Ⅳ-136 Reduction of Good Vehicles Movement

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1. Introduction

The main problem of good vehicles movement include the movement of freight vehicles carrying small shipments within an urban central area. The impact of routing urban small vehicles through consolidated terminals is a suitable solution for this problem (1,2). Some few studies have been carried out:
In Columbus, Ohio, CBD area, the impact of routing urban small movement ranging from 0.0 to 5000 lb through consolidated terminals was considered by using semitrailer combination good vehicle (3). In New York city, consolidation terminals have been studied and evaluated, in particular by chosing three proposals of routing for good vehicles and comparing between their relative effectivness (4). In Osaka city, only two distribution centers for loading but the consolidation terminals system not existed (5). The purpose of this investigation is to study the effect of using the consolidated terminals of good vehicles in reducing traffic volume entering Osaka CBD.

2. Multi-Origin Simulation Model of Good vehicles Reduction

The analysis of field observation results showed that the average load of good vehicles arriving in study area was 0.74 ton/truck. Accordingly too much good vehicles are needed to transport all loads entering study area. This problem is examined here based on the field observation results by the use of multi-origin simulation model. The model is designed to calculate the reduction rates of good vehicles through the consolidated terminals. This model depends on loading the vehicles by near full maximum load capacity. In this model, all good vehicles should be loaded by 90% from their capacities taking into consideration 10% as a space loading losses.

3. Model Validation

To check the validity of model, a comparison between the results from field observation with those obtained by the model must be accomplished. The load distribution estimated by the model was very near from other estimated by field observation. Also vehicles type distributions introduced by the model was 44.9%, 31.9% & 23.2% for small, medium and large vehicles, while these ratios were 46.75%, 30.75% & 22.5% respectively from field observation, this result can be considered as a second suitable argument for validity of model.

3. Application of the Model

The purpose of this part is to examine the impact of routing urban small good vehicles through consolidated terminals in Osaka CBD. The data required to apply the model were obtained from the field observation and national census in Osaka city. These stimulus conditions can be described briefly.

a) Study area represents half of Senba area in Higashi-Ku in Osaka CBD.
b) Osaka city is divided into four zones of trip origins for good vehicles according to increasing routes of good vehicles movement.
c) Percentages of trips from these origins to study area were 22%, 23%, 25%& 30% for these origins respectively.
d) Average load of good vehicles was 0.74 ton/truck.
e) The probability density function of load distribution is expressed by the

Poisson distribution.

f) Ratios of frequancies of type of vehicles are considered as 47%, 31%& 22% for small, medium and large vehicles respectively.

g) Purposes of loading are 59% and 41% for delivery and pick-up vehicles.

h) Loading is mainly on 1000, 3000& 4000 kgs for small, medium and large vehicles respectively.

The results of the model application realized by implementig four consolidated terminals on the fringe area are shown in Fig. 1. 60% reduction rate of good vehicles through the use of good vehicles carrying near full maximum load capacity.

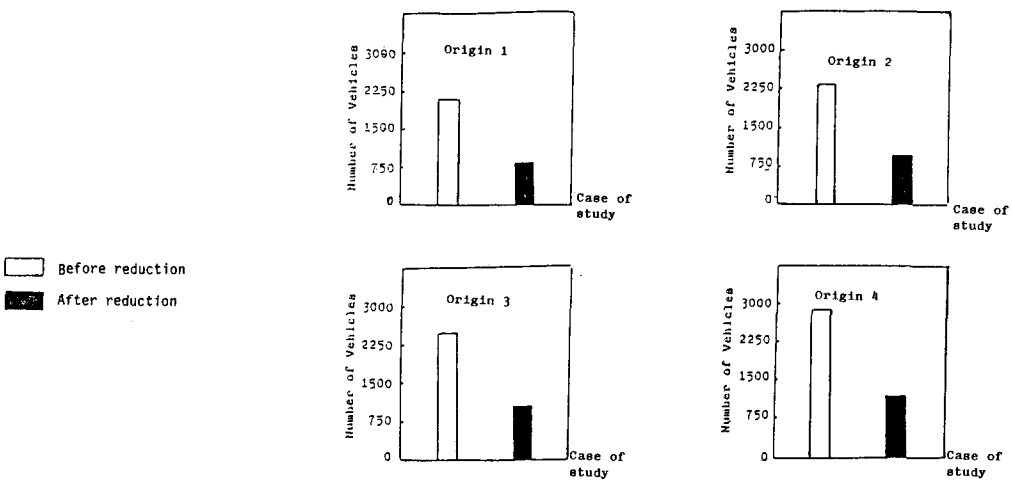

Fig. 1 Results of multi-origin simulation model

5. Conclusion

This study has attempted to conceptualize a method for improving the efficiency of urban good vehicles distribution through the consolidated terminals of good vehicles movement to minimize the traffic volume of good vehicles entering CBD area. This reduction rate was 60% from total good vehicles arriving study area. When evaluate the reduction rate for small vehicles only, 35% reduction for small vehicles arriving. Accordingly, these results directly effect to relieve congestions and delays at CBD.

References

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