CHAPTER 4

RAILWAY FARE AND PASSENGER SERVICE POLICY

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4.1 Railway Fare

4.1.1 Railway Fare Setting Methods

Railway fare setting methods differ between countries. Japan uses the multiple costing method. In multiple costing, the relationship between revenue and fare can be expressed as follows:

Total revenue (fare + other) = Total expenditure (labor costs, expenses, capital costs) in the rail way division + Profit

Notes: 1. Expenses are running costs (excluding labor costs)
2. Capital costs: Taxes, depreciation costs, and interest expenses

However, since construction projects for subways and public railways in large cities are often partially subsidized by the government or other agencies, the user fare bearing capacity is rather considered in multiple consisting.

In the JR Group, JR Hokkaido, Shikoku, and Kyushu are appropriating operating profits from the management stabilizing funds granted by the nation to compensate for the running costs.

Since public organizations have begun to promote adding or extending railway lines these days, fares also tend to place their bases on the infrastructure charges and railway business running costs.

European countries are now separating railway construction and management in terms of accounting, organization, and institution and setting up an environment that permits open access only from qualified railway managing bodies. In this case, fares will probably be determined by adding railway rents to the running costs of railway managing bodies.

In large cities, however, transportation fares are often suppressed to some extent for the convenience of citizens and smooth transportation. To compensate for the fare suppressions, running costs are subsidized in various ways.

Regarding passenger fares in the traffic zone of Paris, the national government, local government, and passenger transportation coordination organization are obliged to keep the revenue-and-expenditure balances of the transportation public corporation of Paris and the national railway of France. If an actual fare is set below the revenue-and-expenditure balancing fare, the national and local governments compensate for the balance at the ratio of 7: 3.

Railway companies in Germany are vertically separated into infrastructure divisions and transportation divisions and the latter divisions pay infrastructure charges. As to urban railways (city railways of about 50km at most), the transport fares are determined according to two standards under the passenger transportation law regulating fares - one oriented to sound corporate management and the other oriented to transportation policies. Since priority is generally given not to a high revenue but to a great passenger population, the transport fare level is generally lower than the cost level.

To promote public transports in domestic cities, a transportation union was formed to integrate short-distance and local corporate railways. The transportation union charges common fares. The member companies coordinate their traffic services and apply common fares. Fare revenues are pooled once in the union, then distributed to the member companies according to travel distances and other predetermined standards. The provincial governments pay costs necessary for the transportation union. The business subsidy amount is said to have reached about 54% of the total revenue (total in Germany, as of 1993).

Generally speaking, urban railways are actually receiving subsidies for their constructions and operations. Therefore, fares are also determined with this in mind.

In the Manila metropolitan area, the existing railways are LRT 1, 3 and PNR. In addition to these three lines, several lines are under construction or schedule.

LRT 1 (13.95 km with 18 stations) is owned and managed by LRTA (a special company 100% invested by the government) and operated by a private company (METRO 100% invested by LRTA, until June 2000) under a contract with LRTA. The fares for the line are flat (12 pesos for a token but 2 pesos between three end stations) but the introduction of magnetic cards is scheduled in December 2000 to adopt the travel-kilometer system (or travel distance system). Fares under the new fare system are yet to be determined.

LRT 3 was constructed by MRTC (a consortium invested by 7 companies) using the BLT method and operated by DOTC. After 25-year lease, this railway will be owned by the nation.

When the railway was tentatively opened in December 1999 (12.9 km with 10 stations), the travel-kilometer fares from 17 to 34 pesos were set. Because of a small passenger population, however, the fares were reduced to 12 to 20 pesos by revision in February 2000. When the first planned section (16.9 km with 13 stations) was completed in July this year, the fares were reduced again to the six-month tentative fares of 9.5 to 15 pesos to increase the passenger population.

PNR, a national railway under DOTC supervision, uses the travel distance system for about 30 km in the urban commutation area. The fares are set lower than those of jeepneys.

For MRT 2 now under construction, the travel-kilometer system (or travel distance system) will be adopted with the same fare rates as LRT 1 because both LRT lines are under LRTA management.

LRT 6 under schedule for BOT construction will adopt a fare rate system similar to that of LRT Line 1 because the railway is to be constructed on an extension from LRT Line 1.

LRT 4 is saved for future discussion because neither the constructor nor the management body is known.

DOTC's basic policy about railway fares is based on the recognition that it is difficult to cover all costs with fares. According to this policy, the government should owe infrastructure costs and the fares should be determined with an emphasis on the following:

① Making the maximum use of transportation capacity
② Reducing the governmental subsidies
③ Giving incentives to railway companies for keeping high service levels

By this policy, DOTC says that it is not appropriate to set fares beyond the fare bearing capacity of general passengers. Railway managing bodies are expected to ensure high service levels by management efforts with governmental assistance.

Under these circumstances, competitive railway fares will be set by considering the price levels and the fares of other public transports.

4.1.2 Railway Fare Systems

Flat, travel-kilometer, travel distance, and distance fare systems

Railways in large cities may use the flat fare system for short lines. The flat fare system used to be promoted because turning ticket barriers can reduce necessary personnel for ticket punching. However, since the working kilometers of urban railways increased and the automatic ticket barriers suppressed personnel at ticket barriers, the travel distance fare system reflecting the travel distance is generally adopted.

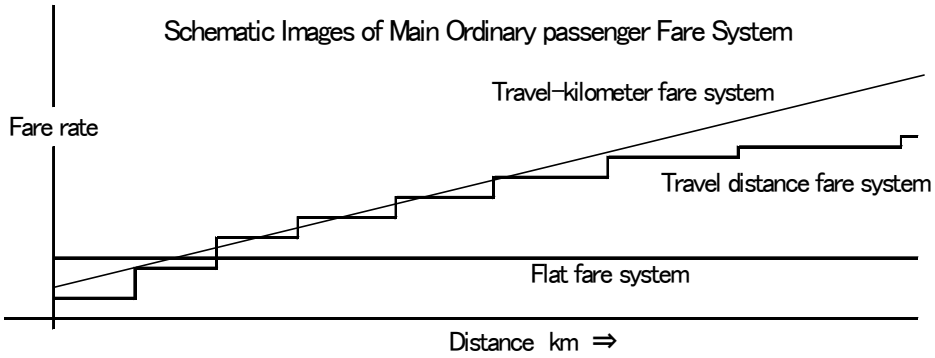


Fig. 4.1.1 Railway Fare Systems in Japan

For Manila, the travel distance fare system seems appropriate because LRT constructions will be promoted sequentially through mutual cooperation in future.

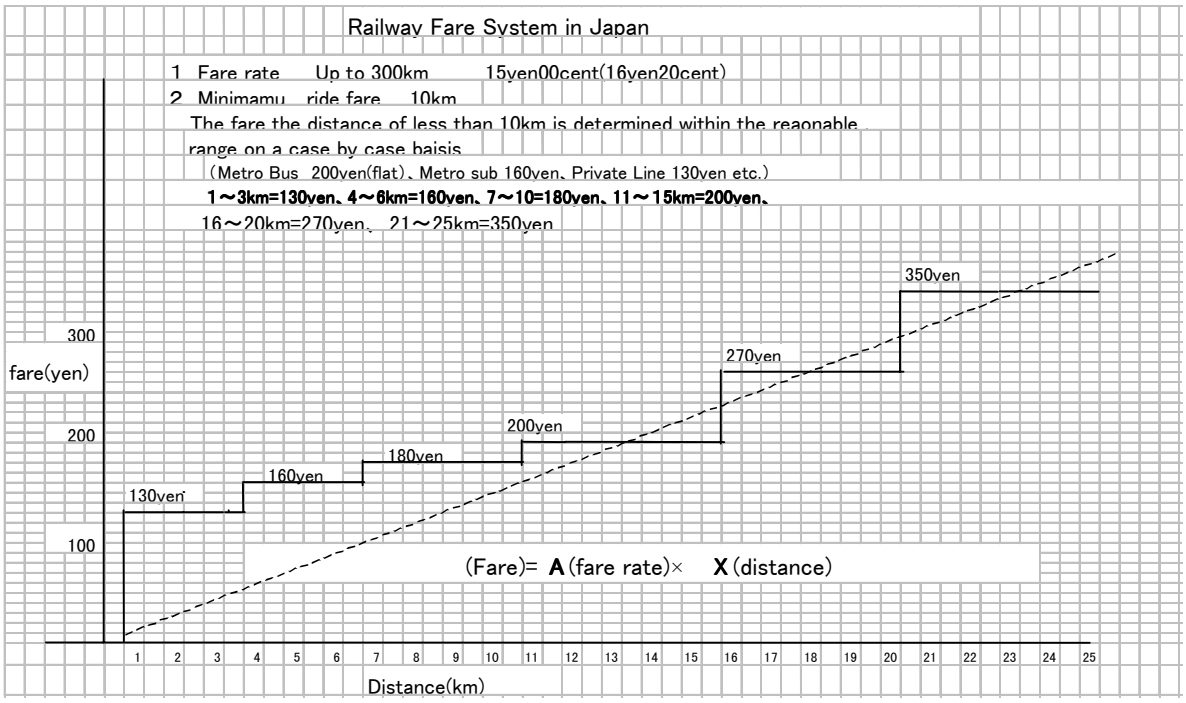


Fig. 4.1.2 Railway Fare System in Japan

4.1.3 Railway Company Fare Levels

Fares may differ between railways companies depending on the service levels and past experiences. For example, LRT 1 has made great achievements since opened 15 years ago and now has regular users, while LRT 3 has just opened and not made achievements yet. In terms of service, cars on LRT 1 are air-conditioned enough while those on LRT 3 are fully conditioned. In addition, there is a great difference in fare bearing capacity between the line because the passengers using LRT 3 are mainly workers while those using LRT 1 are students. In addition, the main competitors for LRT 3 are buses while those for LRT 1 are jeepneys. For MRT 2, workers and students account for about half the passengers and the main competitors are jeepneys. This is why fares may differ between lines.

However, a fare system too complicated may not be preferable in Manila because the railway managing bodies tend to adopt the through-fare system.

Table 4.1.1 Transportation Service Conditions for Each Line

Item \ Line	LRT 1	LRT 3	MRT 2
Competitive transport	Mainly jeepney	Bus	Jeepney (Partially bus)
User characteristic	Many students	Many workers (55.6%) Room for students on the opposite way	Workers and students
Speed	Fast (26.3k/h)	Fast (35.8k/h)	Fast (26.0k/h estimated)
Air-conditioning	Partially cooled	Cooled	(Cooled)

The EDSA Street where LRT 3 was constructed used to be a main road of 50 m wide with a great traffic capacity. However, the construction of LRT 3 reduced the effective road width about 20 to 30%. A high fare may cause a great loss in urban traffic if it is the reason for a small passenger population. A tentative fare reduction increases passengers. Carrying more passengers at low fares instead of air at high fares seems more significant for ensuring a revenue and an understanding about the convenience of a railway and for making an effective use of a social capital. (The fares may be set low for the time being and returned to the normal level after the service facilities are upgraded.)

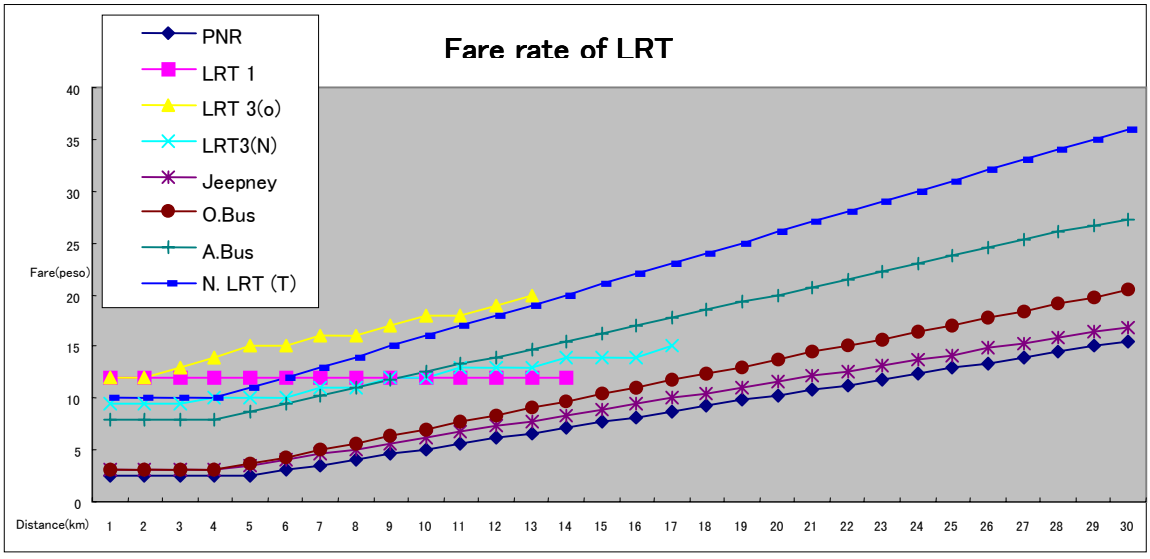
4.1.4 Standard Fare Setting

For railways in Manila, it is very difficult to determine optimum line fares. As expected numeric values are available from past reports on various surveys, no more survey may be needed. For future proposals about fares, however, preferable fares are estimated here for reference.

Since the government has three basic policies about fares as mentioned before, the LRT fares should not be set beyond the fare bearing capacity of general users but by considering competitions with other public transports.

LRT 1 has an adequate history of transportation with a user understanding about the speed and fare level and requires even further enhancement of the transportation capacity. LRT 3 is still not exhibiting its advantages after about one year in service because the line is not completed, and has not aroused the demand to the full because the fares are higher than people think.

In this survey, the traffic demand estimation model (STRADA) developed by JICA was used. In this case, fares were set slightly higher than those of air-conditioned buses comparatively close to the railway cars in transportation service conditions. The reference transportation capacity was calculated by adding the walk time, wait time, get-on/off time, travel time, and congestion to the tentative fares. Then, the fare where the passenger population and revenue become the greatest was calculated, by using fares as a key parameter. The results of the above analysis are as follows.



(Note) N. LRT (T) shows tentative fares.

Fig. 4.1.3 Transport Fares and LRT Tentative Fares

The results of the above sensitivity analysis are as follows:

Table 4.1.2 Sensitivity Analysis on Tentative Reference Values

	Line	20%down	15%down	10%down	5%down	Base
Passengers/day	LRT 1	729,337(+35.8)	720,474(+34.1)	632,893(+17.8)	615,420(+14.6)	536,907(100)
	LRT 3	636,073(+67.1)	608,572(+59.9)	517,234(+35.9)	476,768(+25.3)	380,473(100)
	MRT 2	608,416(+24.4)	592,533(+21.1)	547,805(+12.0)	526,138(+7.6)	489,017(100)
Average fare (peso)	LRT 1	12.03 (-21.8)	12.66 (-17.7)	13.66 (-11.3)	14.42(-6.4)	15.39 (100)
	LRT 3	12.89 (-20.7)	13.62 (-16.2)	14.29 (-12.1)	15.23(-6.3)	16.24 (100)
	MRT 2	11.13 (-22.0)	11.87 (-16.8)	12.69 (-11.1)	13.48(-5.5)	14.26 (100)
Revenue (1000pesos)	LRT 1	8,774 (+ 6.1)	9,121 (+10.3)	8,645 (+4.6)	8,874(+7.4)	8,263 (100)
	LRT 3	8,199 (+32.7)	8,289 (+34.1)	7,391 (+19.6)	7,261(+17.5)	6,179 (100)
	MRT 2	6,772 (- 2.9)	7,033 (+ 0.8)	6,952 (-0.4)	7,092(+1.7)	6,973 (100)

If the fares are raised 10% from the tentative ones

Line 1: Number of passengers down 15.2% and revenue down 0.6%

Line 3: Number of passengers down 21.8% and revenue down 14.1%

Line 2: Number of passengers down 7.6.% and revenue down 0.7%

If the fares are reduced 10%

Line 1: Number of passengers up 17.8% and revenue up 4.6%

Line 3: Number of passengers up 35.9% and revenue up 19.6%

Line 2: Number of passengers up 12% and revenue down 0.4%

If the fares are reduced 15%

Line 1: Number of passengers up 34.1% and revenue up 10.3%

Line 3: Number of passengers up 59.9% and revenue up 34.1%

Line 2: Number of passengers up 21.1% and revenue up 0.8%

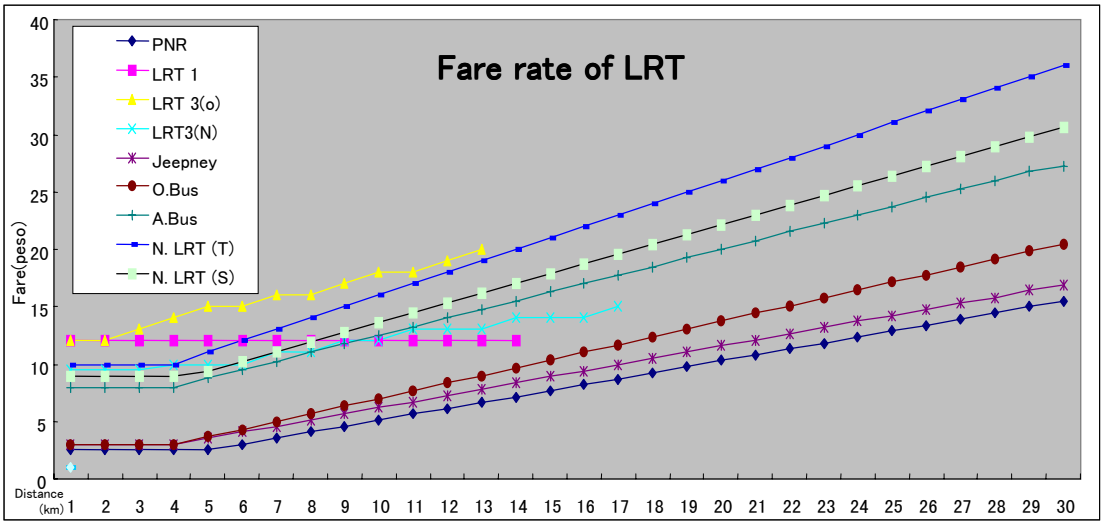
If the fares are reduced 20%

Line 1: Number of passengers up 35.8% and revenue up 6.1%

Line 3: Number of passengers up 67.1% and revenue up 32.7%

Line 2: Number of passengers up 24.4% and revenue down 2.9%

Therefore, 15% down from the reference values may be the fare level for satisfactory revenue and passenger population where a fare reduction increases both the passenger population and the fare revenue.



(Unit : peso)

Distance (km)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
PNR	2.5	2.5	2.5	2.5	2.5	3.0	3.5	4.0	4.5	5.1	5.6	6.1	6.6	7.1	7.6	8.2	8.7	9.2	9.8	10	11	11	12	12	13	13	14	14	15	16
LRT 1	12	12	12	12	12	12	12	12	12	12	12	12	12	12																
LRT 3(o)	12	12	13	14	15	15	16	16	17	18	18	19	20																	
LRT3(N)	9.5	9.5	9.5	10	10	10	11	11	12	12	13	13	13	14	14	14	15													
Jeepney	3	3	3	3	3.5	4.1	4.6	5.1	5.7	6.2	6.7	7.3	7.8	8.4	8.9	9.4	10	11	11	12	12	13	13	14	14	15	15	16	16	17
O.Bus	3	3	3	3	3.7	4.3	5	5.7	6.4	7	7.7	8.4	9	9.7	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20
A.Bus	**8**	**8**	**8**	**8**	**8.8**	**9.5**	**10**	**11**	**12**	**13**	**13**	**14**	**15**	**16**	**16**	**17**	**18**	**19**	**19**	**20**	**21**	**22**	**22**	**23**	**24**	**25**	**25**	**26**	**27**	**27**
N. LRT (T)	**10**	**10**	**10**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**
N. LRT (S)	**9**	**9**	**9**	**9**	**9.4**	**10**	**11**	**12**	**13**	**14**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**26**	**27**	**28**	**29**	**30**	**31**

(Note) 1. Inter-company fare rate is assumed to be set on the conditions where through -fare system is applied to operation distance (km) common tickets used.
2. N. LRT (S) shows standard fares.

Fig. 4.1.4 LRT Fare Rates

4.1.5 Ticket Types and Discount Fares

(1) Ticket types

Ticket types differ between countries. In general, various tickets are issued to increase railway passengers. However, the types of tickets convenient for urban transportation are limited.

In Japan, ordinary single tickets, I.O. Card, coupon tickets,. and commutation tickets are issued. In Manila, Single Journey Ticket (SJT) and Stored Value Ticket (SVT) are issued.

Table 4.1.3 Railway tickets for urban transportation
(Comparison between Japan and Manila)

Japan	Manila
Ordinary single ticket	Single Journey Ticket
Ordinary return ticket ・・・ Saving the trouble of buying a ticket for the way back from an event, sometimes with a slight discount	—
I.O. Card ・・・Allowing a ride from and to anywhere, with no discount （5000yen, 3000yen） Saving the trouble of buying a ticket for the way back	Stored Value Ticket (Discount rate: 7% max)
Coupon ticket ・・・ For riding a limited section at the fare indicated on the ticket with a 10% discount (10-ticket fare for 11 single tickets), saving an infrequent railway user from a congestion	
Commutation ticket ・・・ Used to go to office or school, sometimes with a 50% or greater discount (valid for 1, 3, or 6 months)	—
One-day area ticket ・・・ One-day ticket for unlimited ride within an area at a fare about 5 times the minimum section fare for sightseeing, excursion, and business	—

Commutation ticket is indispensable for a worker or student going daily to office or school by changing trains. I.O. Card is useful for using a railway for a short term or riding indefinite sections daily. Coupon ticket is useful for riding back and forth the same section in a short term. SVT in Manila has an intermediate characteristic between I.O. Card and coupon ticket, useful but not strong enough to increase railway users.

(2) Fare discount

About fare discounts, there is a great discrepancy between Manila and Japan. In Manila, fare discounts to aged, physically handicapped, and student passengers are given or under study. We have the same system in Japan for social welfare and not for sales.

From the viewpoint of sales, Stored Value Ticket (SVT) in Manila gives the last single premium as an equivalent of discount. The premium is 14 pesos at most for 200-peso SVT and the discount rate is 14/200=0.07%. This ticket may save the user from the trouble of buying a ticket each time at a station but is doubtful about the effect of inducing the user to select railway from various transports. In Japan, commutation ticket may be an equivalent of fare discount on urban railways. This enhances the commuter

convenience, increases the commuter population, and serves greatly for settling railway users and reserving revenues.

Urban transportation in the Manila metropolitan area seems to require some railway user incentives like commutation ticket to promote the future development of railway and to enhance its role.

Urban railway users can be classified into commuters, general passengers, and tourists. As a rule, commuters use railways every day except on weekends, especially in limited morning and afternoon hours. General passengers use railways sometimes in the week, especially in daytime hours, and tourists mostly use railways on holidays.

Therefore, several fare patterns depending on purposes may be determined from the said reference fares and applied to make the fare system more flexible.

To general passengers and tourists, the said standard fares apply because they are infrequent railway users. The reference fares were determined by considering the prices and competitions with other transports and have no problems.

As to commuters accounting a great percentage among urban transport passengers, workers generally have one day off a week but workers at public organizations or large enterprises public servants and students have two days off. These commuters generally travel fixed sections once each in the morning and afternoon. Therefore, giving some incentives to this commutation will promote railway uses. As an incentive, discount commutation tickets valid for one month, three months, and six months will be sold. By giving different discounts to workers and students, the fare bearing capacity of railway users can also be considered as one of the railway line characteristics.

Basically speaking, passenger transportation is two-way while cargo transportation is one-way. About LRT passengers in Manila, the number of passengers getting on at each station differs greatly from that of passengers getting off. Despite some exceptions, passengers equivalent of this difference may be using other transports.

Table 4.1.4 Passengers Getting On and Off at Each Station of LRT Line 1

(Unit: 1000)

Station	BAC	EDC	LIB	PUY	CRU	QUI	GIL	UN	CEN	CAR	JOS	BAM	TAY	BLU	SAN	PAP	5TH	MON
Getting on	38	34	22	41	9	5	19	21	9	25	15	4	12	15	11	7	22	71
Getting off	51	34	17	35	10	7	16	31	11	24	15	3	10	14	4	5	10	82
Difference	13		5	6	1	2	3	10	2	1		1	2	1	7	2	12	11

According to the railway user survey conducted in April 2000, the commutation patterns of railway users in Manila seem to indicate that commuters always use the same transport if any useful for going from home to office but select one according to the circumstances if there are several choices. The weekly rates of railway use are 1 to 3 times (33%), 4 to 6 times (28%), and 7 to 12 times (27%). This data is not totally reliable because the results also differ with the number of models in survey hours, but indicates that railways are not very popular.

Therefore, appropriate transportation facilities may be able to induce a population equivalent of this difference to use railways.

Table 4.1.5 Trends of Railway Use (Weekly rates of railway use)

Usage / Line	1～3	4～6	7～12	13～20	Others	Average
LRT 1	30.1%	26.0%	32.1%	8.6%	3.0%	6.6(times)
LRT 3	33.2%	30.6%	22.8%	6.1%	4.3%	5.6(times)

When the UP urban development team conducted a consciousness survey on LRT 3 after a fare reduction, railway users slightly increased and the percentage of regular users became 51%. Considering that the passengers were mostly workers with only a small number of students, there may be still many potential users.

In addition, since LRT 1 is popular, entries into its stations are sometimes limited to ease congestions. LRT 3 is still not popular but the fare reduction at the opening of the first completed section has been increasing the passenger population gradually. Entries into LRT 3 stations are not limited but queues are seen at ticket windows. In addition, a plan is in progress for increasing the transportation capacity of LRT 1 in future. LRT 3 is now being prepared for full opening in 2003. Since MRT 2, LRT 6, and 4 are also constructed

to establish the railway transportation network, the passenger population of each line is expected to grow greatly. This will make it a great subject to ensure a smooth flow from ticket purchase at a ticket window to entry through a ticket barrier. Selling commutation tickets with certain terms of validity is very effective for solving this subject.

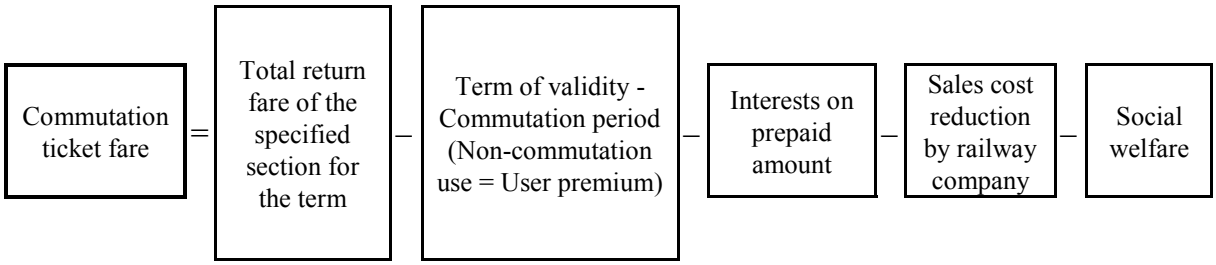
As LRT 1 is full of passengers, you may doubt whether the commutation ticket system that increases the volume of transportation is necessary for LRT 1 as equally as for LRT 3 with a small passenger population and MRT 2 with no background. In Manila, however, the railway service has just started but smooth urban transportation cannot be maintained without this service. Under these critical circumstances, the transportation capacity will further be strengthened for LRT 1 to play a satisfactory role. The current role seems not enough as the railway service. First, train runs at the intervals of 2 minutes and 30 seconds in rush hours should be ensured. Steady execution of this transportation project will enable the current transportation volume to be dealt with adequately.

Therefore, not only LRT 1 and 3 but also MRT 2 should adopt commutation tickets to allow free ride to commuters at discount fares. Since the fares do not change however often the users may ride trains, commutation tickets are helpful for inducing and securing railway users, reserving revenues, and also solving congestions at stations.

(3) Commutation ticket discount rates and terms of validity

The commutation ticket discount rates and terms of validity are significant. Commutation tickets may be valid for one month, three months or six months. However, since long-term commutation tickets seem impractical because users pay fares on their own in Manila, one-month or three-month commutation tickets may be appropriate. Even in that case, tentative payments by employers or installment payments should be studied about commutation tickets.

The discount rates should reflect interests on the prepaid fares, sales cost reductions by railway managing bodies, and user premiums and make users feel commutation tickets cost low.



The commutation ticket count rates have been set high from a long time ago as part of social welfare to workers and students. The high discount rates are probably unique to Japan but have been lowered gradually to reduce loads on railway managing bodies.

As to the popularity of commutation tickets in the Tokyo metropolitan area, commutation ticket users account for 65% and ordinary ticket users account for 35% among the JR passengers. Among private railway passengers, commutation ticket users account for 64% and ordinary ticket users account for 36%. Among the passengers of the metropolitan loop line and subways, commutation ticket users account for 62% and ordinary ticket users account for 38%.

Table 4.1.6 Ratio of Commutation and Ordinarily Ticket Use in Tokyo Area

	JR	Private Lines (7)	Subway Lines (2)
Commutation Ticket	65%	64%	62%
Ordinary Ticket (SJT)	35%	36%	38%

In case of JR, the discount rates are about 50% for worker commutation tickets and 62 to 70% for student commutation tickets.

Table 4.1.7 Reduced Rate of JR Commutation Ticket of Japan
(prepared based on 16 - 20 km travel distance model)

Normal Rate	Reduced Rate Commutation Ticket			
	Type of Ticket	One-month	Three-month	Six-month
100	Commutation	50	52.5	55
100	University student	62.2	64.1	66
100	High school student	67	68.7	70.3

(Note) 1. Reduced rate of commutation ticket = $1 - \frac{\text{One - month regular fare}}{\text{Round trip normal fare of 30 days/month}}$

2. Three-month reduced rate is obtained from the one-month commutation ticket fare multiplied by 3 and reduced by 5%. Six-month reduced rate is obtained from the one-month commutation ticket fare multiplied by 6 and reduced by 10%.

As privately owned railways can establish the fare rate based on the balance of revenue and expenditure, the average rate of 14 major railways is set to 41.5% for one-month

commutation ticket and 79.9% for student ticket, although there are some differences in different railways.

In the connection, because of the sharp increase in construction cost. The discount rate on the recently-opened Subway Line 12 is about 36% for commuter.

In European countries, commutation tickets are used in large cities. In London, Paris, and Frankfurt, the commutation tickets are valid for one week, one month, or one year and even discounted.

The discount rates commutation tickets in Manila should be studied by considering the commuters' tendency for using railways. Roughly speaking, most workers have a day off a week and students have two days off a week. Therefore, the monthly rate of railway use is estimated to be about 85% for workers but 71% for students. If these values are considered with other factors mentioned before, discounts of 30 to 40% seem acceptable. Considering the discrepancy of fare bearing capacity between workers and students, the discount rates should be from 20 to 30% for workers and from 30 to 40% for students. The different discount rates will solve the discrepancy of fare bearing capacity.

Table 4.1.8 Revenues and Fares at Different Discount Rates on 15-peso Single Fare

Ordinary monthly fare	Discount rate	Monthly revenue	Fare per ride (peso)						
900 pesos (15 pesos×2×30 days)	20%	720P(15P*30*2*0.8)	12	13.1	14.4	16	18	20.6	24
	25%	675P(15P*30*2*0.75)	11.25	12.27	13.5	15	16.87	19.28	22.5
	30%	630P(15P*30*2*0.7)	10.5	11.44	12.6	14	15.75	18	21
	35%	585P(15P*30*2*0.65)	9.75	10.63	11.7	13	14.62	16.7	19.5
	40%	540P(15P*30*2*0.6)	9	9.8	10.8	12	13.5	15.4	18
	45%	495P(15P*30*2*0.55)	8.25	9	9.9	11	12.37	14.14	16.5
	50%	450P(15P*30*2*0.5)	7.5	8.18	9	10	11.25	12.86	15
	Monthly use rate		60	55	50	45	40	35	30

Average number of use by worker＝ 6/7 (one day off) = 85.7%.
85.7%×60 (full monthly use) = **51.42 51 times**
Therefore, the discount rate should be determined to make the fare lower. If the premium is also considered, discounts from 20 to 30% may be appropriate.

Average number of use by student＝ 5/7 (two days off) = 71.4%
71.4%×60 (full monthly use) = **42.84 43 times**
Therefore, the discount rate should be determined to make the fare lower. If the premium is also considered, discounts from 30 to 40% may be appropriate.

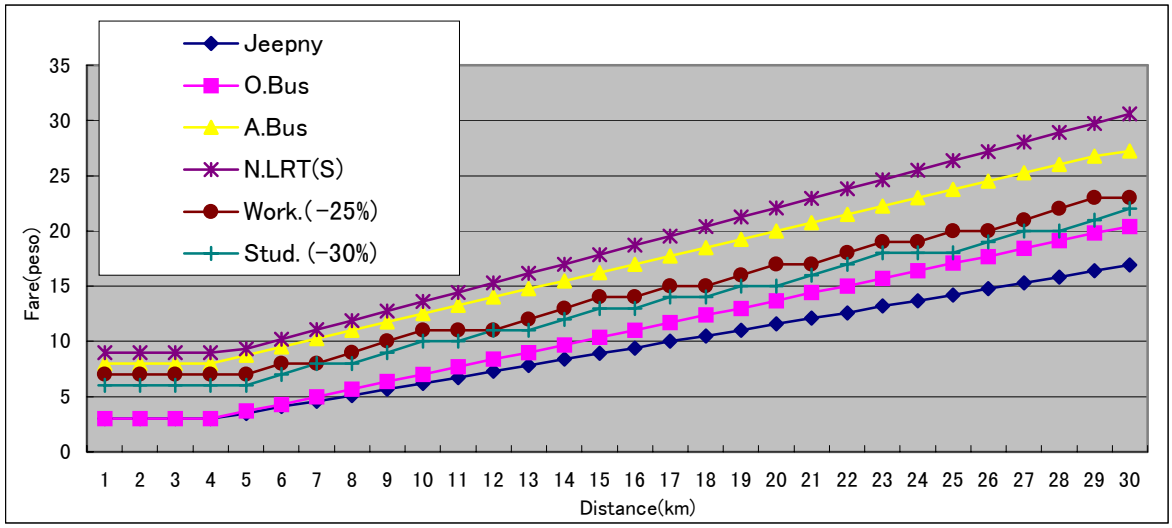


Fig. 4.1.5 Comparison of Ordinary and Commutation Ticket Fares

4.2 Strengthening Linkage between Railway Companies

4.2.1 Inter-railway Transit Tickets and Fares

(1) Common transit ticket

In Japan, the traditional way of railway transfer is to use a transit ticket that tells all railways to use and the total fare. The JR Group companies divided and privatized in 1987 from Japan National Railways use common tickets, including the through-fare system between companies. Between private companies in Tokyo and Osaka, magnetic cards are getting introduced as common tickets but the fares are not common yet.

DOTC, LRTA, and other related organizations agreed on about common tickets for railways in the Manila metropolitan area. At present, however, making tickets common is a difficult subject to solve even between LRT 1 and 3 because it costs high to integrate and unify systems installed individually at railway managing bodies.

From several ideas for common tickets, one costing less and containing future potentials should be selected. We will wait and see what the automatic ticket punching and collecting system division will do.

(2) Inter-railway transfer fare

To determine an inter-railway transfer fare, fares charged by railway managing bodies are aggregated (aggregate-fare system) or working kilometers covered by railway managing bodies are totaled (through-fare system).

In Metro Manila area, the existing railway are LRT 1, 3 and PNR. In addition, MRT 2 is underconstruction and others are in the planning stage. In general, however, it is very difficult to total working kilometers covered by different railway managing bodies because:

① In an urban transport for short-distance transportation, base fares (minimum fares) account for a great percentage of the revenue. Therefore, if the through-fare system is applied to railways managed by different companies, the revenue of each railway managing body will decrease.

② Since railway management is supported by fare revenues, the through-fare system cannot be introduced readily for voluntary management.

However, introducing the through-fare system may be effective for ensuring the convenience of railways in large cities and for positively extending future railway uses. This introduction can be expected to reduce the profit from each transit passenger but to increase passengers.

As to urban railways in European countries, the through-fare system is already adopted between different railway managing bodies in many areas or between railways and buses for the convenience of users. In many cases, the national or regional government pay the arising costs.

In Japan, the six member companies of the JR Group are using the through-fare system. When the Japan National Railways was divided and privatized as the six companies, the system was adopted mainly not to downgrade the service by privatization.

The through-fare system, however, has not been realized between JR and private railway companies or between private railway companies. When covering a short distance by transfer, a slight discount (about 5%) is given to the total fare.

Main features of through-fare system introduced connection between different JR companies include the followings:

① Fare rate of six JR companies varies depending on areas covered. Fare rate of three companies of JR East, JR Tokai, and JR West are different from that of JR Hokkaido, JR Shikoku, and JR Kyushu, respectively. However, fare rate of tickets covering multiple blocks is calculated based on travel kilometers.

② Railways of JR are classified into the major line and local line. Distance indication (km) as a basis of fare computation varies depending blocks involved.

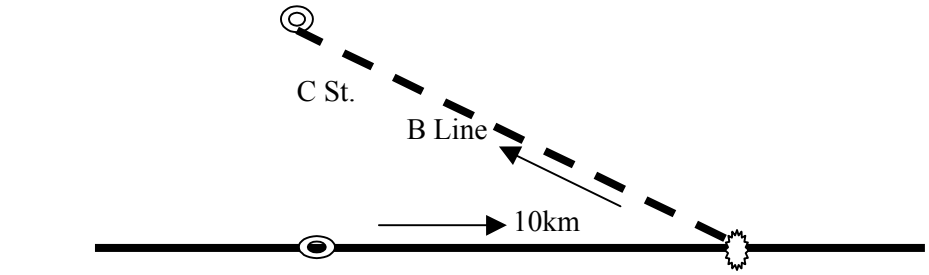
③ Distance indication (km) is called by different names, such as "operation km," "converted km" and "simulated km," depending on characteristics of railway block involved. Travel kilometer is the sum of the above three and is called "calculation km." Amount obtained from the calculation km is the standard fare rate.

Fare of ticket covering the block between three JR main island companies and JR Hokkaido, JR Shikoku, and JR Kyushu.	=	Standard fare rate corresponding to total distance (km) of all blocks (Main line or local lines = operation distance km). (Main line + local lines = calculation km)	+	Amount to be added to total distance (km) from the terminal to JR Hokkaido, JR Shikoku, and JR Kyushu.

When introducing the through-fare system, the fare structure and the system itself may need a review to minimize the revenue losses of the managing companies. In this case, the fare levels should not be uniform to all lines but varied between competitive and noncompetitive lines by considering line characteristics.

However, a too complicated fare system may be difficult to deal with future changes.

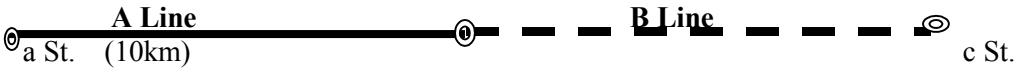
The railways in the Manila metropolitan area (PNR, LRT 1, LRT 3, and MRT 2) are managed by public or semi-public corporations but may permit uniform management in future. Therefore, the consensus on the through-fare system between companies seemed to have paved the way to the system. For the convenience of users, the implementation of the system is expected.



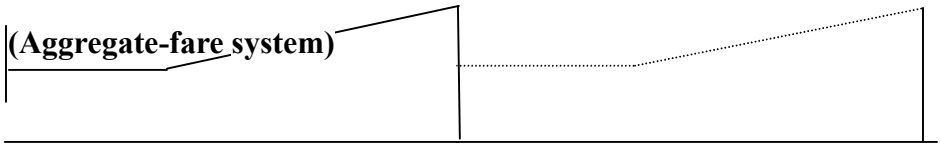
A Line

a St. 10km b St.

A Line	a St.～b St.	3km	10peso	Each km beyond 3km 1peso
B Line	b St.～c St.	3km	10peso	Each km beyond 3km 1peso

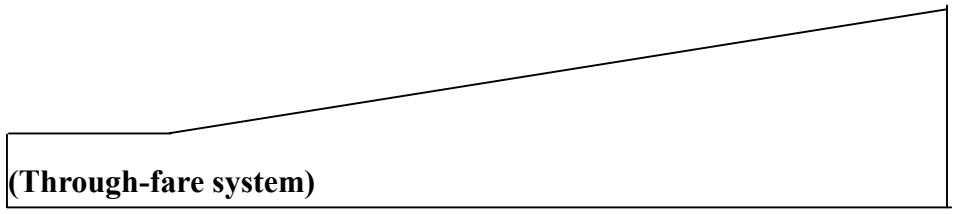


b St. (10km)



17peso 17peso

A Line 17peso B Line 17peso Total = 34 peso



A Line 10km + B Line 10km =20km Total = 27 peso

Fig. 4.2.1 Comparison of Aggregate-fare and Through-fare Systems between Railways

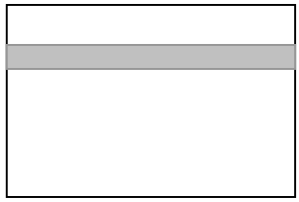
4.2.2 Automatic Fare Collection System and Common Card

(1) Current status of the AFC system in Manila

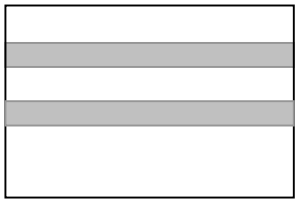
1) The automatic fare collection (AFC) system of LRT 1 is delivered by a French manufacturer (CGA). At the time of our visit, automatic gate and other AFC equipment were installed, but not in use. The AFC system of LRT 3 is delivered by a Japanese manufacturer (OMRON). It is already operating satisfactorily.

Two types of tickets, SJT (single journey ticket) and SVT (stored value ticket) are in use and they are both magnetic cards. This magnetic card is collected and recycled. The information for AFC system consists of fixed data and variable data. Fixed data is, “date of issue”, “name of issuer”, etc, and variable data is “name of starting station”, “balance of stored value amount”, etc. This data is encoded and memorized magnetically on the ticket.

The ways of issuing ticket in LRT 1 and LRT 3 are basically the same. Station staff issues the ticket encoded by equipment called PAM (Passenger Agent Machine) or A/D (Analyzer/Dispenser). LRT 3 is preparing to sell SJT at a vending machine called TIM (Ticket Issuing Machine). In LRT 3, it is possible to sell SVT in some places other than stations because there is equipment designed so that it can fully encode the data without encoding data in the stations.



Magnetic stripe of LRT 1 ticket



Magnetic stripe of LRT 3 ticket

Fig. 4.2.2 Magnetic Stripe on Ticket

2) Ticket information is read and written magnetically in the present AFC system. The information is recorded in the magnetic stripe arranged on the ticket. As is shown above, LRT 1 ticket has only one magnetic stripe. There is a gap in its center, and it memorizes fixed information in its first half and variable information in its last half. LRT 3 ticket has two magnetic stripes and also memorizes fixed and variable information in one stripe, and keeps the second stripe as a reserve stripe. Further investigation revealed that in Manila, the integration of the ticket specification has

been discussed after each manufacturer started the designing of the equipment. OMRON modified its encoding format to match the proposed common specification, but CGA did not modify its encoding format since it was not included in the initial contract. In Japan, each operator acknowledged the necessity of a common encoding format, and a common format was proposed when the AFC equipment was first adopted.

The difference from Japanese AFC system is as follows.

- The magnetic cards of SJT and SVT are recycled.
- Ticket issuing machine is installed only in LRT 3 and LRT 1 has no such machine.
- Automatic fare adjustment machine is not installed.

3) The system configuration of AFC system of LRT 3 is shown below. Except for the fact that LRT 1 can only exchange data between CCS(Central Computer System) and SCS(Station Computer System) by a floppy disk and it has no TIM, LRT 1 has almost the same system configuration as LRT 3.

Automatic Gate	Ticket examination and collection
Analyzer/Dispenser	Issuing SJT and SVT
Ticket Issuing Machine	Issuing SJT(only LRT３)
Station Computer System	Equipment control of AFC system
Encoder/Sorter	Encoding and sorting of magnetic card for reuse
Central Computer System	Control of the whole AFC system

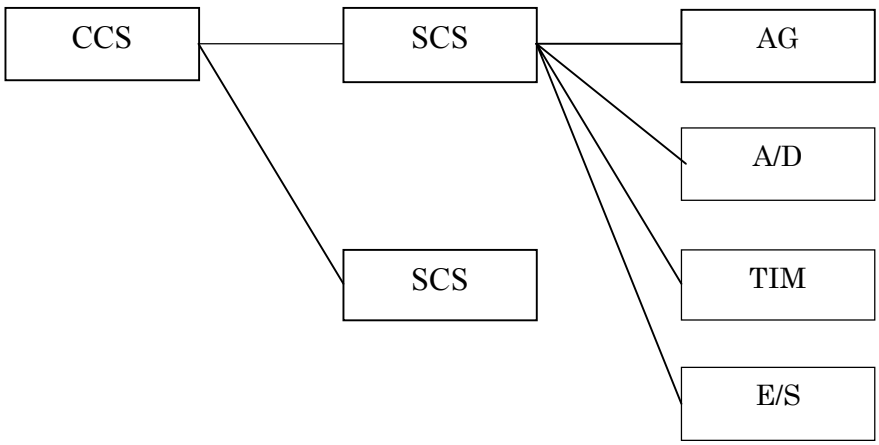


Fig. 4.2.3 System configuration of AFG

(2) Obstacles to the ticket integration

The following items can be considered as obstacles to the ticket integration.

- Because the magnetic card tickets of LRT 1 and LRT 3 have different encoding format, the automatic gate of LRT 1 (LRT 3) cannot read the magnetic card of LRT 3 (LRT 1). As a result, passengers who want to transfer to the other line are forced to buy another ticket at the connecting station.

- Although both LRT 1 and LRT 3 have strong demands for ticket integration, they have not concluded on the final decision about ticket integration. This is because there is no budget for this project, and so a low cost solution is the key factor to the decision making.

- The diffusion of SVT is slow, and the TIM is not yet in operation, so there is a long line to make passengers wait to buy SJT tickets. This may be a disadvantage in increasing the rider-ship. However, unlike the case of Japan, the increase of ticket vending machines shall not necessarily be a direct solution to increase rider-ship, since the quality of bank note in circulation is not appropriate for automatic vending machines, and because there are many coin types, ticket vending machines may not be so convenient.

- Because LRT 1 and LRT 3 are not adopting an integrated fare system, the passengers transferring to the other line are forced to pay relatively expensive fares. The introduction of an integrated fare structure is now under discussion and this conclusion will effect the increase in rider-ship. However, an integrated fare system can not be considered without the implementation of a common integrated ticket.

(3) Consideration of ticket integration

If both LRT 1 and LRT 3 adopts a common integrated ticket, the improvement of convenience will result in the increase of passengers. Furthermore, the adoption of an integrated fare structure will also enhance the rider-ship. If ticket integration was included in the requirements of LRT 1 and LRT 3 in the beginning, it could have been easily realized. Unfortunately, however, because LRT 1 and LRT 3 have required AFC systems of different specifications, the ticket integration cannot materialize without system modification in some degree. The lack of coordination in deciding the required specification for both LRT 1 and LRT 3 seems the cause of this problem in ticket integration and it should be taken for granted that a considerable amount of cost is

resulting from this miss-coordination. This additional cost should be considered as a lesson for not repeating the same mistake in the future.

1) Integration achieved by magnetic tickets

One of the key issues in ticket integration is the modification cost of the existing AFC systems. If there is no cost restriction, we could modify the system it any desirable way without technical difficulty. As an extreme case, it may even be considered to replace one AFC system with the other, although of course this solution is no realistic. Accordingly, it is essential to examine the cost and benefit of integration scheme. In this study for integration achieved by magnetic cards, the following two ticket integration schemes are considered. In the following, for convenience, one of the two lines, LRT 1 and LRT 3, will be called Line X and the other Line Y.

- Total ticket integration by using magnetic card

  In this scheme, all ticket of Line X is available to all AFC equipment in Line Y and vice versa.

- Partial ticket integration by using magnetic card

  In this scheme, some tickets of Line X is available to all AFC equipment in Line X and some AFC equipment in Line Y, however, no ticket of Line Y is available to any AFC equipment in Line X.

The total integration is a plan to adopt the encoding format of Line X as a common ticket specification, and the partial ticket integration plan is to achieve the integration by adopting one type ticket of Line X as a common ticket.

① The outline of total ticket integration

The condition of making LRT 1 ticket compatible with LRT 3 ticket is that they have a common encoding format. Their encoding formats are different. Accordingly, it is necessary to modify the existing AFC system by introducing a common encoding format. The major obstacle to this modification is the cost issue. Total ticket integration requires us to overcome this obstacle.

i) Decision on arranging common encoding format

Total ticket integration will be realized by choosing one of the alternatives below.

- Adopting LRT 1 encoding format as the common one, the AFC equipment in LRT 3 should be modified accordingly.
- Adopting LRT 3 encoding format as the common one, the AFC equipment in LRT 1 should be modified accordingly.

Before choosing one alternative, it is necessary to evaluate the cost and benefit of each alternative. After that, DOTC and LRTA should make the final decision. Performance should be ideally evaluated by using the actual data obtained from the real operation of AFC systems. Getting the actual data, however, is generally difficult and not realistic. Therefore, DOTC will be expected to conduct a test to get performance data for decision. The method for the test could be proposed by the manufacturers.

In the following, for convenience, one of the two lines, LRT 1 and LRT 3, will be called Line X and the other Line Y. Line X's encoding format will be adopted as the common one and Line Y's encoding format will not be adopted.

ii) Hardware modification of AFC equipment

AFC equipment in Line X will not be required to modify its hardware. The sensing mechanism and control circuit of AFC equipment in Line Y shall be modified to accept the magnetic card of Line X.

iii) Software modification of AFC equipment

- The software of AFC equipment in Line X related to fare table and black list will be somewhat modified.
- In addition to the same modification as in Line X, the AFC equipment in Line Y shall be supplemented with the software of data transformation between the encoded data of Line X and that of Line Y.

iv) Software modification to SCS

Both in Line X and Line Y, the transportation result management software of SCS shall be modified to summing up the use of Line X's ticket in Line Y and the use of Line Y ticket in Line X.

v) Software modification to CCS

For both Line X and Line Y, the increase of station causes a slight modification of software to each CCS. And ticket integration will necessarily stimulate the persons concerned to establish a clearinghouse. The clearing functions will be shared between CCS and the clearinghouse. Accordingly, CCS may have to modify the related software accordingly.

vi) Conclusion of total ticket integration

Total ticket integration is an ideal solution for the passengers. We could ask the relevant manufacturers for integration cost and it won't be negligibly small enough to be compared with initial investment. It is difficult, however, to give an incentive to the manufacturers for this job, since in this case manufacturer X who does not get the job would enjoy the business advantage, while manufacturer Y who takes the job has no business advantage, so it is unlikely for the manufacturers to become positive about this job. Furthermore, it is apparent that the ticket format of manufacturer X shall be adopted in future lines in Manila. Therefore, it is essential to pay the modification cost to manufacturer Y, in order to achieve the total integration.

② The outline of partial ticket integration

A ratio of passengers who take both LRT 1 and LRT 3 may suggest the amount of commuters who would take advantage of the ticket integration. The number of passengers who take both lines is not exactly estimated. Partial integration is proposed on the assumption that the amount of the passengers who take both lines is relatively small.

i) Partial ticket integration by a common ticket

We can choose either one of the alternatives below as the common ticket for LRT 1 and LRT 3. Common ticket is SVT and we should exclude SJT. SVT can be issued in advance, and would not require a large amount of additional equipment, so it is proposed that the ticket type for a common ticket shall only be SVT.

- The common ticket should be SVT of LRT 1.
- The common ticket should be SVT of LRT 3.

Also here, a conclusive factor for decision is that which alternative is less expensive. An additional installation of the equipment of one in the other, or replacement of the equipment could be considered as a solution. The amounts of space for an extension of AFC equipment may be considered. In place of the extension of equipment in one line, a part of its equipment may be exchanged with the equipment of the other line.

For convenience, one of the two lines, will be called Line X and the other will be called Line Y. Line X's SVT will be adopted as the common ticket and Line Y's SVT will not be adopted as the common ticket.

ii) Hardware modification to AFC equipment

Because both encoding formats shall not be changed, and only additional installation or exchange of equipment shall be made between the two lines, minimum hardware modification to AFC equipment will be required.

iii) Software modification to AFC equipment

- The software of AFC equipment in Line X related to fare table and black list will be somewhat modified. If an integrated fare system is introduced, the AFC equipment of the connecting station should be modified to make the transfer from one line to another with one ticket.
- Minimum software modification will be required for Line Y's AFC equipment.

iv) Software modification to SCS

- Both in Line X and Line Y, SCS software for managing the transportation results shall be modified to summing up the results of one line's ticket use in the other line and vice versa.
- Minimum software modification will be required for Line Y's SCS.

v) Software modification to CCS

- For Line X, in addition to software modification due to the increase of station, a similar function of clearinghouse will be required. If an independent clearinghouse is established, Line X has to exchange the related data with clearinghouse and software modification will remain

small. Without clearinghouse, CCS should be supplemented with software to clear the account of Line Y.

- No software modification will be required for Line Y's SCS.

vi) Conclusion of partial ticket integration

Partial ticket integration is a compromised solution, and may not be so convenient for some passengers. However, the convenience in railway transportation will be no doubt improved because passengers would have a choice to be able to take both LRT 1 and LRT 3 with one ticket. This plan would only be beneficial if the number of passengers who are transferring to the other line is small, and this plan is not beneficial if there is a large number of passengers using both lines.

2) Integration achieved by smart card tickets

In AFC systems, it seems to be a trend to adopt the use of smart cards instead of magnetic cards. There is a possibility of achieving the ticket integration of LRT 1 and LRT 3 by using smart cards, as well as magnetic cards. A study of the integration achieved by magnetic tickets, and a study of integration achieved by smart card shall be made.

In Hong Kong, electronic ticketing using contactless smart card was implemented three years ago. Recently, more than 90% of subway passengers use smart card ticket on weekdays and 70% to 80% on weekend. Hong Kong system could be regarded as an ideal model of common ticket in transportation.

However, since smart card has many possibility to achieve various solutions in the future, it is doubtful to adopt smart card only for the sake of ticket integration between the two lines.

Discussions are being held about smart card ticketing on the following points

i) The difference between magnetic card and smart card

There are a few differences between magnetic card and smart card. They are both memory media for information. Smart card, however, has three advantages over magnetic card. They are memory capacity, information security and processing ability. Furthermore, smart card ticket can be contactless. It means

that passengers can go through the automatic gate by only holding smart card in case over reader on the gate.

ii) Study of smart cards

Recently, the transportation application is becoming a popular target to increase the usage of smart cards, and not only transport operators but also banking and retail industries are showing an interest in this application. The reason is because smart card can be considered as an electronic purse, and smart card ticket become a trigger to diffuse electronic money. Thus, the implementation of smart card shall also be studied.

iii) Reasons for opposing to ticket integration by smart card

- The high cost of the smart card

  Currently, the card cost of the smart card is about ten times higher than magnetic card. It may be possible to lower this cost by purchasing a large quantity, but considering the average wages of the citizens in Manila, it would be difficult to purchase this card. It may be possible that a low cost smart card would be introduced, but for the time being, the implementation is not practical.

- Unfinished depreciation of the existing magnetic AFC equipment

  The equipment cost of LRT 1 and LRT 3 is not depreciated yet. Since ticket integration by magnetic card is realizable, it is not necessary to implement smart card for the integration, when the magnetic ticketing system is not even depreciated.

- Economical difficulty in realizing smart card SJT

  In most railways, at present, smart card is applied not to SJT but to SVT. This is because inexpensive and disposable smart card for SJT has not been developed yet. Accordingly, if smart card ticketing is implemented, SJT using magnetic card will not be abolished. Both smart card ticket and magnetic card ticket will exist together.

iv) Conclusion for ticket integration using smart card

Many cities in the world studies about the introduction of smart card ticket to their public transport. It is doubtful, however, to rely on smart card immediately to resolve the present situation.

(4) Conclusions

In Metro Manila, various measures have been taken to alleviate urban traffic congestion. Of these measures, the introduction of common tickets and related automatic ticket examination systems is considered indispensable for expanding the role of railways and enhancing their functions. DOTC, LRTA, and other organizations concerned have also the same opinion.

Therefore, it is necessary to make all-out efforts to realize the unification of tickets for LRT 1 and LRT 3 which have already been opened.

As described before, the complete unification system is rather expensive. On the other hand, although the partial unification system is inexpensive, its effect is limited. Therefore, in view of additional investment, the partial unification system is considered acceptable for the time being. In this case, considering such factors as the situation of AFC software maintenance, and space for additional introduction of AFC equipment, and also in view of the fact that AFC equipment on LRT 3 is already in operation, it is practical to adjust the specifications of AFC equipment for LRT 1 with those of equipment for LRT 3 and to limit the common tickets to SVT.

In order to proceed in making the decision, the following steps should be taken;

Step1: Compare the following costs.

1. The modification cost to adjust LRT 1 equipment to LRT3 equipment.
2. The modification cost to adjust LRT 3 equipment to LRT 3 equipment.
3. The cost of additional installation or replacement of LRT 3 equipment to use Line 1 SVT as a common ticket.
4. The cost of additional installation of replacement of LRT equipment to use LRT 3 SVT as a common ticket.

Step2: Select a plan based on the comparison of the above costs.

Step3: Discuss and analyse the technical superiority of the plan.

Step4: Attain a budget to realize the plan.

However, it is necessary to design uniform software valid for all railways and systematically promote measures for wide utilization of the software, because MRT 2 is scheduled to open in the future, and the construction of new railway routes such as Lines No.4 and No.6 is also planned at present.

4.2.3 Methods of Inter-company Settlement of Accounts

(1) General rules for settlement of accounts

In accordance with the execution of through-fare system in addition to the introduction of common tickets and computerized ticket punching and collection system, inter-company accounts must be settled to clear off all inter-company sales revenues and expenditures. Basic rules of this settlement services are that proper settlement can be achieved only when settlement of accounts is made not only by individual railway companies but accurate information is furnished each other. Based on this prerequisite, the following settlement of accounts is carried out.

Settlement of account system followed by six JR companies is as described below.

At first, it is necessary for all railway companies to arrive at the "Agreement on inter-company settlement of sales accounts" and the "Agreement on handling of accounting books and slips of sales accounts." The following procedures should be taken upon the above agreement.

① Obtain the sales revenue covering that of individual companies based on travel kilometers to determine the sales revenue to be received by each company.

② When tickets related to other companies are sold, obtain the amount of sales commission to be received by the company sold the tickets. (This system was established with the intention of promoting the inter-company sales. The rate of commission is set to 1.8% for commutation ticket, 5% for normal ticket, depending on the type of tickets. Commission is paid to all companies sold such tickets. However, commission for near-distance tickets sold on vending machines is not included.)

③ Determine the amount of inter-company sales revenue and sales commission to be returned.

④ Prepare inter-company settlement of account slips describing sales revenue and sales commission.

⑤ Send all settlement of account slips to counterparts not later than the last day of next month requesting for payment.

⑥ Companies received the above slips shall make payment not later than the third day of the month after next.

⑦ Where it is predicted that estimated amount of inter-company settlement of accounts can reach a large amount, payment by rough estimate can be made in the middle of month based on agreement made between related companies.

(2) Organization executing settlement of accounts

Settlement of accounts is carried out by connection transport settlement department of individual companies but a "connection transport settlement service company" can be established to commission all settlement procedures to the company established where there are many related companies.

In Japan, a company called the "Railway Information System Corporation" was established to undertake all such settlement procedures when the National Railway Corporation was broken down into the six JR companies.

In common card ticket system and computerized ticket punching and collection system of 32 private railway and bus companies in Osaka District, settlement of accounts has been made mutually between related companies. However, as participating members have increased and the use of common card ticket system has significantly increased, it has been agreed to establish and operate a "common card ticket sales company" for the purpose of (1) promoting the use and sales of card tickets and (2) reducing cost by blanket purchase of materials and equipment required. Based on this plan, integrated operation of indirect sectors of all private railway and bus companies in Kansai District tends to be facilitated.

In Tokyo District, common card ticket system is to be introduced in October 2000 as described earlier. However, There are no needs to establish a settlement company at this moment, as through service operation of trains between different companies has been carried out and settlement of account system is completed. Establishment of "settlement company" may be required at the time when IC card system has been developed in the future and such companies carry out settlement of accounts.

The Central Clearance Headquarters (CCH) has been established in Manila with the LRTA as a core. It is presumed that the role of this organization can become more

important as common card ticket system and settlement of account system are introduced in the future.

Brief explanation will be made here on the settlement of account system introduced to common card ticket system of bus companies in Tokyo District.

① Common cart ticket system is adopted by the Metropolitan Tokyo Bus and 20 private bus companies in urban areas.

② Buses can be used at payment of cash and by the use of coupon ticket, commutation ticket, and common card ticket.

③ Common card tickets are sold in three types of 1,000, 3,000, and 5,000 yen ticket.

④ Common card ticket can be purchased either at the window of bus operation offices or directly from the bus driver. (Buses are operated only by driver without attendance of bus conductor.)

⑤ The use of common card ticket is recorded when the card is inserted into the fare settlement equipment installed at the entrance of bus. Passenger is required to insert the card again into the fare settlement equipment at the exit to settle account. However, passengers using the Metropolitan Tokyo Bus are required to show the card only when riding a bus because a flat rate is adopted.

⑥ Bus driver is required to forward all memory cards to the operation office.

⑦ Bus operation offices are required to collect all memory cards, to process and transmit data to the headquarters online.

⑧ All bus companies having specific card numbers are required to transmit all sales data to the settlement company in floppy diskettes not later than the first day of the following month.

⑨ The settlement company is required to sum up all data transmitted from bus companies and complete settlement of accounts by the end of month.

⑩ Common card ticket sales companies receive the amount equal to 3% of sales (amount of sales with premium deducted) as commission.

⑪ Unit price of a card is 14.5 yen.

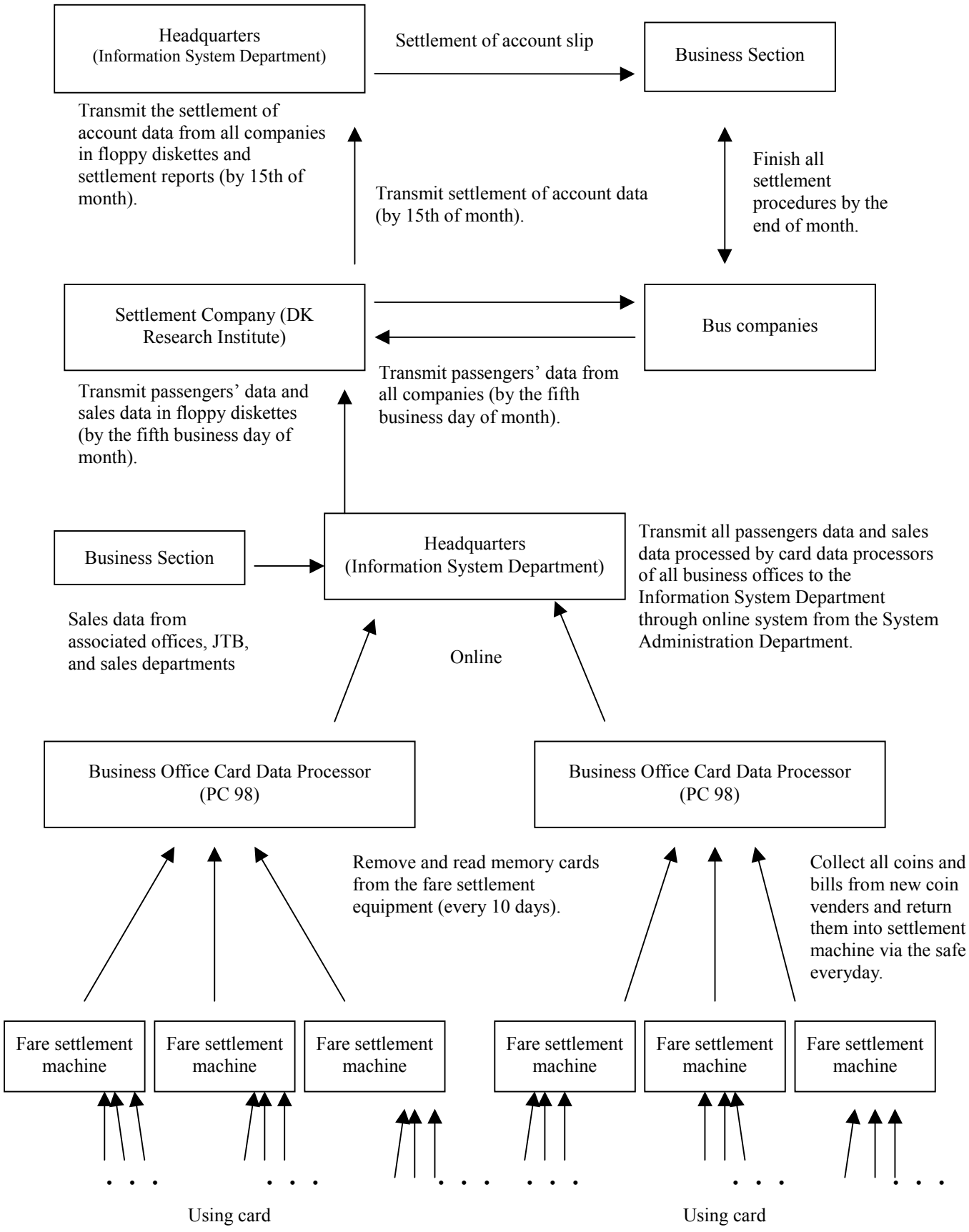


Fig. 4.2.4 Flow Sheet of Common Card Settlement of Accounts

4.3 Passenger Services

Passenger services should be discussed roughly from the viewpoints of station arrangements and functions to transportation services and in detail from the viewpoints of passenger guidance and other face-to-face services. However, since specialists make proposals about terminal planning and transportation planning, proposals are made only about the following:

4.3.1 Passenger Services at Stations

(1) Optimizing the station arrangements

In urban railways, station arrangements greatly affect the trends of railway users. Manila and other populous cities in urban areas require optimum station arrangements based on the migrations of people. This is different from railways that transport long-distance commuters from suburban areas to urban areas as fast as possible by stopping only at limited stations. In large cities like Manila, urban railway stations are arranged at the following intervals in average: 1.2 km on JR Yamanote Line, 1.1 km on subway lines, 1.0 km on private railway lines, and 0.93 km on the monorail line in Tokyo and 1.02 km in Europe. In Manila, the average station intervals are 0.8 km for LRT 1, 1.4 km for LRT 3, and 1.3 km for MRT 2. These intervals seem comparatively long in Southeast Asia where walking distances are said to be short. And, some of them look away from a center of traffic or a center where migrating people gather and part. This should be in mind when planning a new scheme in future.

For your reference, JR Yamonote Line in Tokyo 29 stations on its 35-km line. The station interval seems a little too long for an urban railway as mentioned before. This loop line was constructed in 1914 when the population of Tokyo was about 2.8 million. As the population increased, each station was improved. Most stations have approaches on both sides and ends of platforms so that people living around can reach the platforms by minimum accesses. Therefore, if the platform length of 220 m is deducted from the nominal station interval, the actual interval is about 1 km.

LRT 3 has station intervals of about 2 km at four sections: Kamuning - Cubao (1.93km), Santolan - Ortigas Ave. (2.3km), and Guadlupe - Buendia (1.9km), Magallanes - Taft (1.9km). Depending on the local development statuses, it may become necessary in future to construct new stations in these sections by considering the railway conditions (gradient and curve).

(2) Ensuring the convenience of users at stations

The main advantages of railway transportation are speed, frequency, punctuality, comfortableness, and low fare. As to a railway station used many passengers every day, the evaluation factors are access to the station, the sales system for passengers, the concourse or waiting space, toilets, announcement and guides, and facilities for physically handicapped passengers.

1) Access to the station

The stations of LRT 1 and 3 in Manila are overhead. Therefore, passengers must ascend about 7 to 9 meters from the ground to get on a train at a station of LRT 1 and 7 to 13 meters at a station of LRT 3. The ascend and descend give a great burden on passengers. The stations of Line 3 have elevators, but the elevators are intended for physically handicapped passengers and cannot handle many passengers. Even in the city, escalator can be seen at buildings and underground passages where many people gather and part. Therefore, escalator should also be installed at stations for access to roads. They say that escalators are planned for LRT 3. As the railway fares are set lower than the bus fares to promote railway use, the immediate installation of escalators is expected.

2) Strengthening the ticket windows

The ticket barriers are automated both at LRT 1 and 3 but tickets are sold manually at ticket windows. LRT 1 has comparatively many ticket windows at each station, for example, eight windows at Monumento Station, but LRT 3 has only a few ticket windows. Therefore, long queues are formed in rush hours these days. Although SVT is expected to solve this problem, the diffusion index of SVT is still below 20%. Since the fares are lowered tentatively to deepen the understanding about the convenience of railway, corrective actions should be taken to solve the problem of queuing at ticket windows.

More specifically, it may be necessary to increase ticket windows, consign sales, strengthen advance ticket sales, and apply automatic vending machines.

3) Other

Since the stations are overhead, their names are difficult to see from the ground. To make a station location clear, it is necessary to put up a logo combined from a line name and a station name. "Station name," "open hours," "fare table," and "standard train timetable" are essential for a transport and should be put up at each station

according to the same standards. Executing the put-up contents with responsibility may be effective for gaining confidence on railway.

Some toilets were found difficult to use. Unlike the conventional toilets, it is recommended to upgrade the toilets by charging.

(3) Perfecting the inter-railway liaison transportation function

To ensure smooth passenger transfer between railways, through train runs are preferable. When constructing a new railway line, through train runs should be permitted between lines where a sufficient passenger flow can be expected.

However, this system is often difficult to realize on railway lines already open because railway standards or structures differ between the lines and additional investments are necessary. For smooth transfer between lines, at least the followings should be noted:

1) Integrated maintenance and management of transfer stations on different lines

In addition to the PNR Line and LRT 1 and 3 in service and Line MRT 2 under construction, new lines are now under study for future construction. To make railway play an important role among transports in the Manila metropolitan area, however, the first priority should be given to the establishment of a strong transportation network on the railway lines.

To do so, stations near an intersection of railway lines should be positioned as close to each other as possible for integrated management. Since this seems not enough about the transfer stations of the current railway lines, due considerations should be given in future railway projects.

The stations already open or under construction may require the following improvements:

① EDSA Station on LRT 1 and TAFT Station on LRT 3 are about 200 m away from each other but expected to be a joint station under integrated management. They say that a major company has a development project around these stations. In relation to this project, the stations will be linked through a moving walkway for smooth communications, the tickets and automatic ticket barriers will be made common, and the through-fare system will be introduced. Therefore, the ticket barriers are also expected to have common latches or to be latch-free.

② D. Jose Stations on LRT 1, 4, and MRT 2 may be about 200 to 300 m away from each other. In this area, PEA is proceeding with a local development project including bus and jeepney terminals. About the railway section, it is necessary to make a proposal to PEA so that the three stations can be established and managed as one general station to ensure easy transfers between the lines. The railway managing bodies should also consider the layout to allow the shortest transfers between the three stations and make studies to simplify ticket punching and collection and to construct moving walkways linking the stations.

③ Cubao Station on LRT 3 and MRT 2 under construction are about 400 m away from each other. A development project is going on in this area, including the two stations. An overhead bridge and a moving walkway should preferably be established in this project so that passengers can transfer without going down to the ground.

④ PNR intersects LRT 1 at Burmentitto Station, MRT 2 at St Mesa Station, and LRT Line 3 at Magallanes Station. However, since the PNR station is on the ground level and there is a great discrepancy in the transportation services, the stations can now not be established or managed in an integrated form. Their integration should be discussed again when the facilities are improved and transportation is enhanced in future.

⑤ Monumento Station to be connected to LRT 1 in the second project of LRT 3 and Quezon Ave. Station to cross LRT 4 are also expected to be established and managed as an integrated joint station.

2) Passenger guide signs related to transfers

To make railways convenient and easy for anybody to change trains, guide signs easy to understand are necessary, as well as the bridge and moving walkway mentioned above and other transfer facilities. Except when the transfer stations are close to each other or the transfers are easy, "passenger guide," "transfer information," and "transfer timetable" should always be put up or announced.

Next, data of the Manila metropolitan area is compared with that of the 23 wards in Tokyo, having almost the same populations, and sample transfer guide signs in Japan are introduced.

Fig. 4.3.1 Train Information at a Passageway

4.3.2 Promoting Related Businesses

(1) Significance of related businesses

The railway business, national or private, generally establishes the foundation of national or local life. Since the fare revenue is limited, it is said difficult to make both ends meet only by the railway transportation business alone. Seeking for stronger managerial foundations, Japanese railway management bodies often develop housing complexes and leisure facilities along railways before or with railway constructions to recover development profits and promote development uses. In addition, they introduce such businesses as shops, restaurants, and car parks into the existing station terminals to strengthen the station functions and to stabilize station management by future revenues. In the information-oriented era, advertisements using spaces at stations and on trains are also good sources of revenues.

By purposes, these related businesses can be categorized as follows:

① Businesses directly related to the railway business and sharing or compensating for part of the work

Ticket sales and car servicing

② Businesses to provide railway users with various high-quality services for enhancing conveniences, eventually increasing the transportation and related businesses

Shops, restaurants, and car parks

③ Businesses to make effective uses of lands and spaces belonging to the railways for ensuring revenues from related businesses

Advertisements, leasing spaces under railway bridges, and developing and leasing unused sites

(2) Prerequisites for developing a related business

- Site reservation — A business led by a railway management body require a station or adjacent sites for large-scale development. For medium-scale development, unpopular sites or spaces above the station or railway may be sufficient. For small-scale development, dead spaces in station premises may be enough if used effectively.

- Customer population — Another prerequisite for development is that the station has a user population large enough. In addition, the business should be proved profitable by a survey on the demand or customer tendency for the business.

- Fund raising — The other prerequisite is to raise funds for implementing the project. In general, about 20% of the necessary fund is on hand and the rest is from a bank or other. With this capital, the intended building is constructed and tenants are collected simultaneously. The tenants are supposed to pay the allotted amounts (key money and deposit). Before opening, the tenants shall make interior decorations on their own and the parties involved with the station building shall invite tenants and manage the entire business.

A railway management body make necessary preparations for this kind of business but should establish a management body (ex. ABC Station Building Co., Ltd.) immediately for management. In this case, the railway management body is expected to take the lead in the invested business with over 50% of the company stocks. Tenant fees are determined by percentages in the sales or by amounts.

For medium-scale or small-scale development, however, a subsidiary of the afore mentioned organization is often established to manage the project.

In the economic restoration period of Japan, limited construction budgets were apportioned mainly to ensure safe train runs and increase the transportation capacity but not to reconstruct deteriorated station facilities. Those days, a railway management body used to offer a site (charged) and the local government and joining companies used to pay their shares for constructing and managing a station building by the three parties. This system was called the private-fund railway station system because the station work facilities and the passenger concourse and other railway facilities were owned by the national railways while the rest was owned by the station building company as station building facilities. By this system, about 50 private-fund railways were constructed throughout the nation. Now most of the stations belong to JR-invested companies.

(3) Current status and outlook of railway-related businesses in Manila

Railway-related businesses are now almost none in Manila but their preparations are in progress. LRT 1 has only small shops at several stations because the station spaces are not very large. The advertisement business is suspended temporarily for some contract-related reasons.

As to LRT 3, Show Blvd Station is now preparing spaces for related businesses. Related businesses are also planned at the stations of Ayala, Magallanes, and Guadalupe. Since the businesses are planned to use the space on both sides of each station above the EDSA Street about 50 m wide. If not more than one layer is created for the time being, the space is about 2500 to 3500㎡ ((road width: 50 m － station facility width: 20 to 30 m)× 130 m). Considering that the space is small and the businesses are established along LRT stations, small shops, cafeterias, restaurants, convenience stores, and bookstores seem appropriate. Travel agents also selling railway tickets by consignment are another choice. In short, commercial facilities convenient for railway users and useful for their invitations are necessary.

(4) Railway-related business in Japan

The typical railway-related business in Japan is station buildings. As to the Yamanote Line in the Tokyo metropolitan area, 17 of the 29 stations have almost no plazas in front of them. The other 12 stations are Tokyo, Ueno, and Shinjuku, where long-distance trains depart and arrive, and Shinagawa, Akihabara, Sugamo, Otsuka, Ikebukuro, Mejiro, Shibuya, Ebisu, and Osaki where freight used to be handled. There is room for development at these stations because they have plazas or former freight yards.

Among the stations, Tokyo Station and Shinjuku Station for departures and arrivals of long-distance trains and Ikebukuro Station connected to other JR and private railway lines are now being established as terminal buildings for railway-related businesses of large scales.

The stations of Akihabara, Ueno, Shibuya, Ebisu, Meguro, and Shinagawa have medium-scale businesses using spaces above the stations or under the ground because there are no adequate areas. At other stations, small-scale stores are being developed using slight spaces in their premises.

Table 4.3.1 Related Business at Yamanote Line Stations

Development	Yamanote Line stations (29)	Related business
Large scale	**Tokyo**, **Shinjuku**, **Ikebukuo**, **Meguro** **Ebisu** (5)	Department stores, supermarkets, specialty stores, and culture centers as station buildings.
Medium scale	**Akihabara**, **Ueno**, **Sugamo**, **Shibuya**, **Shinagawa** (5)	Medium-scale station buildings, stops, restaurants, and bookstores (Condominium at Sugamo)
Small scale	**Kanda**, Okachimachi, Uguisudani, **Nippori**, **Tabata**, Komagome, **Otsuka**, Mejiro, **Takadanobaba**, **Gotanda**, Osaki, **Hamamatsucho**, **Shimbashi**, **Yurakucho** (14)	Small-scale restaurants and cafeterias
Other	**Nishi-Nippori**, Shin-Okubo, **Yoyogi**, Harajuku, Tamachi (5)	Stall

Station name = Large station **Station name** = Connected to other line

Fig. 4.11 Shops Utilizing Idle Space in a Station Yard

(Reference)

Related Business at Yamanote Line Stations (Details)

Station	Passengers (Commutation ticket + Ordinary ticket = Total)	Surrounding area	Related business
Tokyo	231,721+144,524 = 376,245	Offices, commercial center	Station bldg. (dept. store), shops, restaurants
Yurakucho	74,013+91,582 = 165,595	Offices, commercial center	Medium restaurants, shops
Shimbashi	82,237+149,093 = 231,330	Offices, commercial center	Medium restuarants, shops
Hamamatsucho	76,774+86,002 = 162,776	Offices, commercial center	Small restaurants
Tamachi	42,700+119,105 = 161,805	Offices, commercial center	Stall
Shinagawa	161,532+71,638 = 233,170	Offices, commercial center	Medium restaurants
Osaki	13,938+30,849 = 44,787	Offices, commercial center	Stall
Gotanda	48,774+86,942 = 135,716	Offices, commercial center	Small restaurants
Meguro	71,468+42,595 = 114,063	Offices, commercial center	Station bldg. (dept. store)
Ebisu	65,156+52,905 = 118,061	Offices, commercial center	Station bldg. (dept. store)
Shibuya	238,233+184,576 = 422,809	Commercial center	Station bldg. (dept. store), restaurants
Harajuku	25,528+45,057 = 70,585	Offices, park	Stall
Yoyogi	33,712+21,143 = 54,855	Office quarters	Stall
Shinjuku	393,643+325,664 = 719,307	Commercial center	Sta. bldg. (Large dept. stores)
Shin-Okubo	16,952+18,715 = 35,667	Living quarters	Stall
Takadanobaba	141,872+78,533 = 220,405	Commercial center	Stall
Mejiro	26,550+16,958 = 43,508	Educational area	Medium restaurants
Ikebukuro	308,303+231,879 = 540,182	Commercial center	Sta. bldg. (Large dept. stores)
Otsuka	30,764+25,624 = 56,388	Living quarters	Small restaurants
Sugamo	55,963+34,755 = 90,718	Living quarters	Small restaurants, condominiums
Komagome	28,728+17,075 = 45,803	Living quarters	Small restaurants
Tabata	24,136+14,758 = 38,894	Semi-industrial area	Stall
Nishi-Nippori	76,630+30,866 = 107,496	Living/shopping quarters	Stall
Nippori	46,037+32,384 = 78,421	Living/shopping quarters	Stall
Uguisudani	11,012+13,234 = 24,246	Living/shopping quarters	Stall
Ueno	108,198+97,552 = 205,750	Offices, commercial center	Medium restaurants, shops
Okachimachi	50,045+37,507 = 87,552	Commercial center	Small restaurants
Akihabara	74,354+67,375 = 141,729	Commercial center	Dept. store under rail bridge
Kanda	76,198+42,798 = 118,996	Commercial center	Small restaurants

Note: "Passengers" means the daily average number of passengers in 1996, not including transit passengers using transit tickets.

4.3.3 PNR Service Improvement Measures

There are now several railway construction projects in the Manila metropolitan area. Despite poor transportation services, however, no activation efforts are in progress about PNR piercing through the metropolis but not fulfilling the duty of urban railway. This may be attributable to the following five reasons:

One, PNR is intended for long-distance and medium-distance railways. This railway is not able to or improved to handle or control a great many short-distance commuters born from the population quickly growing in the Manila metropolitan area. The stations permit free access because both rails and stations are on the ground level and there are no fences separating the station premises from outside. It is often impossible for a conductor to find a passenger with no ticket and receive a fare on a crowded train. This is a great cause of disorder in railway use.

Two, PNR has level intersections between the railway and roads piercing through the city. In the center of the metropolitan area, PNR intersects roads at about 40 places. In some densely populated area, PNR has more than 10 crossings at 200 m intervals. To prevent accidents, staff is positioned at crossings of great traffic and blocks the road traffic when a train passes. However, this is far from normal because the train must slow down.

Three, people live illegally along the line. Illegal residents construct buildings very close to the railway, even beyond legal limits, and enter the railway tracks not only to disturb train runs but also to cast stones.

Four, the government PNR authorities seem not very aggressive because the problem is too difficult to solve. However, PNR extending from the north to the south through the metropolis is useful as an urban transport, not less than other railway lines at all. This is a valuable railway route for urban transportation in Manila growing outward to the suburbs in future but is half-paralyzed now. Therefore, a project is under study to divide the PNR route into the north rail on the northern side and MCX on the southern side. If implemented, this project may disturb the general uses of PNR.

Five, PNR has been surveyed several times. Some people say no more surveys are necessary but all the past surveys are only partial and not aimed at activating PNR because they do not discuss the current statuses in detail.

Under these circumstances, a new PNR activation project should be initiated with an immediate survey to clarify the ideal image of PNR in the metropolitan area and measures for its promotion with the followings in mind:

① PNR is a promising urban line anticipated to increase users greatly if drastically improved.

② If the current level crossings with roads are left, improvements cannot be expected even when illegal residents are eliminated.

③ This makes it necessary to discuss a partially or totally overhead or underground railway for the metropolitan section of about 10 km.

④ To promote this project, a specialist familiar with this kind of case should make a feasibility study at the earliest timing.

⑤ If this problem in the metropolis is solved, the railway will server well not only for urban transportation but also for transportation from medium-distance areas because the metropolitan area is growing.

Many parties are attempting various measures to ease traffic congestions in the Manila metropolitan area but railway is a very promising solution. Under these circumstances, leaving the PNR deteriorated and corrupted at the center of the metropolis may be a social loss. This railway has been surveyed many times so far but none of them seem to have discussed the way of regeneration and the best role of PNR. By spending about a decade, the railway of Jabotabek in the Jakarta metropolitan area was regenerated from the similar environment. In Manila, we do hope the regeneration of PNR.

Fig. 4.3.3 PNR Line in an Inner Area

4.3.4 Linkage between Railway and Others Transports

In succession to LRT 3 just opened, MRT 2, LRT 6, and 4 will be established sequentially in several years to easy traffic congestions in the Manila metropolitan area.

Mutual service competitions about fare, speed, and comfortableness improve used benefits in the end.

However, these competitions must be based on efficient and orderly urban transportation. A certain guideline is necessary about fares, and transportation routes should be set to bring out the best from each transport.

From this point of view, the policy should be discussed about the following :

① The EDSA Street used to be core of urban transportation. At the construction of LRT 3, however, about 20% to 30% of the street was given to the railway. Therefore, the new traffic policy should make the services better and more efficient.

② Railway can fulfill its duty only by offering transportation services easy for anybody to use at fares acceptable to anybody.

③ An efficient route network should also be organized for bus that used to play the main role in road traffic. It may be important to establish a system that allows railway and bus to exhibit comprehensive power for improving urban transportation by working in concert. This way of thinking can be applied in the construction of the MRT 2 and planning of the LRT 4 in the future as well.

④ To promote the railway use, new jeepneys routes are also necessary around railway stations.

⑤ It may also be necessary to give some incentives to the operators, for example, about the handling of their licenses.

⑥ The introduction of tickets and fares which allow transfer between the railway and other means of transport (bus and jeepneys) may now be difficult because there are many minor bus and jeepneys operators having very different managerial foundations and service levels, unlike railway management bodies having a common managerial foundation. This subject will be discussed in future when railway becomes ready to fulfill its duty and can be linked mutually with bus or jeepneys.