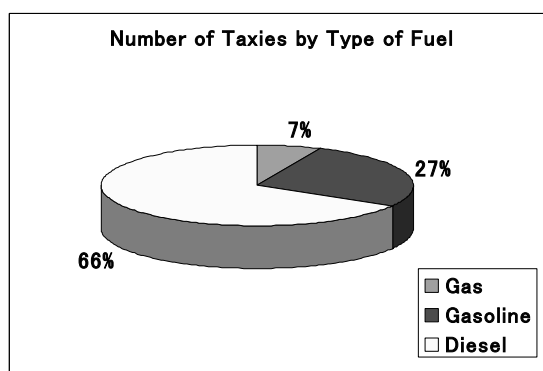


Figure 5.5-3 Number of Taxis by Type of Fuel

4) Opinion for Administration

The taxi company's opinion regarding the current administration conditions was interviewed. The five (5) items were prepared beforehand in the survey sheet. The survey results are summarized in Figure 5.5-4. Nine companies out of ten desire a strong administrative control for unauthorized taxis, Colectivos and moto-taxis. The companies do not desire a reduction of the authorized taxis.

The other administrative requests of the companies are shown below:

- a) To strengthen the administrative control of unauthorized taxis under the Municipal Ordinance of Lima (No. 196).
- b) To make a guideline to improve driver's manners.
- c) To prepare a driver's uniform so they are recognized as authorized taxis.
- d) To restrict a taxi which is 10 years old or over.
- e) To restrict the number of taxis to balance demand and supply.
- f) To prepare communication means, especially radio equipment, between taxis and administrative organizations.
- g) To make a satisfactory pension system.
- h) To prepare a satellite office of a related agency.
- i) To prepare many taxi stations.
- j) To enter and inspect a taxi company to observe whether a taxi is operated under the related laws or not.
- k) To request a change of fuel system from gasoline to natural gas to improve air pollution and to reduce operation costs.

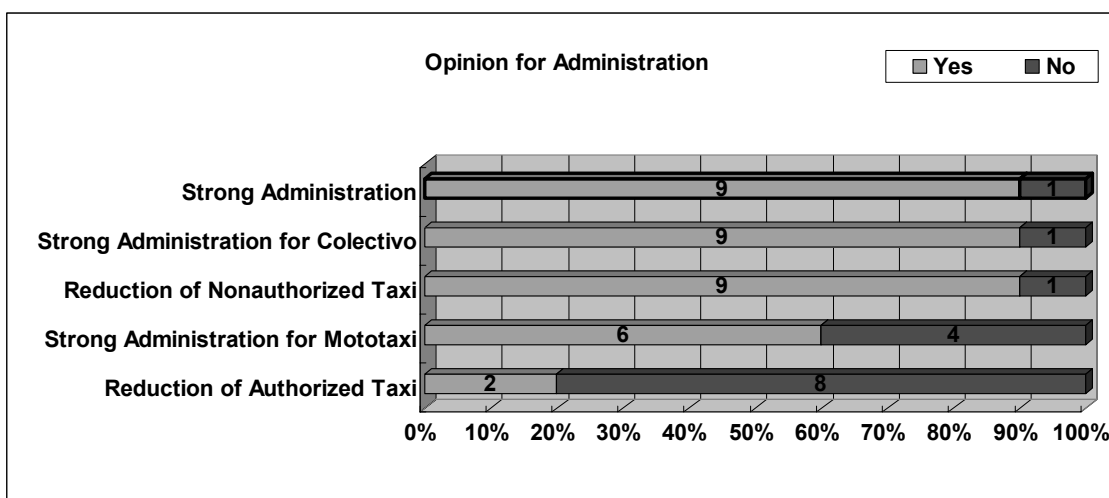


Figure 5.5-4 Opinions regarding Administration

5) Problems of the Taxi Companies

The problems of the taxi companies were also surveyed and are shown below:

- a) An operating disadvantage for authorized taxies since there are too many unauthorized taxies.
- b) To operate a taxi with bad maintenance conditions.
- c) To insufficiently execute a driver's training.
- d) To insufficiently execute the inspection of an unauthorized taxi.
- e) Low profitability caused by keen competition with other taxies, especially unauthorized taxies.

(3) Trip Conditions

1) Number of Trips and Travel Distance

Taxi trip conditions were surveyed by taxies sampled in the field. There were a hundred and ninety four (194) sampled taxies, of which 68 taxies are for authorized taxi, 92 for unauthorized taxi and 34 for company taxi. Trip information such as the number of trips, origin and destination and number of passengers is surveyed. Table 5.5-4 shows the characteristics of taxi operations based on the survey data analysis.

The average numbers of daily trips are approximately 11 for company taxi, 20 for authorized taxi and 20 for unauthorized taxi. The trips of individual taxies (authorized and unauthorized taxies) are many, while the company taxi has half the trips. This is because the company taxi waits for a passenger at a taxi station (i.e., hotel, hospital, etc.), rather than cruising everywhere to get a passenger. The average number of passengers for all types is approximately 2 persons. This figure is almost the same as that from the screen line counting data. The average daily proceeds are approximately S./78 for company taxies, and S./121 for authorized and unauthorized taxies. The proceeds of the company taxi is approximately 60% of the individual taxi due to the characteristics of operation.

Table 5.5-4 Characteristics of Taxi Operation

Type of Taxi	Number of Drivers Interviewed	Average Working Time (hour)	Average Trip Time (min)	Average Passengers (person)	Average Trip Fare (S./)	Average Number of Trips	Average Daily Proceeds (S./)
Company Taxi	34	13:15	18	2.1	7.4	10.6	77.6
Authorized Taxi	68	13:40	20	2.0	6.1	20.0	121.3
Unauthorized Taxi	92	13:37	19	2.0	6.0	20.3	120.8
Total	194						

Note: unauthorized taxi: some taxis operate as colectivos temporarily.

2) Empty Taxi (without Passenger)

An empty taxi without passengers is an important factor to consider the efficiency of taxi operations. Table 5.5-5 shows an empty taxi ratio, which divides number of empty taxis by the number of taxis with and without passengers. In the morning period, the empty ratio is as low as 0.26. This shows that approximately 26% of the total is empty taxis.

Table 5.5-5 shows an operated distance ratio of empty taxis with regards to the total operated distance, which was measured with the equipment of the geographical positioning system (GPS). A taxi in which the surveyor took the GPS chased after a target taxi. The data of taxi operation distances with and without passengers was collected from twenty (20) taxis by authorized and unauthorized taxis.

As it can be seen, the empty distance ratios are 0.80 in the morning, 0.90 in the afternoon and 0.82 in the evening. This figure means that the ratio of the taxis with and without is 1 to 0.80. The operated distance of empty taxis is 80-90% of taxis with passenger. This ratio is higher in the afternoon when taxi demand is low.

Table 5.5-5 Empty Taxi Ratio

Time Period	Type of Taxi	7:00–10:00	11:00–14:00	17:00–20:00
Empty Taxi Ratio on Screen Line	All Taxi	0.26	0.39	0.36
	Operated Distance	0.64	0.86	1.18
Ratio of Empty Taxi by GPS	Authorized	1.01	0.95	0.55
	Unauthorized	0.80	0.90	0.82

(4) Taxi User Conditions

In the taxi passenger interview survey, in which the interviewed samples are approximately 1,000, the general taxi user conditions in the morning peak hour were collected. From the analyses of the collected data, such as trip purposes of user, taxi fare, and reasons of taxi use, it was found out that taxis are an important public transport mode in the metropolitan area. The detailed analyses are shown in the following sections.

1) Trip Purpose

Figure 5.5-5 shows a composition ratio of trip purposes in the morning peak hour, which are composed of “to work”, “to school” and “others”. The ratio of “to work” and “to school” purposes account for approximately 45% of the total, in contrast to 90% for the bus. As it can be seen, it is obvious that the taxi is used for many purposes in comparison to the bus, which is used for specialized purposes: “to work and to school” in the morning peak hour.

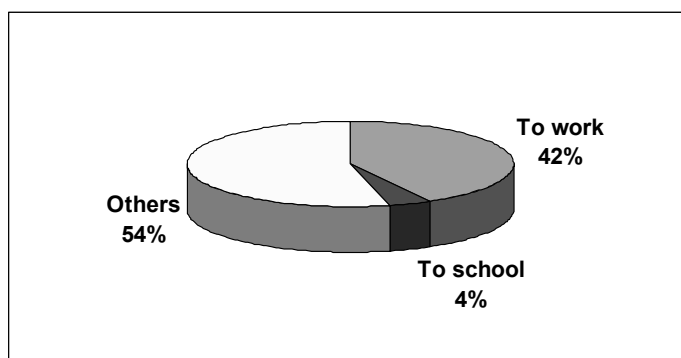


Figure 5.5-5 Composition ratio of Trip Purposes of Taxi Users

2) Travel Time

Figure 5.5-6 shows the distribution of travel time by taxi. As it can be seen, approximately 70% of the total have a travel time of less than 20 minutes and the ratio of travel time to exceed 30 minutes is approximately 10% of the total. As it can be seen, the passengers use taxis for a medium time or distance trip.

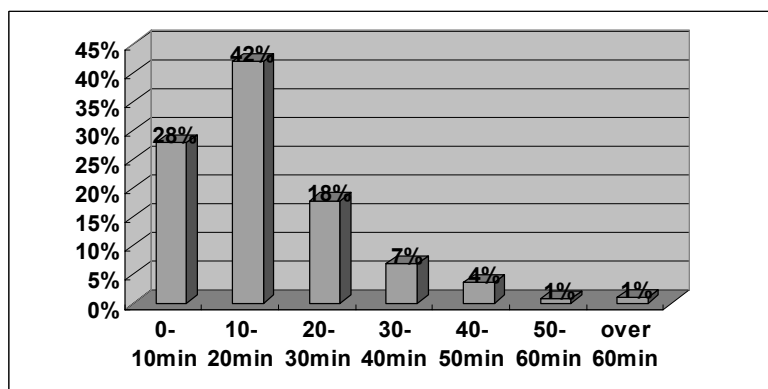


Figure 5.5-6 Distribution of Travel Time of Taxi Users

3) Taxi Fare

Figure 5.5-7 shows the distribution of the paid taxi fee in the morning peak hour. As it can be seen, approximately 60% of the total are less than a paid fare of S/. 6.0. This fare rate is approximately 3.0 times of a bus fare rate.

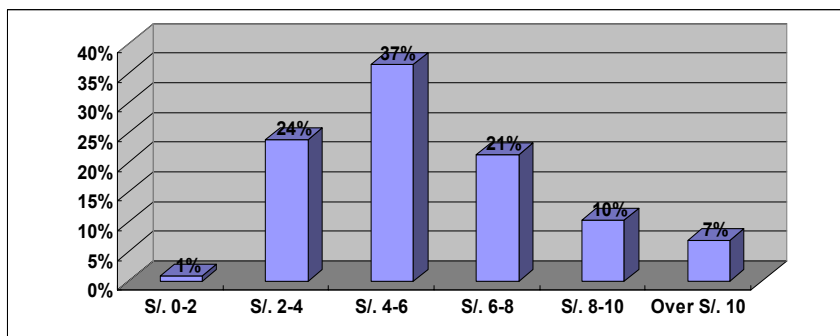


Figure 5.5-7 Distribution of the Taxi Fare Rate

4) Alternatives

Figure 5.5-8 shows the composition ratio of other public transport uses when passengers do not take taxis. As it can be seen, the public transport (Omnibus, Microbus and Camioneta) takes a higher ratio at 53% of the total in use. The second highest ratio is that of the Colectivo. Its figure is approximately 26%. “No other alternatives” is 14% in ratio. This means that there are no alternative modes besides the taxi.

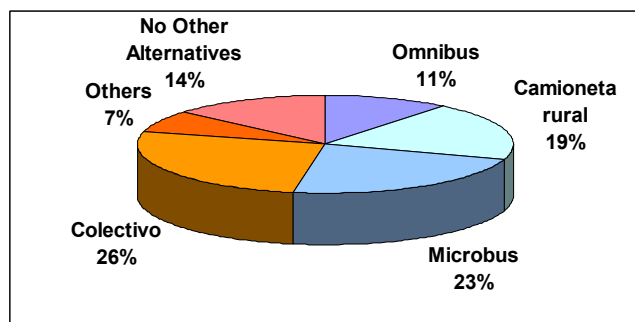


Figure 5.5-8 Composition Ratio of Other Public Transport Uses

5) Reasons for Taxi Use

Figure 5.5-9 shows the composition ratio of reasons of taxi use. “Faster than bus service” (67% of the total) takes the highest ratio of the reasons, followed by “others” (20%), and “Crowded in a bus” (7%). As it can be seen, the main reason for taxi use is a higher travel speed.

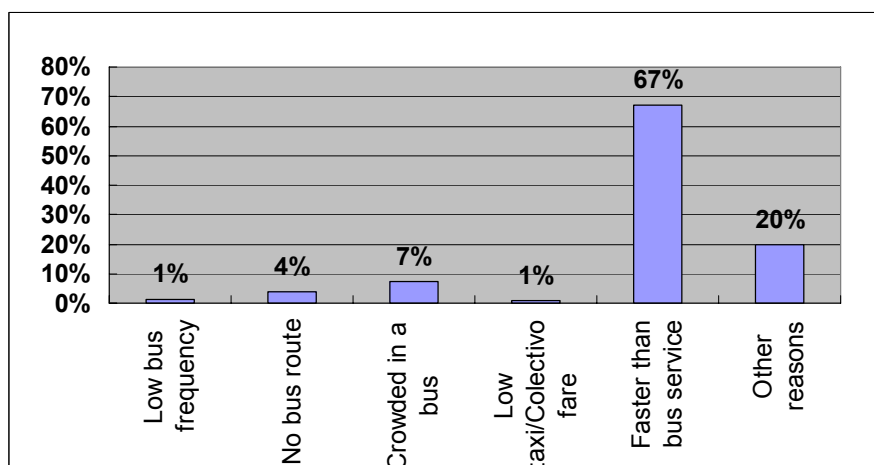


Figure 5.5-9 Composition Ratio of Reasons of Taxi Use

6) Problems of Taxis

The taxi passenger’s opinions regarding the current taxi problems were surveyed. The four (4) items related to the current problems were prepared beforehand in the survey sheet. The survey results are summarized in Figure 5.5-10. The problems of traffic safety and security take the higher ratio. Those figures are 26%, and 24% of the total, respectively. The item “Others” is also higher in ratio, which mainly includes the reason of “too slow speed”.

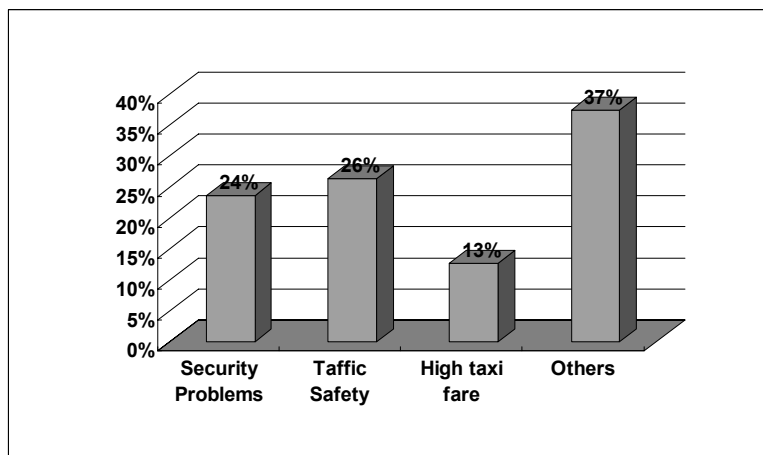


Figure 5.5-10 Distribution of User’s Opinions regarding Taxi Problems

(5) Taxi Drivers

In the taxi driver interview survey, in which about 1,050 drivers were sampled, the taxi driver’s conditions were collected. From the analyses of the collected data, such as type of taxi operated, working pattern, taxi possession, working hour and reason to select a driver, the driver’s working condition was disclosed. The detailed analyses are shown in the following sections.

1) Type of Taxi Operated

Figure 5.5-11 shows the composition ratio of the type of operated taxi by type of taxi license (company, authorized and unauthorized taxis). The type of taxi is mainly a station wagon. On the other hand, the sedan is minor in ratio. As for the authorized taxi, the ratio of the Tico (light vehicle with 3 passenger seats excluding driver) is higher at 46% of the total.

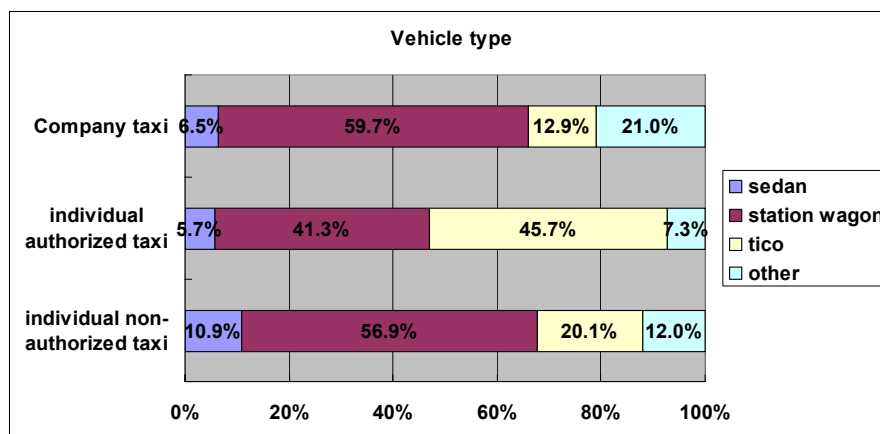


Figure 5.5-11 Composition Ratio of Type of Taxi Operated

2) Working Pattern

Figure 5.5-12 shows the composition ratio of the working pattern of the driver classified into primary and part time jobs. Almost all drivers belong to the primary job type. The ratio of part time jobs by the unauthorized taxi drivers is somewhat higher. The figure represents 15% of the total. This means that the driver of the unauthorized taxi looks for other jobs under unemployment and its percentage of drivers' accounts for 55% of the total.

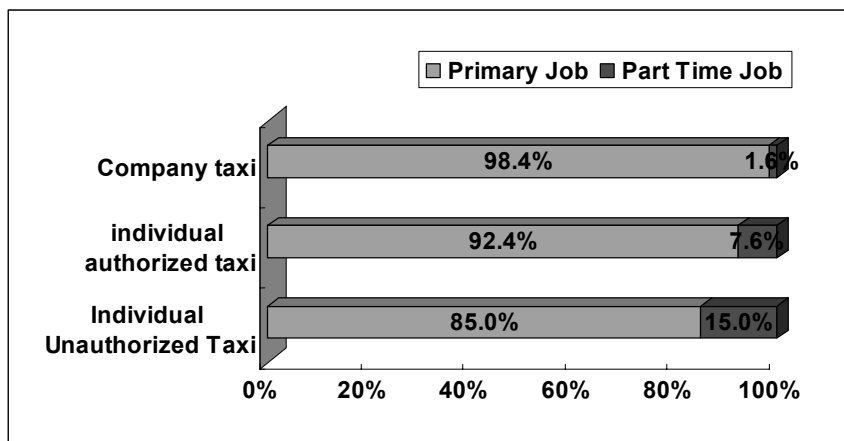


Figure 5.5-12 Composition Ratio of the Working Pattern of Drivers

3) Type of Taxi Possession

Figure 5.5-13 shows the composition ratio of the type of taxi possession classified into owned and rental taxi. The ratio of rental in the company taxi is higher than that in the individual taxi. As mentioned before, the number of taxies owned by companies is few and the contracted taxies possessed by owners are many.

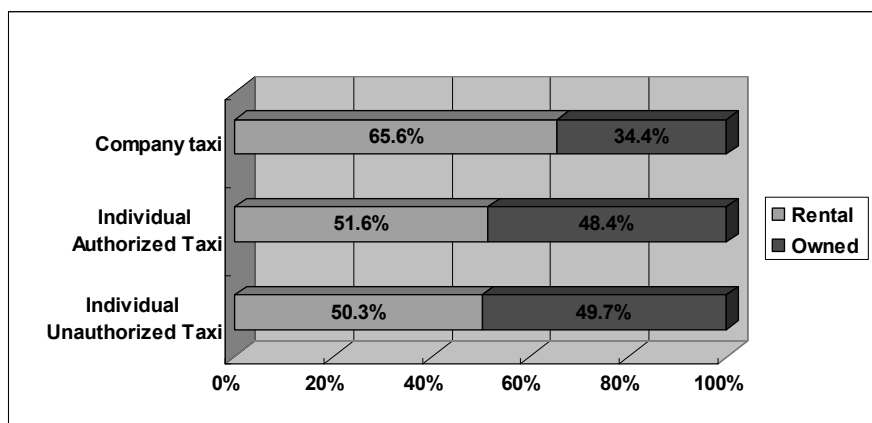


Figure 5.5-13 Composition Ratio of Type of Taxi Possession

4) Working Hours

Figure 5.5-14 shows the composition ratio of working hours by driver. The average working hours of all types of taxies are approximately 13 hours. Approximately 70% to 80% of all drivers work a range between 12 and 18 hours.

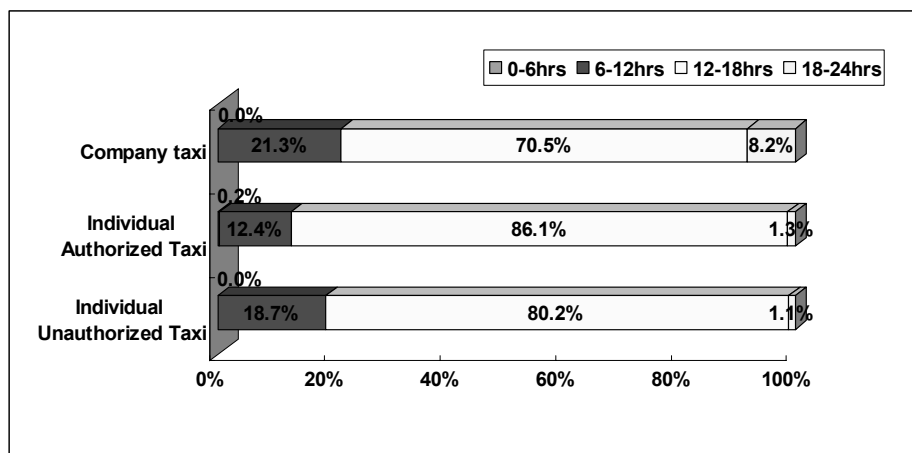


Figure 5.5-14 Composition Ratio of Working Hour

5) Travel Distance

Table 5.5-6 shows an average daily operation distance by type of taxi. As it can be seen, the average distance is different between taxies by the primary and part time jobs. The average distance of the primary job is 182km/day for the authorized taxi and 169km/day for the unauthorized. As for the part time job, the average distance is short by 20-30% of the primary job.

Table 5.5-6 Average Daily Operation Distance

Items	Average Operation Distance (km/day)
Primary Job	
Authorized Taxi	182.3
Unauthorized Taxi	169.3
Part Time Job	
Authorized Taxi	120.8
Unauthorized Taxi	146.0

6) Reasons to Select a Taxi Driver

As for the reasons why a taxi driver selects a taxi worker, approximately 85% of the total is unemployment for which 90% is for the authorized taxi and 80% for the unauthorized taxi. The taxi transport industry contributes to the present employment conditions.

(6) Taxi Station

There are approximately 100 taxi stations in Lima, of which 74 stations are already in operation, 27 stations are under planning, and 8 stations are still undecided. Figure 5.5-15 and Figure 5.5-16 show two types of taxi stations: type-1 is an off-line bay and type-2 is an on-line bay. Type-2 is employed in the Center area and does not have enough space for a sidewalk on the road. Figure 5.5-17 shows the location of the taxi stations, which are concentrated in the Center and large supermarkets.

The parking capacity of taxi stations ranges between 10 and 12 vehicles, which can only be used by authorized taxis.

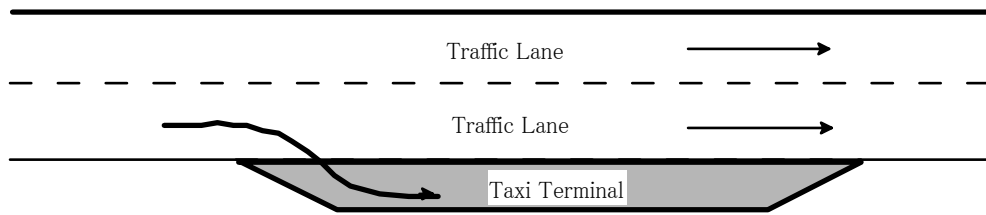


Figure 5.5-15 Type-1 (Off-line bays) of Taxi Stations in Lima

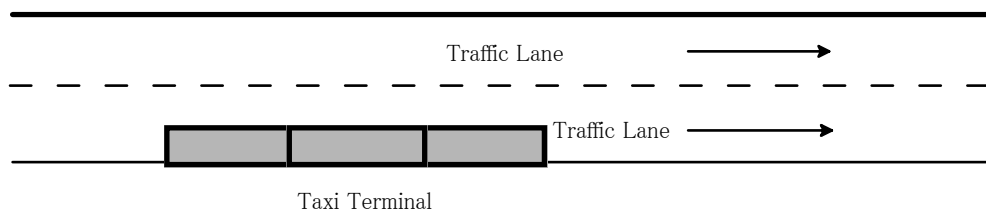


Figure 5.5-16 Type-2 (On-line bays) of Taxi Stations in the Central Area of Lima



Figure 5.5-17 Location of Taxi Stations in Lima

5.5.2. COLECTIVO

(1) Introduction

The Colectivo functions as a fixed-route taxi like a bus, and operates on major bus routes in competition with buses. The advantage of the Colectivo against bus transport is that it provides a rapid operation taking a seat. For instance, Colectivos use wagon type vehicles to operate on through traffic lanes on the Paseo de la República expressway in competition with the buses that operate on the exclusive bus lane. Although there is no parking on this road, since it is an urban expressway, Colectivos park on the safety zones of the expressway to board and alight passengers. This is very dangerous from the viewpoint of traffic safety. The fare rate of the Colectivo is approximately double the rate of the bus.

In suburbs, since there are not enough buses and taxis in operation, Colectivos become popular. Figure 5.5-18 shows a typical Colectivo in the suburb of Lima, for which a large sedan is used. The number of Colectivos is not available since it is a vehicle unauthorized by the administration.

In the past, the Colectivo was a main mode of public transport, before the public bus system was improved in a bus route, service frequency, and a bus fleet like at the present. After that, the Colectivo operation gradually reduced in proportion to the improvement of the bus system. Recently, the Colectivo has been restored since the bus service is lower in travel time than before due to traffic congestion.



Figure 5.5-18 Colectivo parked near Suburban Area

(2) Colectivos Operated on Main Roads

The DMTU recognizes the operation of Colectivos as a fixed-route taxi like a bus on some major roads, which are Av. Arequipa, Av. Benavides (Av.Colonial), Paseo de la República (Vía Expresa). Colectivos on those roads are available in the operating conditions.

A taxi company authorized to operate Colectivos operates them on those roads. However, the DMTU recognizes the operation of Colectivos as a station taxi, not a Colectivo, from the viewpoint of the law. There are 13 taxi companies authorized to operate Colectivos on the Vía Expresa. Three companies are on Av. Colonial. The registered number of taxis in those companies is 527 and 433, respectively, as shown in Table 5.5-7. As it can be seen, the Colectivo age is older than that of the taxi.

Table 5.5-8 shows the number of authorized taxis (Colectivos) by vehicle weight on the Vía Expresa according to taxi ages. Seventy percent (70%) of the taxis used as Colectivos weigh 1.4 ton or more, which is categorized as a middle class sedan. The Colectivo ages are older. The ratio of Colectivos used with 20 years or more to the total is approximately 60%.

Table 5.5-9 shows the number of Colectivos authorized and taxis (Colectivos) unauthorized by the DMTU operating on the Vía Expresa. As it can be seen, the ratio of unauthorized Colectivos to the total is approximately 45%. Half of the Colectivos operate on the Vía Expresa as unauthorized Colectivos.

Table 5.5-7 Number of Colectivos Owned by Taxi Companies According to Age and Road

Unit: vehicles

Road Name	00 - 10 years	11 - 20 years	21 - 30 years	30 years or over	Total
Via Expresa	62	167	155	143	527
Ratio	11.8%	31.7%	29.4%	27.1%	100.0%
Av. Colonial	7	78	187	161	433
Ratio	1.6%	18.0%	43.2%	37.2%	100.0%
Total	69	245	342	304	960
Ratio	7.2%	25.5%	35.6%	31.7%	100.0%

Source: DMTU/SETAME

Table 5.5-8 Number of Authorized Taxis (Colectivos) by Vehicle Weight on the Vía Expresa

Unit: vehicles

Range of Weight (kg)	0-10 Years	11-20	21-30	30 years or over	Total	Composition (%)	Remarks
600 - 899	0	22	32	28	82	15.7%	Light Vehicle
900 - 1399	45	11	5	10	71	13.6%	Small Vehcile
1400 - 1700	16	131	117	104	368	70.6%	Middle -sized Vehciles
Total	61	164	154	142	521	100.0%	-
Composition (%)	11.7%	31.5%	29.6%	27.3%	100.0%	-	-

Source: DMTU/SETAME

Table 5.5-9 Number of Colectivos Operated on the Vía Expresa Authorized /Unauthorized by the DMTU

Unit: vehicles

Items	Number of Colectivos	(%)
Authorized by SETAME (DMTU)	521	50.0%
Unauthorized but Registered	49	4.7%
Unauthorized and No-Registered	471	45.2%
Total	1,041	100.0%

Source: DMTU/SETAME

(3) Colectivo User Conditions

In the Colectivo passenger interview survey, in which the interviewed samples are approximately 300, the general Colectivo user conditions in the morning peak hour were collected. Since Colectivos operate on a fixed-route like a bus, nine (9) major routes were selected for the survey. The survey route location is shown in Figure 5.5-19.

From the analyses of the collected data, such as trip purposes of user, Colectivo fare, and reasons of Colectivo use, it was found out that the Colectivo is an important public

transport mode in the metropolitan area. The detailed analyses is shown in the following sections.

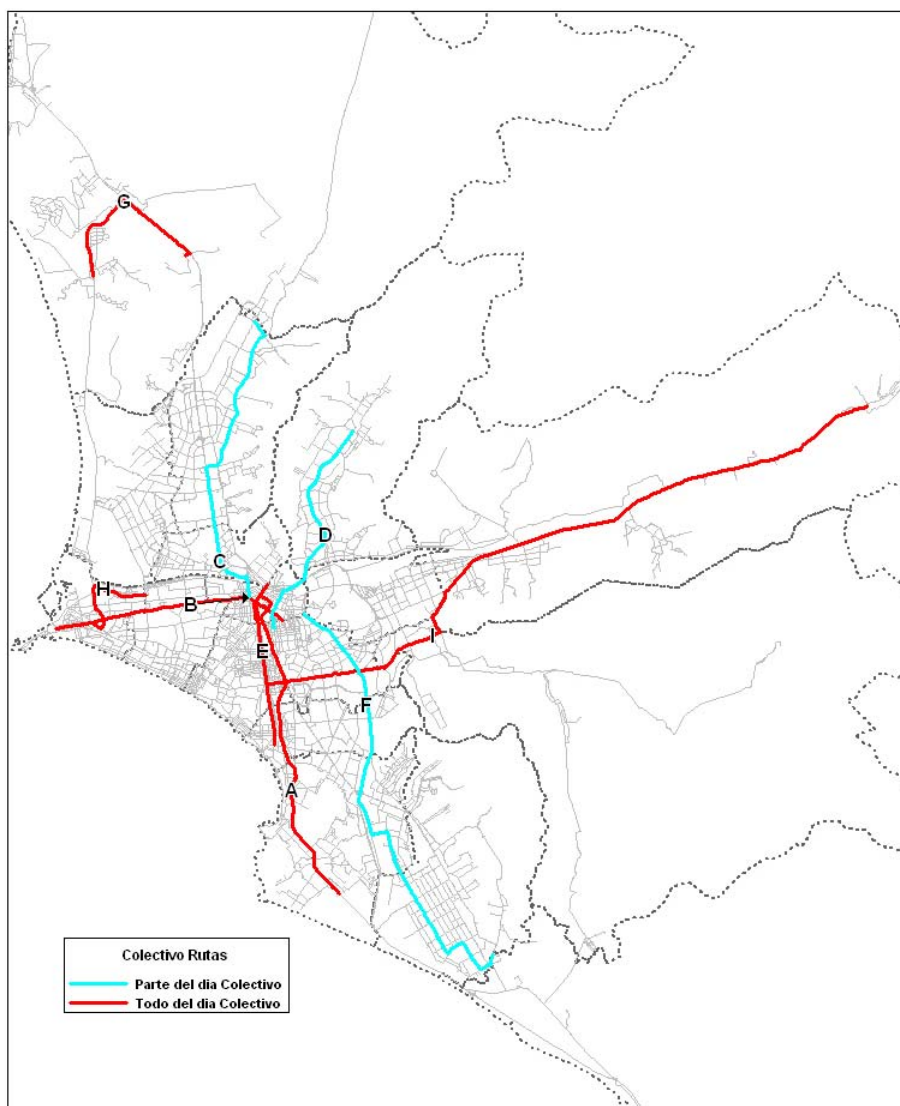


Figure 5.5-19 Colectivo Survey Routes

1) Trip Purpose

Figure 5.5-20 shows the composition ratio of trip purposes in the morning peak hour, which are composed of “to work”, “to school” and “others”. The ratio of “to work” and “to school” purposes account for approximately 80% of the total, in contrast to 45% for taxis. As it can be seen, it is obvious that the colectivo is an important public transport mode in the morning peak hour.

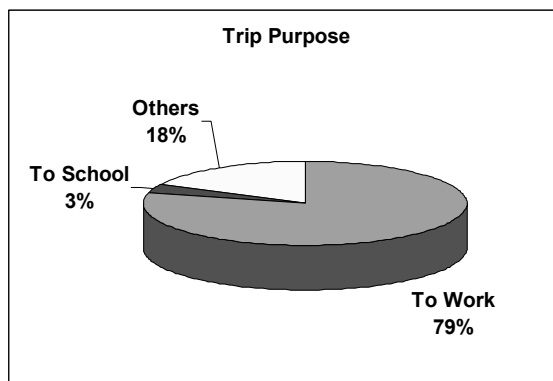


Figure 5.5-20 Composition ratio of Trip Purposes of Colectivo Users

2) Travel Time

Figure 5.5-21 shows the distribution of travel time by Colectivo. As it can be seen, approximately 55% of the total have a travel time of less than 30 minutes and the ratio of travel time to exceed 60 minutes is approximately 10% of the total, in contrast to 45% of the bus. As it can be seen, the passenger uses the Colectivo for middle distance trips between buses for long trips and taxis for short trips.

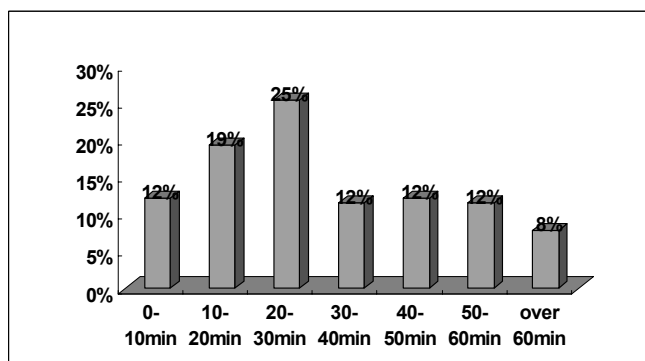


Figure 5.5-21 Distribution of Travel Time of Colectivo Users

3) Colectivo Fare

Figure 5.5-22 shows the distribution of the paid taxi fee in the morning peak hour. As it can be seen, approximately 70% of the total have paid fare of less than S/. 2.50. This fare rate is approximately 1.3 times the bus fare rate and 0.4 times the taxi rate. The Colectivo fare rate is related to travel distance.

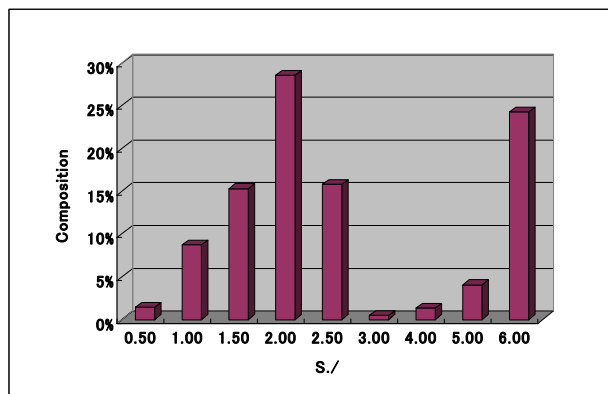


Figure 5.5-22 Distribution of Colectivo Fare Rate

4) Alternatives

Figure 5.5-23 shows the composition ratio of other public transport uses when passengers do not take Colectivos. As it can be seen, the public transport (Omnibus, Microbus and Camioneta) takes the higher ratio with 52% of the total in use. The second highest ratio is that of the taxi. Its figure is approximately 23%. “No other alternatives” is 11% in ratio. This means that there are no alternative modes besides the taxi. Those ratios of alternative modes are the same as that of the taxi.

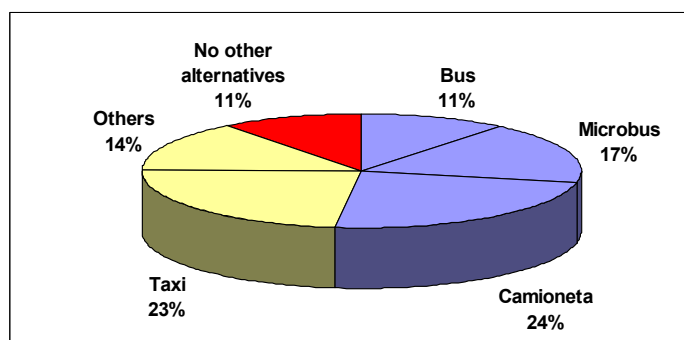


Figure 5.5-23 Composition Ratio of Other Public Transport Uses

5) Reasons for Colectivo Use

Figure 5.5-24 shows the composition ratio of reasons of Colectivo use. “Faster than bus service” (86% of the total) takes the highest ratio of the reasons, followed by “No sufficient route” (10%), and “Others” (4%). As it can be seen, the main reason of Colectivo use is a higher travel speed.

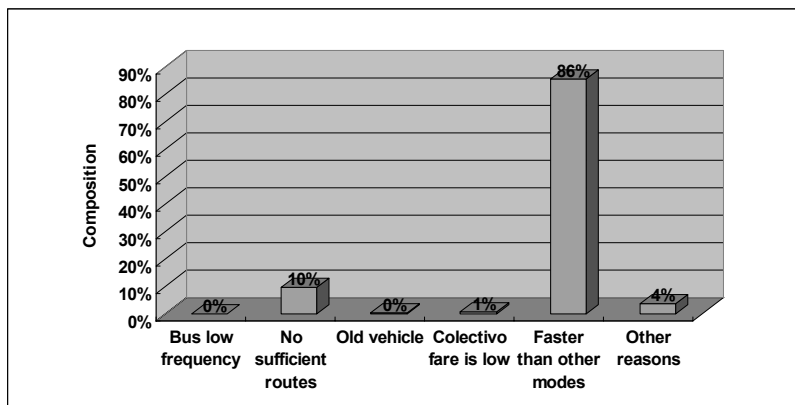


Figure 5.5-24 Composition Ratio of Reasons of Colectivo Use

6) Problems of Colectivos

The Colectivo passenger’s opinion regarding the current Colectivo problems were surveyed. The four (4) items of the current problems were prepared beforehand in the survey sheet. The survey results are summarized in Figure 5.5-25. The problems of security and high fare rates take the higher ratio. Those figures are 24%, and 19% of the total, respectively. The item “Others” including bad maintenance conditions and driver’s manners is also higher in ratio.

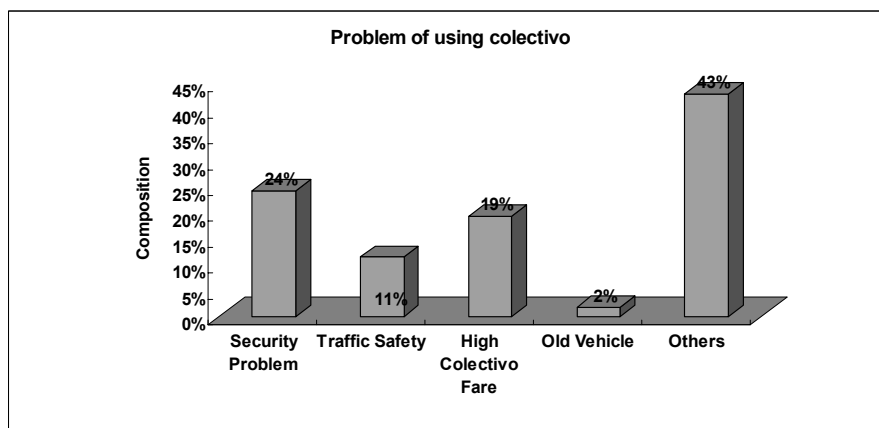


Figure 5.5-25 Distribution of User’s Opinion for Colectivo Problems

(4) Colectivo Driver

In the Colectivo driver interview survey, in which about 300 drivers were sampled, the driver’s conditions were collected. From the analyses of the collected data, such as the type of Colectivo operated, working pattern, Colectivo possession, working hour and number of trips, the driver’s working condition was disclosed. The detailed analyses is shown in the following sections.

1) Type of Colectivo Operated

Figure 5.5-26 shows the composition ratio of the type of operated Colectivo. Since Colectivos operate on a fixed-route like a bus, a large sized vehicle is needed. The ratio of station wagons is higher at 64% of the total. On the other hand, the sedan is somewhat low in ratio.

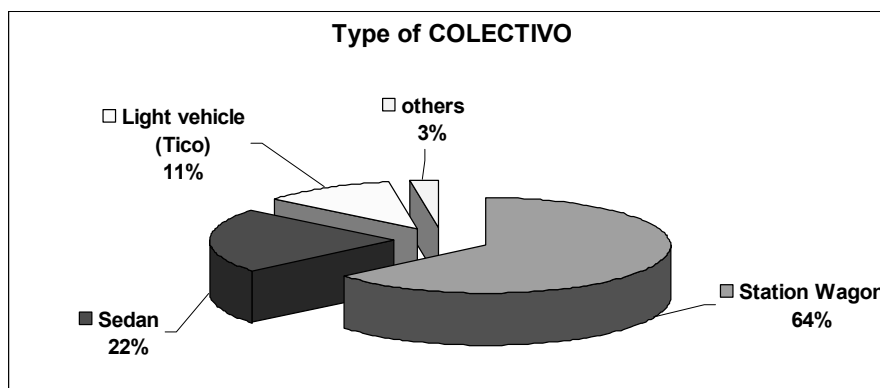


Figure 5.5-26 Composition Ratio of Type of Colectivo Operated

2) Working Pattern

Figure 5.5-27 shows the composition ratio of the working pattern by driver classified into primary and part time jobs. Almost all drivers are of primary job type. The ratio of part time jobs is somewhat higher. The figure is 22% of the total. This figure is also higher than that of the taxi drivers (15% for the unauthorized taxis). This means that the driver looks for other jobs and the percentage of drivers accounts for 50% of the total.

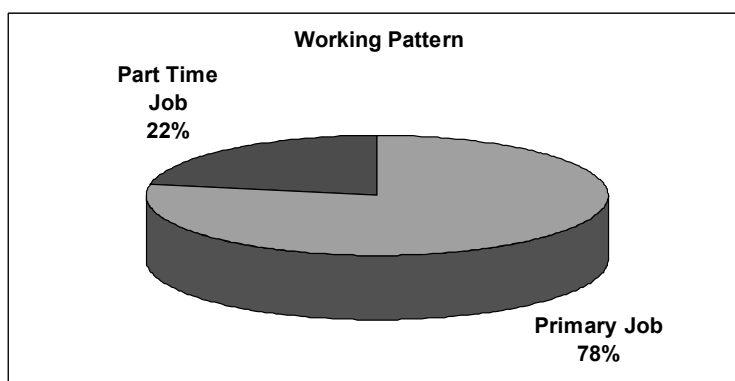


Figure 5.5-27 Composition Ratio of the Working Pattern of Drivers

3) Type of Colectivo Possession

Figure 5.5-28 shows the composition ratio of the type of taxi possession classified into owned and rental taxi. The ratio of the owned is higher than that of the rental. This ratio is opposite in type of possession against the taxi in which the owned ratio of the authorized taxi is 48%.

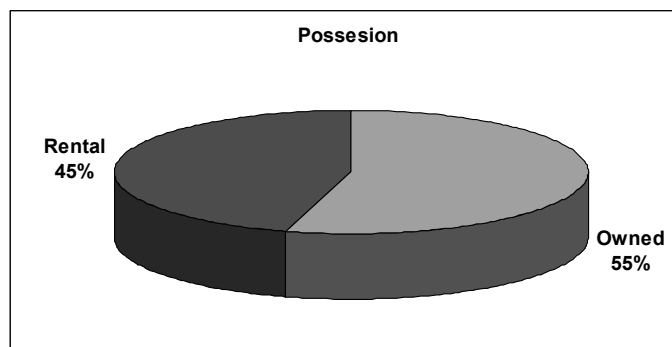


Figure 5.5-28 Composition Ratio of Type of Colectivo Possession

4) Working Hour

Figure 5.5-29 shows the composition ratio of working hours by driver. The average working hour is approximately 12 hours. Approximately 50% of drivers work at range between 12 and 18 hours. On the other hand, approximately 70% to 80% of all taxi drivers work a range between 12 and 18 hours.

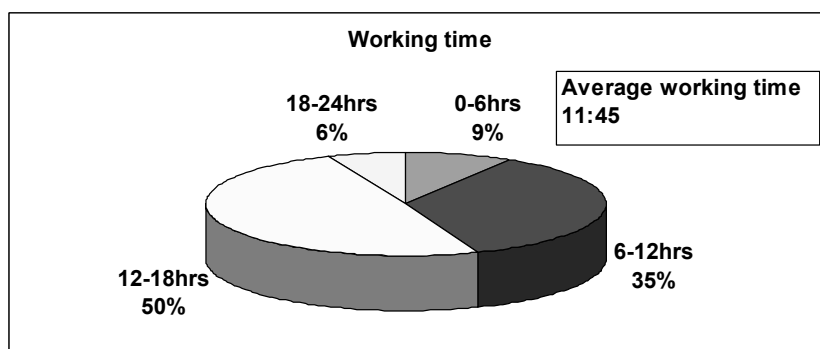


Figure 5.5-29 Composition Ratio of Working Hour

5) Number of Trips per Day (round trip)

Figure 5.5-30 shows the relationship between route distance and the number of daily trips (round trips). As it can be seen, Colectivos that operate on long distance routes have merely 3-4 round trips. On the other hand, the number of trips on short routes within 15 km is approximately 8-12 round trips. This shows that the long route is low and the short route is high.

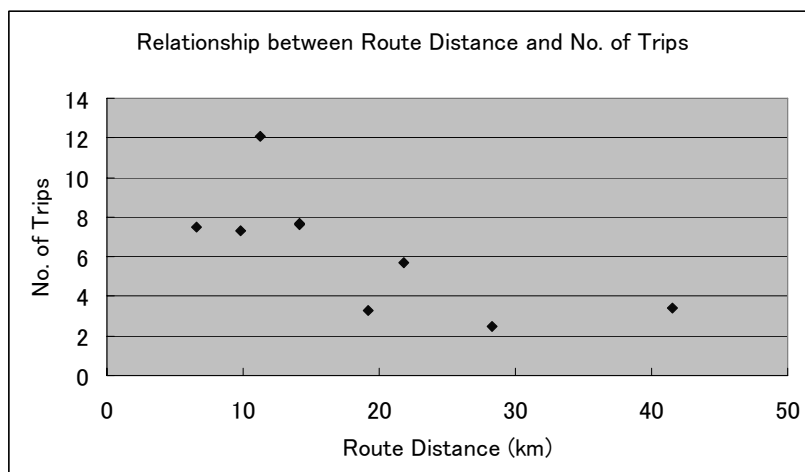


Figure 5.5-30 Relationship between Route Distance and Number of Daily Trips

5.5.3. MOTO-TAXIS

(1) Introduction

Within the suburb of Lima and Callao, the moto-taxi service operates as a paratransit. The moto-taxi is a three-wheeler motorcycle taxi with a space for two passengers in the rear of the car (see Figure 5.5-31). The moto-taxi operation is restricted within the suburbs because the tricycle car operates with low speed and instability in traffic flow, and disturbs smooth traffic flow and safety. The figures of moto-taxis are not available. However, it is estimated that approximately 45,000 vehicles are operated in the suburb.

The moto-taxi provides a feeder service in areas between residential areas and a bus terminal or bus stop in the suburb on a narrow minor road on which it is difficult for a bus to pass through.



Figure 5.5-31 A Typical Type of Moto-taxi

(2) Moto-taxi User Conditions

In the moto-taxi passenger interview survey, in which the interviewed samples are approximately 450, the general Moto-taxi user conditions in the morning peak hour were collected. Since the Moto-taxi operation is restricted within the suburbs, seventeen (17)

major locations where moto-taxis actively operate were selected for the survey. The survey location is shown in Figure 5.5-32.

From the analyses of the collected data, such as trip purposes of user, fare, and reasons of moto-taxi use, the function of moto-taxis in the metropolitan area was found out. The detailed analysis is shown in the following sections.

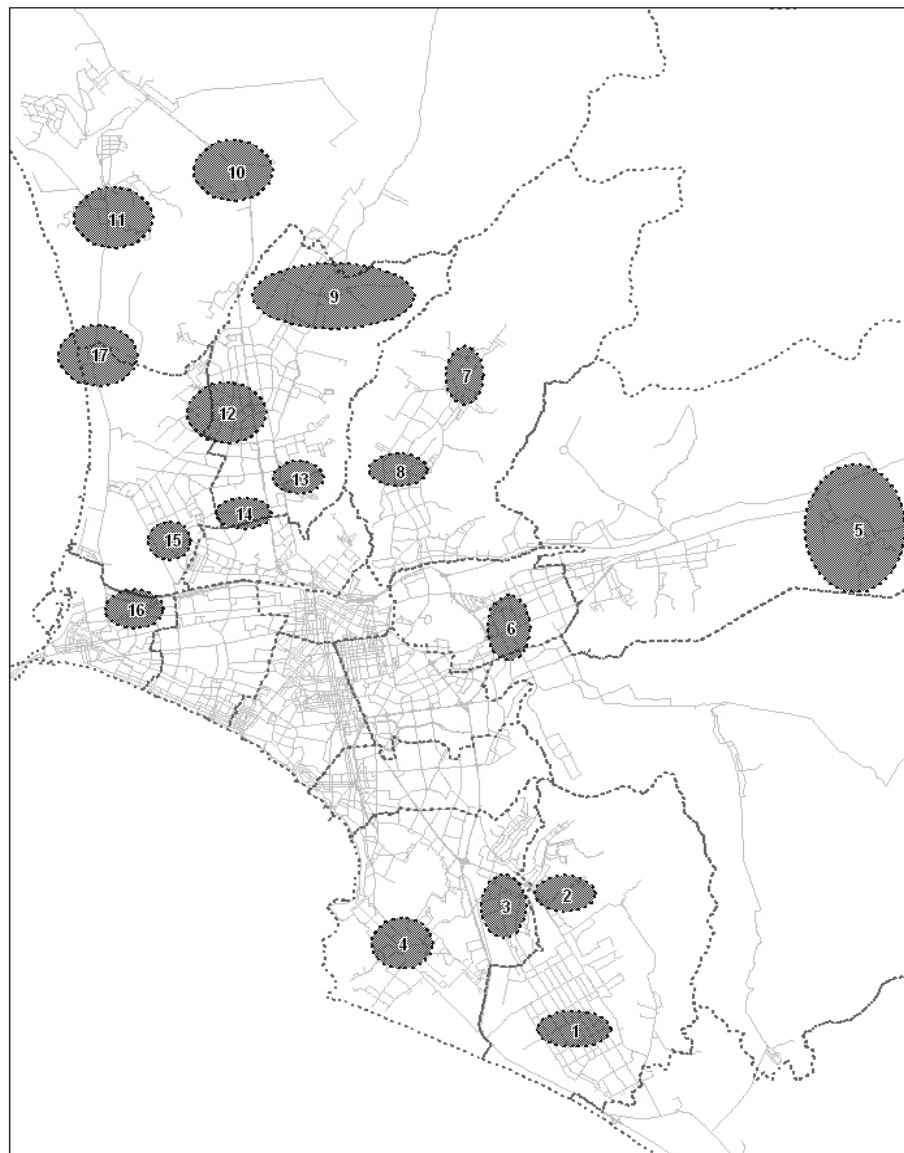


Figure 5.5-32 Moto-taxi Survey Locations

1) Trip Purpose

Figure 5.5-33 shows the composition ratio of trip purposes in the morning peak hour, which are composed of “to work”, “to school” and “others”. The ratio of “to work” and “to school” purposes account for approximately 46% of the total. This is the same ratio as that of the taxi. As it can be seen, it is obvious that a moto-taxi is used for many purposes in comparison to the bus and Colectivo, which is used for specialized purposes: “to work and to school” in the morning peak hour.

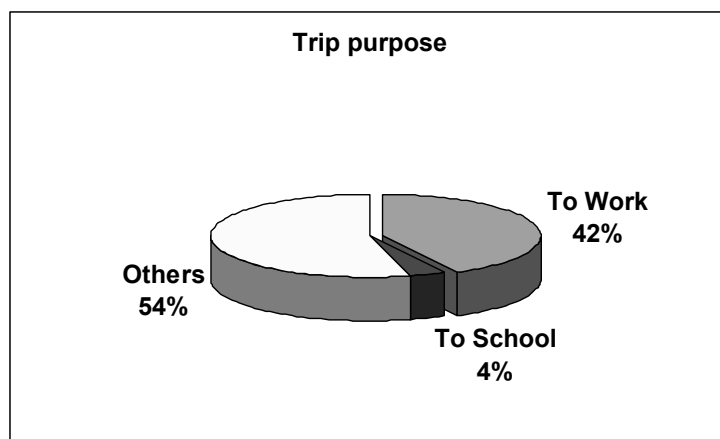


Figure 5.5-33 Composition ratio of Trip Purposes of Moto-taxi Users

2) Travel Time

Figure 5.5-34 shows the distribution of travel time by moto-taxi. As it can be seen, approximately 90% of the total have a travel time of less than 10 minutes and the ratio of travel time to exceed 20 minutes is as low as 10%. As it can be seen, the passenger uses a moto-taxi for a short time trip.

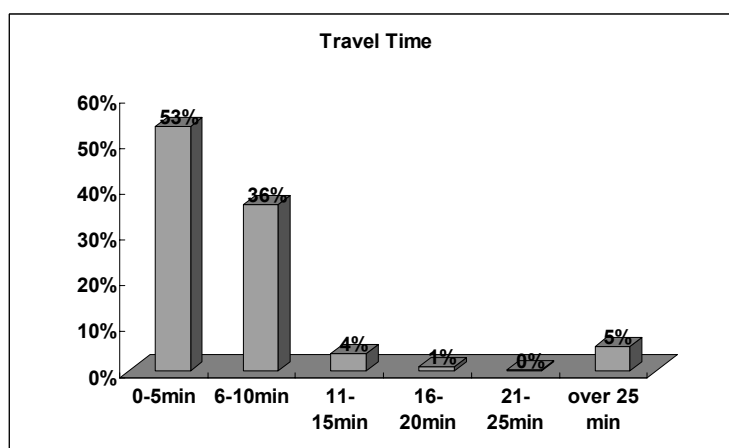


Figure 5.5-34 Distribution of Travel Time of Moto-taxi Users

3) Moto-taxi Fare

Figure 5.5-35 shows the distribution of the paid moto-taxi fee in the morning peak hour. As it can be seen, approximately 60% of the total is a paid fare of S/. 0.50 or less. This fare rate is approximately a quarter or half of the bus fare rate.

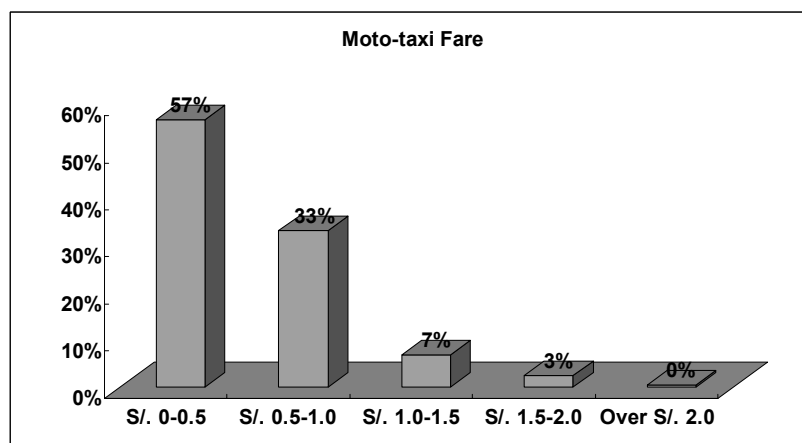


Figure 5.5-35 Distribution of the Moto-taxi Fare Rate

4) Alternatives

Figure 5.5-36 shows the composition ratio of other public transport uses when passengers do not take a moto-taxi. As it can be seen, the highest ratio is others including walking. Its figure is approximately 34%. The second highest is public transport (omnibus, microbus and camioneta). It takes 30% of the total in use. “colectivo” is 14% in ratio. This means that the alternative mode instead of moto-taxi is walking.

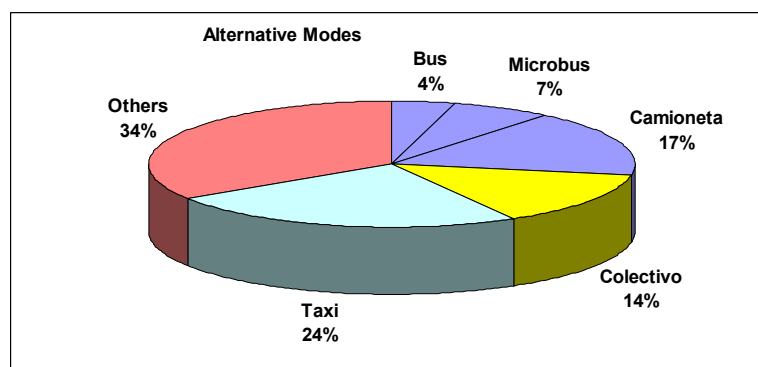


Figure 5.5-36 Composition Ratio of Other Public Transport Uses

5) Reasons for Moto-taxi Use

Figure 5.5-37 shows the composition ratio of reasons of taxi use. “Low fare” (47% of the total) takes the highest ratio of the reasons, followed by “No bus routes” (23%), and “Faster than bus” (7%) in exclusive of “Others”. As it can be seen, the main reason of moto-taxi use is that it is easy to use due to a low fare.

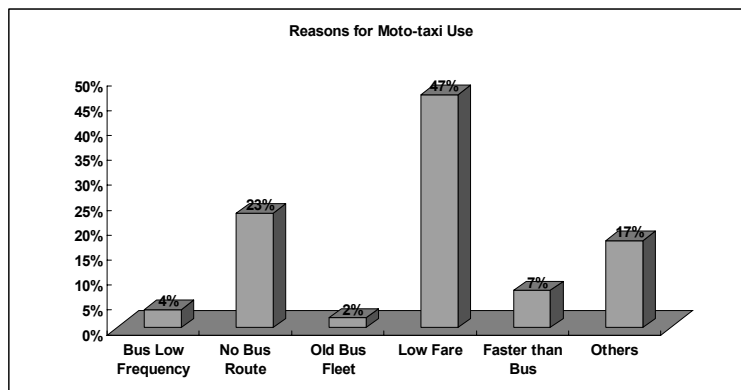


Figure 5.5-37 Composition Ratio of Reasons of Moto-taxi Use

6) Problems of Moto-taxis

The moto-taxi passenger's opinion for the current problems was surveyed. The four (4) items of the current problems were prepared beforehand in the survey sheet. The survey results are summarized in Figure 5.5-38. The problems of security and traffic safety take the higher ratio. Those figures are 47%, and 14% of the total, respectively. The item "Others" is also higher in ratio, which mainly includes the reason of "driver's manner", "no comfortable" and "low maintenance".

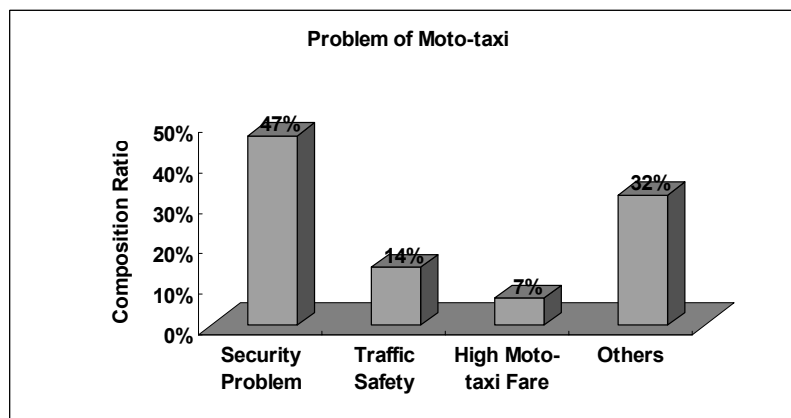


Figure 5.5-38 Distribution of User's Opinion for Moto-taxi Problems

(3) Moto-taxi Driver

In the Moto-taxi driver interview survey, in which about 450 drivers were sampled, the driver's conditions were collected. From the analyses of the collected data, such as working pattern, taxi possession, working hour and number of trips, the driver's working condition was disclosed. The detailed analysis is shown in the following sections.

1) Working Pattern

Figure 5.5-39 shows the composition ratio of the working pattern for drivers classified into primary and part time jobs. Almost all drivers are belonging to the primary job type. The ratio of part time jobs is low. The figure is 9% of the total. This figure is also lower than that of the taxi drivers (15% for the unauthorized taxis).

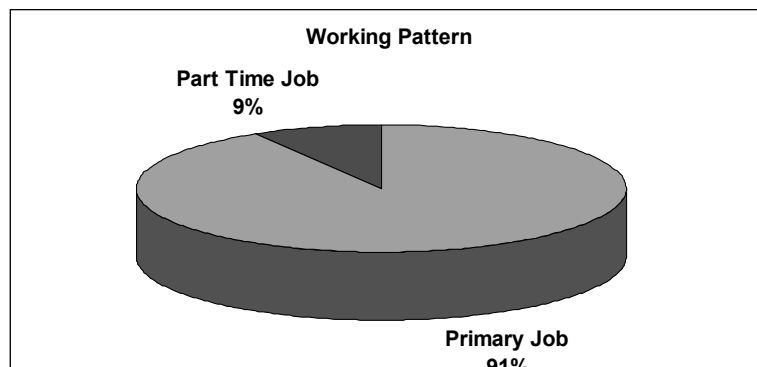


Figure 5.5-39 Composition Ratio of the Working Pattern of Drivers

2) Type of Moto-taxi Possession

Figure 5.5-40 shows the composition ratio of the type of taxi possession classified into owned and rental taxi. The ratio of the owned is higher than that of rental. The figure of the owned is approximately 52%, which is similar to that of the colectivo (55%).

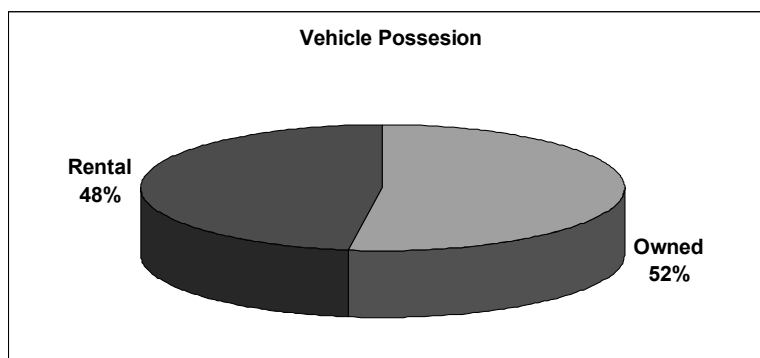


Figure 5.5-40 Composition Ratio of Type of Moto-taxi Possession

3) Working Hour

Figure 5.5-41 shows the composition ratio of working hour by driver. The average working hour is approximately 14 hours. Approximately 80% of drivers work a range between 12 and 18 hours. This figure is similar to that of the taxi drivers, not for the colectivo (50%).

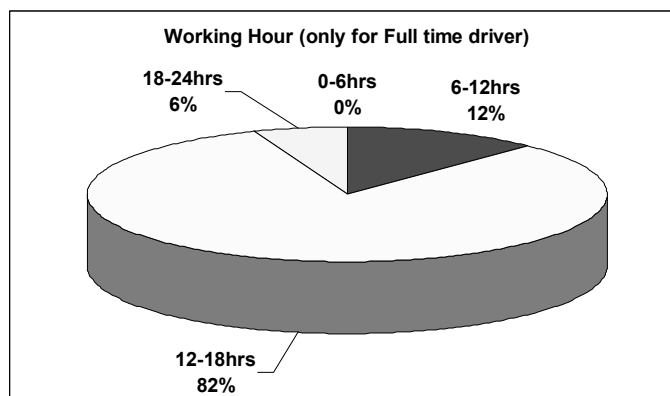


Figure 5.5-41 Composition Ratio of Working Hour

4) Number of Trips per Day

Figure 5.5-42 shows the distribution of an average number of trips per day by moto-taxi. As it can be seen, the average number of daily trip is approximately 40 times, which are double the average number taxi trips. The ratio of the number of trips to exceed 40 times the total is approximately 50%. Since passengers easily use moto-taxis due to the low fare, the number of trips is many.

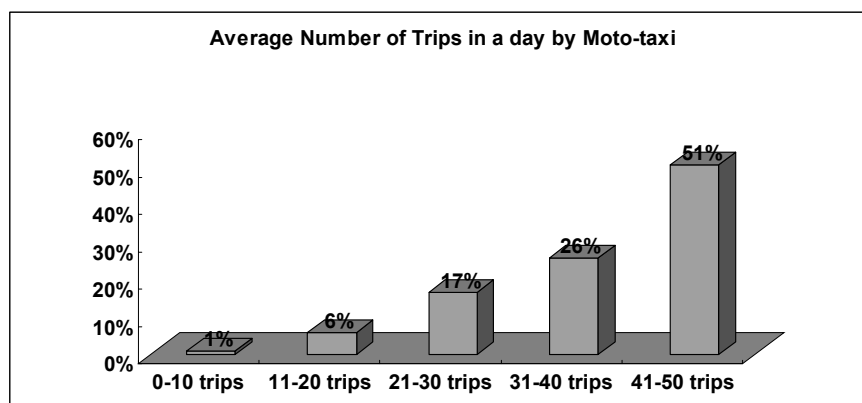


Figure 5.5-42 Average Number of Trips by Moto-taxi

5.6. CURRENT PROBLEMS AND ISSUES

Table 5.6-1 and Figure 5.6-2 show a summary of the existing public transport conditions and problems in the metropolitan area of Lima and Callao. Public transport in the area is composed of buses, taxis, colectivos, and moto-taxis as a paratransit. The main public transport is the bus transport and its complement and competitive modes are taxis and colectivos.

The bus company operates the bus transport with an old-fashioned bus under a severe competition with others due to the weak restriction. The bus passengers are forced to accept a long travel time under uncomfortable conditions. Residents in the metropolitan area suffer traffic congestion, traffic accidents and problems of air and noise pollution under severe urban traffic and transport conditions.

(1) Bus Operation

There are too many bus routes authorized by the municipalities. There are currently approximately 570 routes. Those routes are concentrated in particular roads in the Center. For example, approximately 150 routes pass through Av. Ugarte. This is because the bus routes covers all of the metropolitan area from residential areas in the suburbs and the bus route configuration makes it possible for bus passengers to arrive at many destinations without making transfers from suburb areas. As a result, the number of bus routes increase.

The bus is operated in accordance with passenger demand under this bus route configuration. Therefore, bus passengers are close to the bus capacity on a segment of a bus route, while on other segments the capacity is not reached. This means that the efficiency of the bus operation become worse. In consideration of the efficiency, a shuttle operation system on the route segment with heavy demand will be proposed. In the system, the number of the routes will be decreased, while the number of service frequencies will be increased. This system will be more efficient.

Since the bus passengers board in a suburb and alight in the Center, the efficiency of the bus operation becomes better on the bus route between the suburb and Center. On the other

hand, on the route between a suburb and a suburb by the way of the Center, the efficiency becomes worse. Since there are many of these types of routes in the metropolitan area, the bus company's financial balance worsens.

The average distance of bus routes is approximately 64.3km in the roundtrip route. This means approximately 30-40km in the single route, whose distance is equivalent to the distance between the south and north of Lima. There are a considerable number of bus routes unauthorized by the municipalities. As a result, those operating conditions cause excessive competition.

The maximum bus passenger volume ranges between 30,000 and 38,000 passengers/hour/direction in the morning peak. The passengers use Omnibus, Microbus and Combi-bus. The maximum number of buses on the roads is approximately 1,600 vehicles/hour/direction in the morning peak. Approximately 50% of the total in average is Combi-bus. This causes heavy traffic congestion.

(2) Bus Service in Low-Income Residential Areas

The public bus transport service in low-income residential areas has several problems in the bus route network. The extreme low-income population (2.3% of the total population in 2002 according to statistical data of the INEI) lives in the slopes of hilly terrains and mountains far away from major roads. Since the buses are directly operated into these low-income areas, the resident in the area must use a moto-taxi to arrive home after alighting a bus as shown in Figure 5.6-1.

Although residents request the extension of a new bus route into the area, bus companies do not welcome this request due to the low passenger demand and a worse access road. At the same time, the company is resistant from the point of view of the financial balance due to the competition with moto-taxis with a low fare rate. At present, the residents pay the bus fare. Additionally, the moto-taxi or colectivo fare must also be paid. In some case, the residents go to a road with a bus route on foot as a self-defense measure. Therefore, it is indispensable to serve a new public transport system.

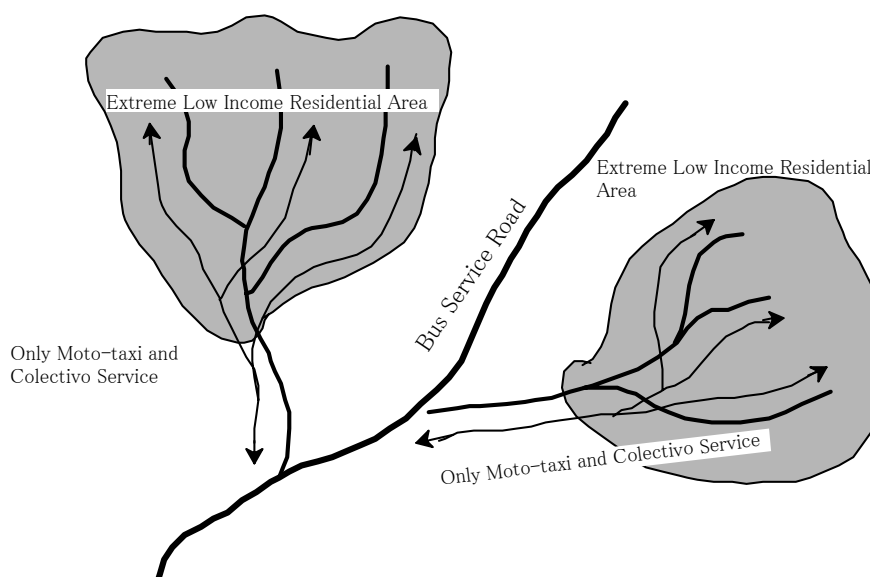


Figure 5.6-1 Existing Public Transport Service in Low Income Residential Areas

(3) Bus Facility

The total length of the busway exclusive of private vehicles with fence and cube at the present is approximately 30km. Bus stops are not prepared in Lima and Callao beyond particular roads, which are Av. Venezuela, Av. Javier Prado, etc. There are no bus terminals either.

Therefore, bus passenger's board and alight buses everywhere, whether bus stop facilities exists or not, when bus passengers raise their hand as a signal at sidewalks on roads with the approach of buses. However, in the planning stage of a bus system, such as the rerouting or integration of a bus route and an advanced operation system, it is necessary to prepare bus stop facilities and to practice boarding and alighting at bus stops.

(4) Taxi and Colectivo

The number of taxies in Lima is approximately 30,000 vehicles. Moreover, there are many taxis not registered in the DMTU, whose figure is not identified. In the 104 traffic volume count survey, the ratio of the authorized and unauthorized taxies operated on the roads is approximately 1 to 1. colectivos also operate as a fixed-route taxi like a bus. The advantage of colectivos against the bus transport is that they provide a rapid operation taking a seat. The actual conditions of operation for colectivos are not available in the DMTU.

On Av. Carretera Ventanilla, the traffic volume ratio of colectivos stands for approximately 45% of the total. It is obvious that this mode of transport shares passengers with bus transport.

(5) Competition with Bus, Taxi and Colectivo

Although the bus, taxi and colectivo are important public transport modes in the metropolitan area of Lima and Callao, these modes of transport share passengers under the keen competition of fare rates, operation speeds and convenience due to the excessive number of vehicles on the supply side. Moreover, it is difficult to increase a bus fare rate in order to free competition. Under these conditions, it is difficult to manage bus companies in terms of income and expenditure balance.

(6) Other Conditions

1) Bus Company

It is difficult to manage bus companies in terms of income and expenditure balance under the keen competition and it is difficult to purchase new bus fleets. The average buses are old-fashioned and the bus fleets are not enough to maintain. This causes air and noise pollution. The number of small buses (combi-bus) is more than that of the large and medium buses, and the figures have recently increased. This causes traffic congestion on the roadways.

2) Bus Passenger

From the viewpoint of bus passengers, the bus route network covers all the areas and prepares bus routes on which it is possible to arrive at destinations without transfers. The route configuration forces a long travel time for bus passenger in order to make a detour. Many small buses cause traffic congestion. Recently, those small buses have increased due to the request of bus passengers, which prepare a rapid operation and adequately fit in narrow roads.

Of the bus passengers, approximately 35% (2.3% for the extreme low-income population) belong to the low-income population. It is necessary to plan a public transport for this poor population.

3) Administration

The administration of the public transport is not enough to control the unauthorized operation of buses, taxis and colectivos, which serve a rapid transport with a low fare rate for bus passengers. This occurs because the administration does not have the necessary power or its structure is inadequate to control the transport operation.

4) Citizen

Residents in the metropolitan area suffer traffic congestion, traffic accidents and problems of air and noise pollution under severe urban traffic and transport conditions.

Table 5.6-1 Summary of Existing Public Transport

	Items	Sub-items	Lima	Callao	Issues	
Bus	Bus Route	Number of Bus Routes	431	263	Too many bus routes	
				-	Unauthorized bus routes	
		Number of Bus routes on Roads	150 or more	-	Too many bus routes on roads	
		Configuration		-	Too many destinations from origin	
		Average Route Length	64.3km/round	-	Long distance routes	
	Bus Operation	Bus Passengers on Roads	Maximum 30,000 to 34,000 paxs/dir/hr in 1997	-	-	Loading and unloading everywhere
		Number of Buses on Roads	Maximum 1,300 veh/dir/hr in 1997	-	-	Too many operated buses on routes
		Operation speed	12- 15km/h	-	-	-
	Bus Facilities	Busway	Paseo de la Republica, Av. Tomas Marsano, Av. Brazil	-	-	30km
		Bus Stops	-	-	-	Few bus stop facilities, besides Paseo de la Republica and some major roads
		Bus Terminals	-	-	-	Nothing but only private bus company's deposit
	Bus Fleet	Bus Tariff	\$ 0.5-1.0 Sol	-	-	Low bus fare
	Number of Bus Fleet	Lima in 2003		24,500	-	Low maintenance of bus fleet
		Callao in 2004		-	7,094	Too many small buses
Bus Company			1,196	150	-	
Administration				-	Weak bus control	
	Number of Taxies	Authorized in 2004	30,258	225	Many taxies	
		Unauthorized in 2004	27,000	925	Too many unauthorized taxies (not available in figures)	
	Taxi company		286	-	-	
Colectivo	On Av. Arequipa in Morning Peak	Car	9%	-	Colectivo is an unauthorized taxi	
		Taxi-authorized	3%	-	Many Colectivos	
		Taxi-unauthorized	13%	-	Problems for traffic safety	
		Colectivo	19%	-	Keen competition with buses on major roads	
		Buses	54%	-	-	
		Others	2%	-	-	
Total		100%			-	
Moto-taxi					Operation within suburban areas Function as a paratransit	

Lima Public Transport System

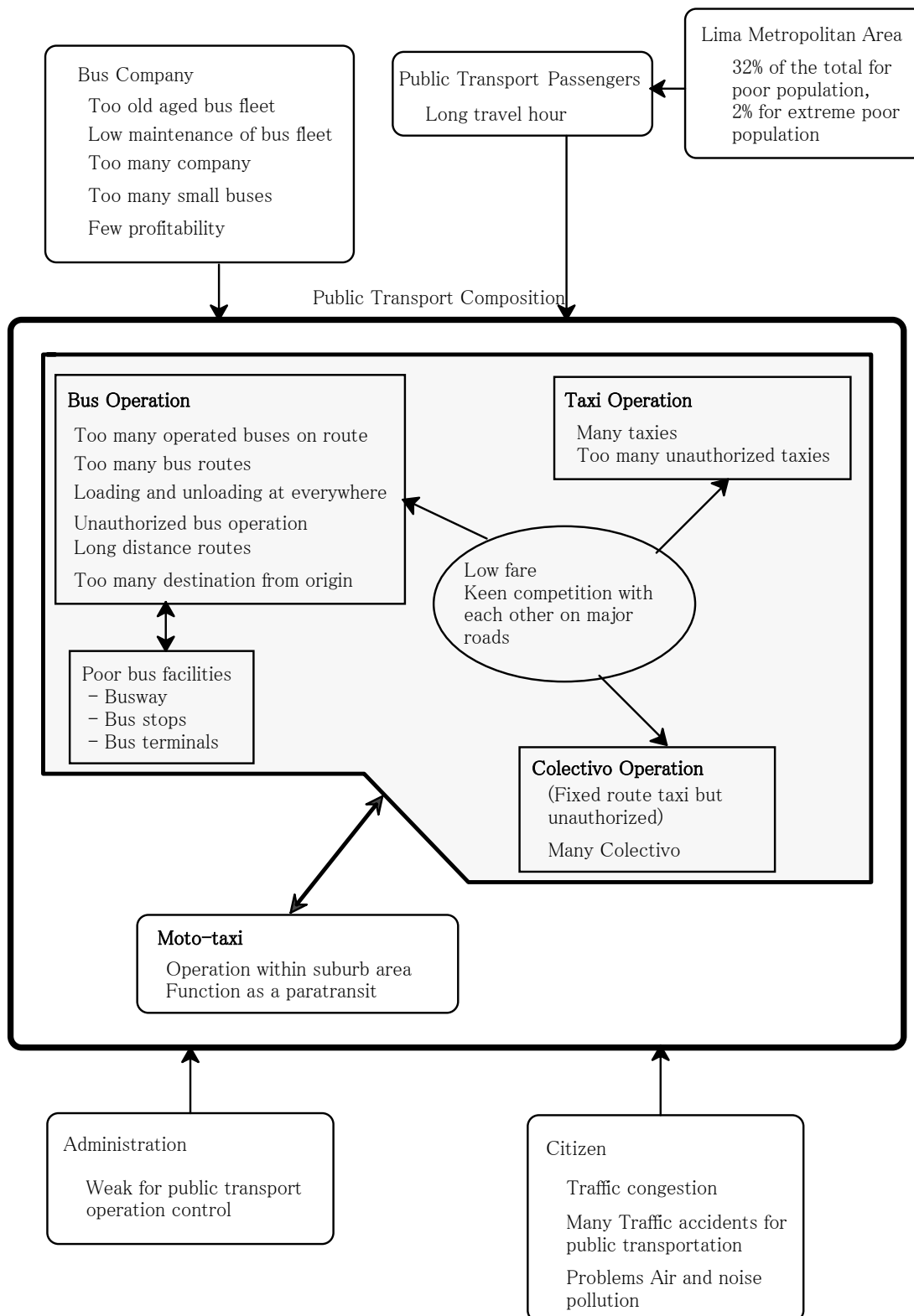


Figure 5.6-2 Problems of Existing Public Transport