

Airport Access in Japan

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HIGH LAND PRICE AND AIRPORTS IN JAPAN

1. Japan has 85 public airports and they are classified into three classes, by a law passed in 1956. Class I airports (4: Narita, Haneda, Osaka and Kansai) are mainly for international flights, Class II (28) are for domestic trunks and Class III are for local flights. There are other airports that are used jointly with self-defense forces (5), and a few more airports for commuter services and for general aviation (See Table 1).
2. These classes are not strictly defined ; Haneda and Osaka have been used mostly for domestic trunks since Narita and Kansai opened, and many Class II airports have international flights, mainly because of the capacity limitation of Class I airports. However, the classification is maintained because it determines the level of subsidies in construction and repairs, and also who administers the airport -- the transport minister or the governer of the province where the airport is located.
3. Airports in Japan are very small, as compared with those in other countries. The main reasons are the availability of land where few people live and the high price of land. In the case of Kansai, built on a reclaimed island, the total cost of construction was 1.5 trillion yen (15 billion U.S. dollars, assuming the exchange ratio of \$1 = 100 yen), including the cost of reclamation and of the construction of the bridge connecting the airport to the shore. The cost of building access routes (highways, sea routes and railroad extensions) was roughly 2.5 trillion yen (25 billion U.S. dollars). The cost was astronomical, but the airport is modest. It has only one runway of 3,500 meters on 511 hectares of land. But Kansai is noise-free and is the first 24-hour airport.* The Transport Ministry is planning to build another runway on the expanded island, and it is expected to cost at least another 1.5 trillion yen.
4. The high construction cost of airports and of access routes are partially due to the absence of the concept of "eminent domain" in Japan (and also in most of Asian countries). Without eminent domain, the only way to acquire land for public use is to purchase it at market prices. In Japan where small holdings are normal, lengthy

*Sakakibara (1993)

negotiations are needed, often with hundreds of landowners to determine the selling price in order to build ten kilometers of highway. And if one of them does not consent to sell his land, the entire project has to be stopped, as is shown in the case of the Narita expansion. Often reclamation is cheaper than purchase. Thus Kansai is in the sea, and a highway access to it is along the coast. They still had to pay the fishermen who owned the rights to fish in the Osaka Bay and whose number increased in hundreds as the construction drew near, but fishing rights were a lot cheaper than the land.

AIRPORT ACCESSES AND ITS INSTITUTIONAL ARRANGEMENTS

5. In Japan, the transport system is controlled by the Ministry of Transport (MOT). The only exception is construction and maintenance of the road system, which is controlled by the Ministry of Construction (MOC). Road transport is regulated by the MOT, but tolls are collected by the MOC to finance construction of new road.
6. The MOC was formerly an unimportant division of the MOT, but became an independent ministry in 1948 as the necessity of construction of highways was recognized. The MOT had traditionally emphasized railroads and coastal shipping, and the MOC has grown as more money poured into road construction.*
7. This division of labor looked cosy at the beginning but as time passed, it created a certain amount of ministerial rivalry. If roads are improved further, railroads and coastal shippings may lose customers. Yet highways will continue to be built as long as the revenue from highway tolls can finance new construction. The MOC is a "have" ministry while MOT is a "have not." Of course the collaboration of the two ministries is crucial for the transport system to function properly. We have chosen the case of airport accesses to see how rivalries and collaborations are counterbalanced.
8. As already suggested, most Japanese airports are constructed and managed by the MOT (except Narita and Kansai : the former by a public corporation and the latter by a third sector stock-holding company. However, even these two are under de facto control of the MOT). In the past, airports were sometimes constructed without the careful plan of access roads. Even if there is a plan, road construction is often delayed because of difficulties in land acquisition. Since new airports are constructed further in the countryside, the provision of road access is becoming increasingly more difficult.
9. There could be a legitimate suspicion if the MOT favored railways over road access. The MOT has always emphasized efficiency of mass transport. However,

* The report of Ralph J. Watkins' Committee on Japanese Roads (1956) says that Japanese roads are "unbelievably bad and we do not know any other industrialized country which has neglected its road network so completely" (translated by the authors from the Japanese version of the Report).

the construction of a rail access is also difficult and expensive. Furthermore, a new railroad is rarely financially viable unless the population of the mother city is very large. No private railroads nor JRs, which have become private, are willing to engage in the risky business of new construction. So far only Narita (JR Eastern and Keisei), Haneda (monorail), Kansai (JR Western and Nankai), Shin-Chitose (JR Hokkaido) and Fukuoka (city subway) are being served by rail. Rail accesses for Miyazaki (JR Kyushu) and for Osaka (city monorail) are now under construction (See Table 1). There has been no Japanese airport where a rail or highway access was completed before the opening of the airport. Most airports started with bus services on narrow roads from the closest railroad station(s), and even today many airports are deprived of rail and/or highway services.

Table 1 AIRPORTS IN JAPAN CATEGORIZED BY ACCESS

	Rail and bus	Bus from railroad stations	Private car and bus (not from the railroad stations)
Class I	Narita Haneda Kansai	Osaka	
Class II	Shin-Chitose Fukuoka	Sendai Akita Yamagata Nagoya Hiroshima Yamaguchi-Ube Kohchi Kitakyushu Nagasaki Kumamoto Miyazaki Kagoshima	Asahikawa Wakkanai Kushiro Obihiro Hakodate Niigata Takamatsu Matsuyama Naha
Class III		Memambetsu Hanamaki Fukushima Izumo	Monbetsu Nakashibetsu Aomori Shonai Toyama Matsumoto Tottori Nanki-Shirahama Iwami Okayama
Civilian-Military		Komatsu	

FACTORS IN ACCESS CHOICE

10. Appendix shows access characteristics of 43 major airports in Japan. From the appendix we tried to determine important factors of the access mode choice. Theoretically, people would choose the access with the lowest total cost, that is, money cost plus time cost. We tried to calculate these costs, but found a lot of irregularities that made generalization impossible. First of all, it was difficult to determine travel time. We used bus time schedules, and for private automobiles the distance divided by the average speed of the car on road, neglecting unexpected congestion. The value of time changes according to localities. For example, income differential between the highest and lowest is almost double. Thus we gave up the calculation of time cost and concentrated on money cost. We still could not find strong evidence that people would choose the lowest-cost mode. Probably we would need to gather more data for individual airports, data such as passenger characteristics, availability of luggage delivery services, average congestion time, etc. The only way to acquire this data would be interviews and questionnaires, which we could not do.
11. However tentatively we noticed two obvious factors through statistical approach. One is simple enough. The share of private automobiles in the access depends on the size of the mother city. The smaller the population, the larger the share of private automobiles. Of course, as the city size is smaller, the chance of using other modes such as rail and bus is less (Figure 1).

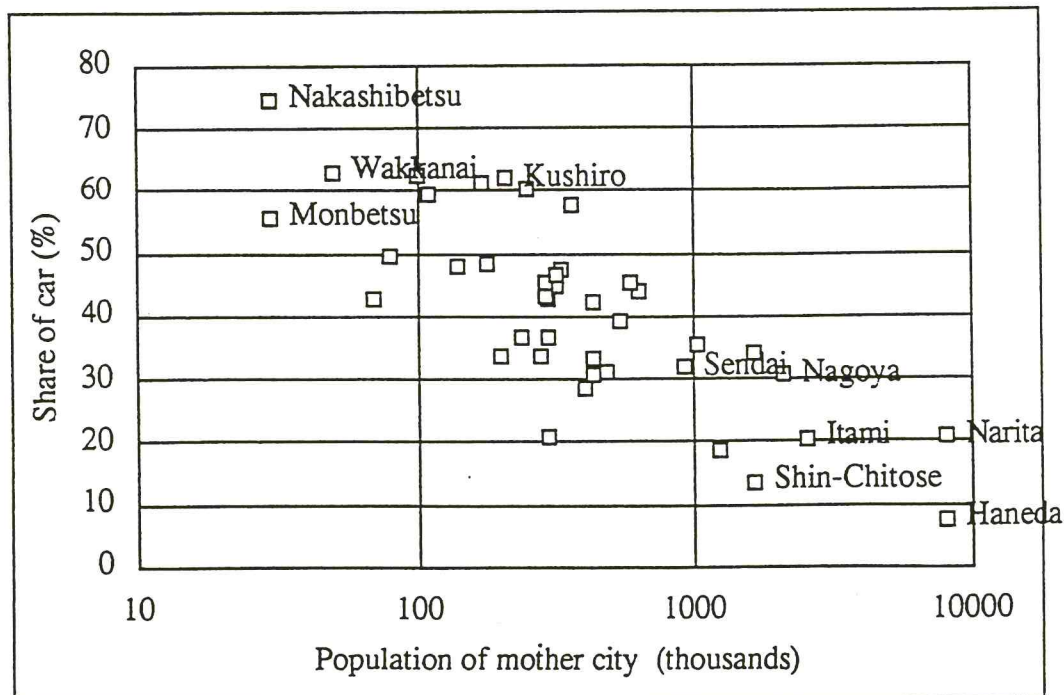
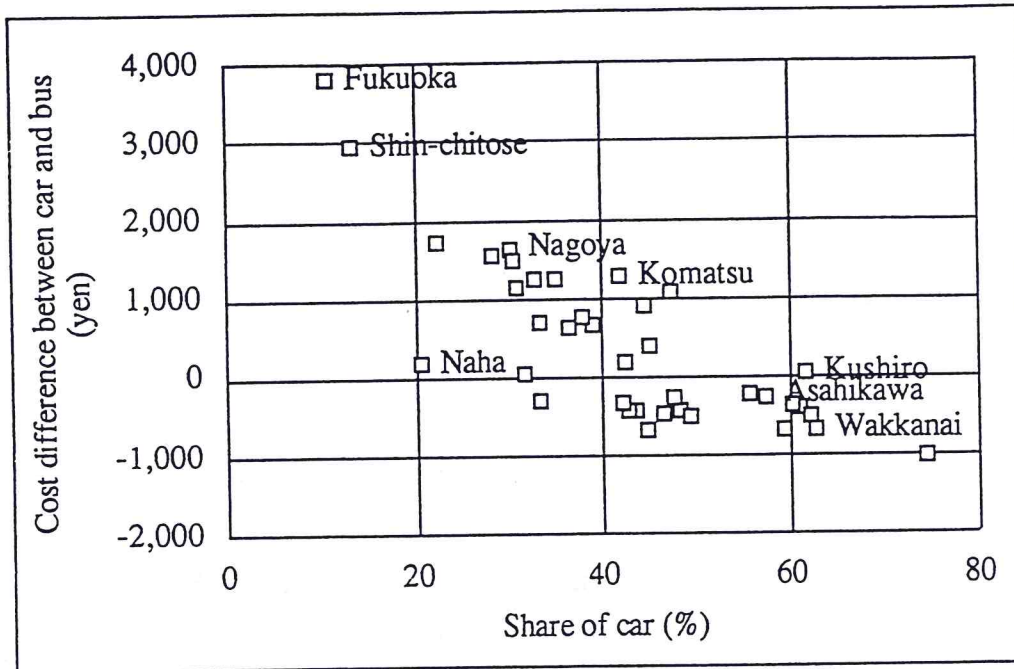


Fig.1 - Share of private car and population of mother city

12. The second factor is parking charges. Some of the irregularities were corrected by including the parking charge. Again in airports of smaller cities, the charge is lower, and in many cases free, and more room is available for illegal parking. When we included parking charges in money cost, the credibility of our calculation is considerably improved. The correlation coefficient of 0.73 at the 99% confidence level ($R^2=0.54$) in the choice of bus or car is, in our judgement, not so bad (Figure 2). And if we exclude airports in metropolitan areas (Narita, Haneda, Osaka, Kansai), the correlation coefficient becomes 0.79 ($R^2=0.62$).



Note: Narita, Haneda, Osaka and Kansai are omitted from this figure .

Fig.2 - Share of private car and cost difference of car and bus

ACCESSES TO THE KANSAI INTERNATIONAL AIRPORT

13. Kansai is the first airport in Japan to have all the planned accesses completed before the airport. There are two highways (one an extension of the existing highway and another newly built along the coast) and two railroads (one private, another JR West), all of which reach the shore-end of the double decker bridge (upper for road and lower for rail), leading to the airport. There has been closer collaboration between the two ministries--- at least both ministries proudly say so.
14. Kansai brought a new dimension to the traditional practice of building and managing an airport. This time it is not done by MOT, but by a stock holding company called Kansai International Airport Co. (KIAC), whose capital was subscribed by the central government (67%), related municipal governments (17%) and the business community (17%). The executive board of the KIAC is composed

of representatives of all parties that subscribed the capital. The president (in the Japanese corporate system, the CEO) came from MOT. (The current president is former vice minister of MOT).

15. A somewhat touchy problem was, who should build and manage the bridge. Traditionally the bridge construction was a realm of MOC, and, once constructed, the toll would be set by the MOC and its revenue would go to a pool managed by MOC. MOT insisted that it should be done by the KIAC. A compromise was reached : the bridge would be built by MOC and managed by KIAC, and MOC would send an executive to the board of the KIAC.
16. Both MOC and MOT competed in construction of access routes, and rail and road access were completed together with the bridge before the opening of the airport. The access routes are shown in Figure 3 and access conditions are shown in Table 2.

Table 2 ACCESSES ROUTES TO THE KANSAI INTERNATIONAL AIRPORT

From Nanba		
Rail (Nankai)	29 minutes (40 km)	Fare 1,150 yen*
Auto	45 minutes (50 km)	Toll 1,950 yen
From ShinOsaka		
Rail (JR)	45 minutes (40 km)	Fare 2,930 yen*
Auto	60 minutes (50 km)	Toll 1,950 yen
From Kobe		
Auto	70 minutes (70 km)	Toll 2,350 yen
Sea	28 minutes (30 km)	Fare 2,200 yen
From Kyoto		
Rail (JR)	75 minutes (100 km)	Fare 3,430 yen
Auto	110 minutes (100 km)	Toll 3,450 yen
From Tenri-Nara		
Rail (JR)	75 minutes (80 km)	Fare 1,630 yen
Auto	80 minutes (80 km)	Toll 2,850 yen
From Wakayama		
Rail (Nankai)	35 minutes (40 km)	Fare 750 yen
Auto	40 minutes (40 km)	Toll 1,750 yen

* including express charge in railroad.

note: gas price is not included in auto.

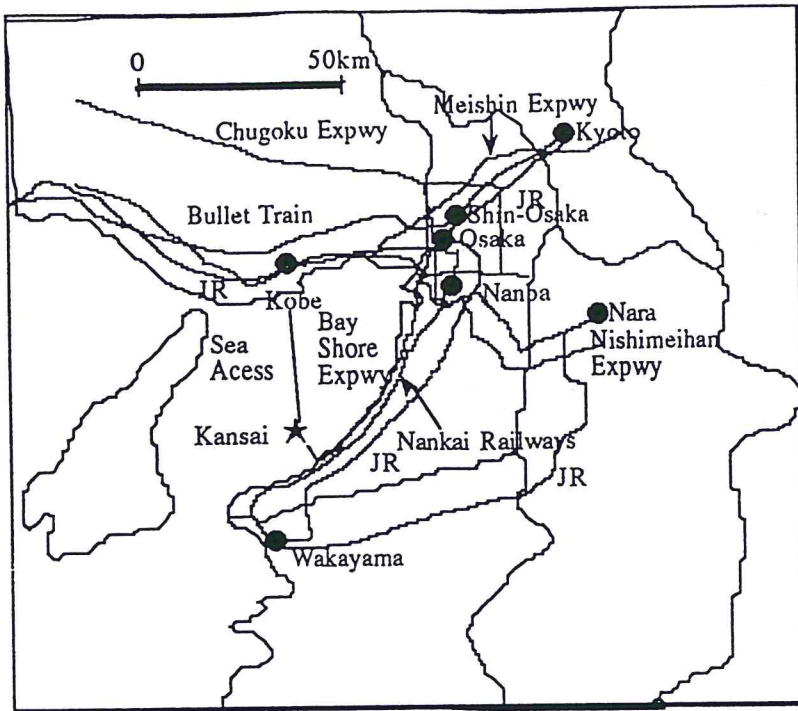


Fig.3- Accesses routes to Kansai International Airport

17. In the airport there is a five story "parking" building, adjacent to the terminal, containing the railroad station of 4 tracks (2 for Nankai and 2 for JR) and parking for 4,500 cars.
18. From the Table 2 we can easily recognize an absolute cost advantage of the rail access. Further auto access is handicapped by possible congestions and travel time delays. Many airports in the world, where rail access is available, have similar conditions, but the shares of rail is a lot lower than in Kansai. At Kansai, you can see few private autoes on the bridge, and the parking lot is practically empty.
19. As already suggested in our calculation, the key factor seems to be the parking charge. In the case of Kansai, the first hour is 600 yen, and each 30 minutes after that is 300 yen. Beyond 8 hours it is 100 yen for every 30 minutes. If you leave the car at the Airport for 24 hours, you will be charged 80 U.S. dollars (\$ 1 = 100 yen).
20. The charge was set at the total construction and maintenance cost divided by the estimated demand of parking. (We don't know who estimated the demand !) If MOT is running the airport, it may keep the current rate of the parking charge for some time to come, to maintain supremacy of mass transportation. But the Kansai Airport is managed by KIAC, and the empty space means the loss of revenue. KIAC is now thinking of reducing the parking charge.

CONCLUSION

21. We have explained institutional arrangements surrounding airport accesses in Japan, elements of competition, rivalry and coordination among different modes. We also did some calculations to find factors influencing modal choices, and found out that calculated costs will not reflect shares of the modes, unless the parking charge is included in the auto cost. We verify this by describing the case of the Kansai.
22. We do not know how far our findings could be applied to airport accesses in other countries. But if one wants to increase the patronage of mass transport in airport accesses, increase in parking charges seems most effective.

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Appendix Mother City, Share of Mode, Cost and Cost Difference*

	Mother city		Share (%)		Cost (yen)		Cost difference (yen)
	city name	population (thou.)	Auto	Bus**	Auto***	Bus****	
			A	B	C	D	C-D
Narita	Tokyo	8,160	20.5	26	8,438	2,795	5,643
Haneda	Tokyo	8,160	7.3	7.8	9,275	715	8,560
Osaka	Osaka	2,620	20.3	36.7	5,438	579	4,859
Kansai	Osaka	2,620	18.7	22.9	10,800	1,402	9,398
Shin-Chitose	Sapporo	1,670	13.4	15.4	3,819	882	2,937
Asahikawa	Asahikawa	360	57.4	20.1	289	552	-263
Wakkanai	Wakkanai	50	62.8	17.2	206	910	-704
Kushiro	Kushiro	210	61.8	23.6	1,275	1,256	19
Obihiro	Obihiro	170	61.2	20.2	523	950	-427
Hakodate	Hakodate	300	36.6	11.6	1,096	467	629
Sendai	Sendai	920	31.7	27.4	806	780	26
Akita	Akita	300	42.7	30.8	1,008	850	158
Yamagata	Yamagata	250	60.2	9.7	275	640	-365
Niigata	Niigata	490	31	16.7	1,578	455	1,123
Nagoya	Nagoya	2,150	30.4	24.1	2,538	925	1,613
Hiroshima	Hiroshima	1,057	22.2	17.2	2,815	1,098	1,717
Yamaguchi-Ube	Ube	180	48.3	16.6	419	860	-441
Takamatsu	Takamatsu	330	47.3	9.6	1,706	660	1,046
Matsuyama	Matsuyama	440	32.9	16	1,610	367	1,243
Kohchi	Kohchi	320	44.5	19.3	1,406	520	886
Fukuoka	Fukuoka	1,240	11	10.8	5,351	1,552	3,799
Kitakyushu	Kitakyushu	1,030	35.2	6.7	1,498	270	1,228
Nagasaki	Nagasaki	440	30.5	32.3	2,474	990	1,484
Kumamoto	Kumamoto	630	43.8	20.5	1,206	1,653	-447
Oita	Oita	410	28.2	23.3	2,715	1,176	1,539
Miyazaki	Miyazaki	290	45.2	19.9	1,296	937	359
Kagoshima	Kagoshima	540	39.1	29.4	2,431	1,797	634
Naha	Naha	300	20.6	7.1	1,041	874	167
Nakashibetsu	Shibetsu	30	74.4	17.5	55	1,077	-1,022
	County						
Monbetsu	Monbetsu	30	55.6	38.9	316	545	-229
Memambetsu	Kitami	110	59.4	23	41	731	-690
Aomori	Aomori	290	42.9	19.6	192	625	-433
Hanamaki	Hanamaki	280	33.4	9.4	1,326	650	676
Shonai	Sakata	100	62.4	13.5	206	735	-529
Toyama	Toyama	320	46.5	13.2	137	630	-493
Matsumoto	Matsumoto	200	33.4	19.3	193	510	-317
Nankishirahama	Nishimuro	70	42.4	2.5	69	424	-355
	County						
Tottori	Tottori	140	47.6	12.7	96	380	-284

Izumo	Izumo	80	49.5	21.2	220	730	-510
Okayama	Okayama	590	45	27.5	138	817	-679
Komatsu	Kanazawa	427	41.9	26.3	2,313	1,059	1,254
Tokushima	Tokushima	259	38	11.1	1,110	345	765

*Excluding Fukushima which has no data available.

**Excluding charter bus.

***Assume that a liter of gas run 8 kilometers and that the price of gas is set to be 110 yen per liter and include parking charge of 24 hours.

****Weighted average by multiplying frequency by fare.

Cf. Unyusho Kokukyoku (1994)