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The Journey to Work Patterns in Jurong Industrial New Town, Singapore

by

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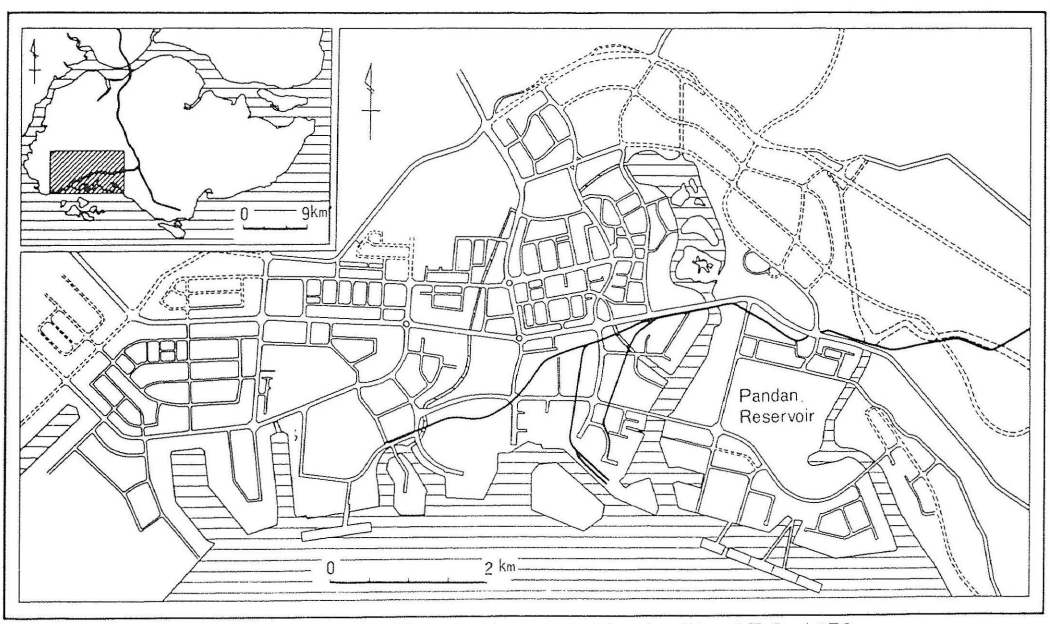
I Introduction

Journey to work can be simply defined as the trip which employees undertake from his or her residence to the work place and return. It occurs regularly and the flow of trips concentrates highly in the morning and the evening rush hours periods. Therefore, journey to work is one of the important determinant of transportation problems, for example, traffic congestion problem



Source : Jurong Town Allocation Plan, Architectural /Planning Div., J.T.C., 1978.

Fig. 1. Maps of Jurong Industrial New Town

in the country. This paper will examine the journey to work patterns of the residents in Jurong Industrial New Town. It is a planned new town which is located on the south-western part of Singapore(Fig.1). This Industrial New Town is designed under the neighbourhood principles and is an attempt to provide adequate employment opportunities, shopping, educational, recreational and other social facilities for the residents of the new town.

The study will serve two purposes : 1) to describe and to analyse the journey to work patterns such as distance, time, mode of transport and cost of transport ; 2) to observe the effect of socio-economic background on the patterns of journey to work in the new town.

II Data Source

Most of the statistical figures are provided by the Jurong Town Corporation. However, the study is mainly based on a sampling survey of the residents in the new town and it is also reference to the non-residents of the new town which survey is also undertaken by the author.

In the survey of the residents in the new town, the following data have been recorded : the distance of travel and time taken to and from work, the mode of transport, the monthly cost of transport, the location of the individual workplace and finally, socio-economic characteristics of the residents, such as nationality, race, age, sex, marital status, numbers of dependents, occupations, education and income are also included.

III Patterns of Journey to Work

The residents of Jurong Town tend to travel shorter distance. The patterns of trip distribution tend to be more concentrated rather than disperse. The surveys show that 82% of the residents. travel less than 9 kilometers and spend less than 30 minutes to travel to the

Table. 1. The Simple Correlation between Socio-Economic Characteristics and Travel Distance

	Sex	Age	Marital Status	No. of Dependents	Occupation	Education	Income
Distance	0.11	0.03	0.10	−0.11	0.17	0.08	0.10
Travel time	0.07	0.00	0.07	−0.13	0.08	−0.02	−0.08
Mode of transport	0.08	0.10	0.10	0.03	0.20	0.18	0.19
Transport cost	0.19	0.18	0.21	0.03	0.35	0.25	0.43

workplace. While, there are about 75% of the non-residents travel more than 20 kilometers to the new town and spend an average of one hour to travel to the workplace.

1. Patterns of Travel Distance

Most of the work trip studies have suggested that socio-economic characterisitics are often important factors in attempting to explain the variation of the distance that the workers undertake to travel. For example the A. Hech's study showed that the work-residence separation increases as the incomes of the workers increase.People with higher incomes travel a longer distance to their workplaces[1]. P. W. Daniels suggested that the job performed by individual employees will usually reflect the individual's total income. This in turn will determine how much time and how far he can afford to travel to work. He contended that the varying occupational group as a control on "Journey to work" patterns can be widely recognised[2]. Wachs and Kumagat noted that how far and how much time a person can afford to undertake a trip is presumbly related to his socio-economic status. The high income and the professional and managerial emplyoyees tend to have greater freedom of mobility and a higher degree of

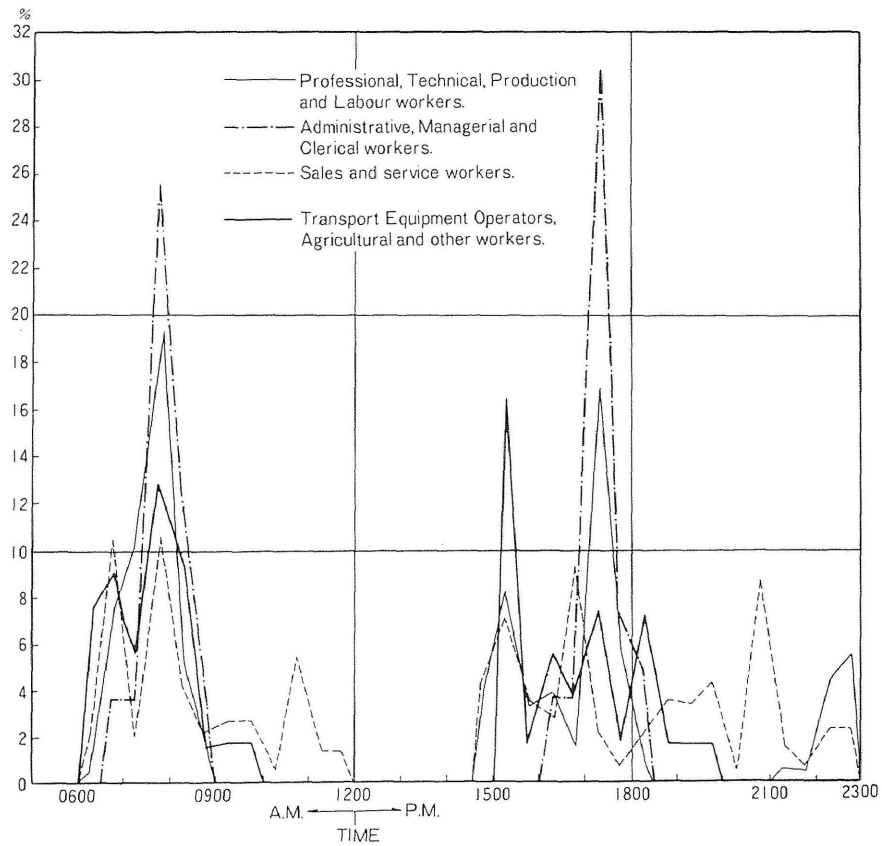


Fig. 2. Daily Work Trips Volume by Occupational Groups

accessibility to a place than low income and unskilled or semi-skilled workers[3].

From Table 1, the correlation between distance and socio-economic variables (such as age, education, sex, marital status, numbers of dependents and income) shows a very weak directional relationship. The value with distance for each variables is far from satisfactory. The rejection of these variables with distance, due to the fact that Jurong new town is planned under the concept of self-contained town in which people would both live and work within the town. Thus, it has resulted that there has no significant difference between distance travel and socio-economic groups.

2. Daily Work Trip Patterns

In Jurong Town, the residents' work trip begins early as 6:00a.m. and then gradually increase before 7:30 a.m. to 8:00 a.m., the volume increase rapidly and reaches its first daily peak and it gradually flattens after 9:00 a.m. At noon, the work trip movements become less and less (Fig. 2). After 2:30 p.m., the movements of work trip begin to increase, and the volume of movements fluctuates between 2:30 p.m. and 5:00 p.m. At 5:30 p.m. it reaches the second peak hour of the day.

From Fig. 3, the movements of sales and service workers are rather disperse. No any obvious movement pattern can be found because they mainly start to work at the most convenient time as to gain the maximum profit in their business. The administrative, managerial, clerical and related workers are mainly travel from 7:30 a.m. to 8:00 a.m. and from 5:00 p.m. 5:30 p.m. in order to meet their office working hours. For professional, technical, production workers and labourers, their work trip movements are apparently separated into three perdods in the day. It is mainly due to the fact these occupations have a proportion of their workers engaged in shift work. This has resulted in the minor peak during 6:30 p.m. to 7:30 p.m. and again in the afternoon from 2:30 p.m. to 3:30 p.m., and finally in the evening from 10:00 p.m. to 11:00 p.m..

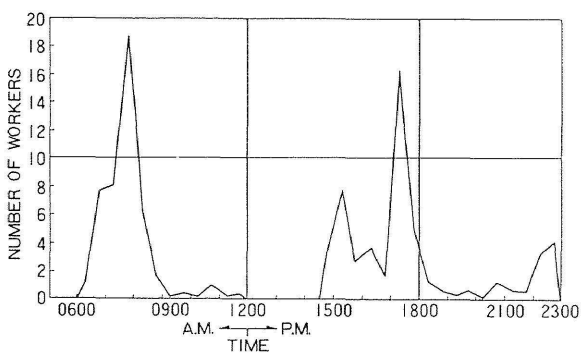


Fig. 3. Percentage of Total Daily Work Trips Volume

3. Patterns of the Mode of Transport

The choice of transport used by the workers in their daily journey to work is a critical feature pressing upon the problems of transportation. Generally speaking, if the majority of travel is made by private transport, the concentration on the road will most likely lead to traffic congestion. If most of travel take place on public transport, this tendency is likely to be alleviated.

Journey to work in this town involves different types of transportation. From the survey, the public and factory buses have represented two of the dominant modes of transport in this area. The former accounts for 37% and the latter for 35%. Workers travelling by private automobile account for only 11%. Among them, the majority are self-owned, and only about one-fifth of them are provided by the company. In addition, 70% of workers go on foot and 6% by motor cycle to their work sites. The remainders go either by bicycle or other modes of transport, such as truck, etc..

However, from the non-residents survey, the public and factory buses have also represented the most important mode of transport in this area. Workers travelling by private car are slightly higher than the residents, and about 10% car-pool and etc (Table 2).

In conclusion, the lower the income of worker, the more likey travel by a cheaper means of transport, The higher the income, the more likely the person is to travel by private automobile. Therefore, income is one of the important social variables which are responsible for explaining the differentiation of the mode of transport used by workers in this area.

4. Patterns of Transport Cost

As A. Hecht has mentioned, "Workers should locate their residence in the urban space

Table. 2. Percentage distribution of mode of transport by number of workers

Residents			Non-residents	
Mode of transport	No, of workers	% of total	Mode of transport	% of total
Factory bus	185	37	Factory bus	31.9
Public bus	176	35	Public bus	38.2
Private car			Private car	14.8
(1) owned	43	9	Mini-bus	4.9
(2) co.	11	2	Others	10.2
Walking	35	6		
Motorcycle	10	2		
Bicycle	28	7		
Others	9	2		
Total	497	100		100.0

Table. 3. Average travel distance of occupational groups

Occupational groups	Average travel distance (km)
Professional	5.77
Administrative	8.28
Clerical	8.55
Sales worker	7.32
Service worker	7.52
Agriculture	10.50
Production	3.89
Transportation	10.50
Workers	4.30
Others	9.21

according to ability to substitute "journey to work" expenditure for residence expenditure. As the objective of workers is to minimize its ability within the constraints of the budget. The economic man should locate at a distance from the workplace where the marginal location rent cost is equal to the marginal journey to work cost." This implies that income does affect the transport cost expenditure. Low income workers prefer to select their residence and place of work as close to each other as possible in order to avoid high cost of transportation.

However, in order to examine the effect of each of the socio-economic variables on transport expenditure. The simple correlation technique was applied. The result is shown in Table 1 and Table 3. It showed that the level of income carries heavier weights as compared to the other variables in affecting the cost of expenditure on transportation in this study. The value of 0.43 to some extent explains that the transport cost increases as the income of the workers increases. In other words, workers with higher incomes spend more on transport that lower income workers. Both education and occupation also show a positive relationship with transport cost. Since these two variables with income reveal a fairly high correlation coefficient among them, the values of correlation coefficients between transport cost and education, transport cost and occupation are 0.35 and 0.25 respectively, which are lower than the value between income and transport cost. Therefore, it is income, rather than occupation or education, which accounts for most of the variation of transport cost.

IV Conclusions

This paper has examined the journey to work patterns in Jurong Industrial New Town. The major findings can be noted as follows :

(1) About 80% of the workers travel less than 9 kilometers to their working place.

Workers with different socio-economic backgrounds do not show any differences in the distance covered in "journey to work".

(2) Two of the dominant modes of transport used by workers in their daily journey to work are public and factory buses. The higher income workers are most likely to travel by private transport, whereas lower income workers travelled largely by public transport, such as public and factory buses.

(3) Nearly 50% of workers spend less than 20 dollars a month on transportation. The higher income workers spend more on transportation than lower income workers.

(4) Two major concentrations of work flows occur in the morning between 7:30 a.m. and 8.00 a.m. and in the evening between 5:00 p.m. and 5:30 p.m.. Workers with a different nature of work show a contrasting temporal pattern of "journey to work" among each other.

Since most of the workers use public buses, few of them use private cars, so theoretically the traffic congestion is not so serious. But 1/3 of the workers in Jurong Town are non-residents, they are also travel during these two peak periods. So traffic congestion is always be a continuous problem facing by the pattern of journey to work.

(5) Work-flows made within the town account for 78.87% and beyond the town they account for 18.31%. In addition, about 2.82% of the workers do not have a fixed working place.

(6) Another finding is that, there is little correlation between socio-economic background and journey to work patterns. There has no any significant relation between them or it is better to say the correlation between distance and socio-economic variables is obviously. The main reason of which is that Jurong Industrial Town is the first Singapore industrial town. It is planned by the government under the concept of self-contained, so that majority of the workers can live and can work in the industrial town.

Notes and References

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