An experiment of a town centre traffic management package employing traffic capacity reduction and public transport promotion—the case study of Toyonaka station district

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Abstract

This paper presents a review of the process and results of an experiment for traffic capacity reduction and street enhancement in a town centre in Japan. Regeneration of town centres is one of the most important factors for keeping 'green mode' transport patronage aiming at sustainable development. Most cities in Japan have old city centres of a "High Street" type; i.e., a narrow shopping street which is inappropriate for modern day traffic. Such areas are suffering from congestion of mixed traffic and also have problems with on-street parking due to a lack of loading space. As a result, there is a reduction of town centre vitality. Traffic management measures, such as the introduction of transit or pedestrian malls, are necessary in order to revive these streets.

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shopping area, consisting of narrow shopping streets linking to a railway station. Unfortunately, due to a large volume of motorized vehicles and, along with much on-street bicycle and loading vehicles parking, it has made the area undesirable for shoppers. A relief road is also congested by through traffic due to it not being wide enough.

The Toyonaka municipal government and the Ministry of Construction has begun research into street quality improvement and carried out a traffic experiment for 4 days in April 2000. The authors were involved with the planning of these experiments and the design and analysis of the impact survey. In order to enhance the quality of the streets for shoppers and reduce traffic congestion, traffic capacity reduction by pedestrian-only mall and transit mall on shopping streets, along with public transport promotion measures were introduced in this experiment. As results, a reduction of traffic volume and increase of bus users coming to the district were achieved.

According to data from an interview survey given to shoppers and retailers, these experiments were viewed to be a measure of greening of the shopping area, although the bus-transit mall scheme was not so popular with retailers.

1. Regeneration of Town Centres and Greening Transport

Economic down-turn of town centres has become one of the most important problems for many local cities in Japan due to new forms of retailing and out-of-town shopping centres which have become popular due to increased car ownership. For keeping 'green mode' transport patronage as well as maintaining communities and infrastructures in down town areas, revitalisation of town centres is regarded as one of the most important measures for sustainable development of local cities[1]. In practice, however it is, difficult to establish strategies by way of gaining public agreement under the actual condition of town centre areas.

Most cities in Japan have old city centres of a "High Street" type; that being, a narrow shopping street which is inappropriate for modern day traffic. Such areas suffer from congestion of mixed traffic and also have problems with on-street parking due to a lack of loading space and shoppers parking spaces. As a result, there is a reduction of town centre vitality.

One of the best solutions in order to revive these town centres is implementation of traffic management measures, such as the introduction of transit or pedestrian malls, promotion of public transport access, and the car traffic restraint measures[2,3,4,5]. This answer, however, is not so popular for shop owners and local businesses. They often insist on the expansion of road capacity and the building of multi-level or underground parking spaces aiming at facilitating car access for shoppers.

They regard the lack of parking spaces as being the greatest weak-point of old-style town centres compared with the out-of-town centres. Local businesses also oppose restraints on the freedom of loading and unloading in front of their shops and on shoppers' access to their vehicles. Of course, these strategies
require large capital investment which is not economically viable for small local cities.

With regard to reallocation of spaces for pedestrians, cyclists, and motor vehicles, public involvement is inevitable in realizing the 'pleasant town centre'. For planning strategies and design processes, the involvement process of local citizens, who lack the expertise of transport planners and street designers, is necessary in order to gain their approval. For this reason, a phased experimental approach is adopted in many cases.

Adopting this approach means that discussed plans will be tested on an experimental basis and potential problems analysed so that the design can be improved through the participation and approval of actual users.

In Japan, due to the lack of legal means for these approaches, experimental attempts of this kind have rarely been carried out. It is only recently that the Ministry of Construction has given its official endorsement to carry out such experimental transport management plans thus promoting a number of traffic management experiments involving public across the country. This paper presents a review of the process and results of a traffic capacity reduction experiment and street enhancement in Toyonaka station town centre in Japan.

2. Toyonaka Station Town Centre

Toyonaka city is located in a suburb of Osaka city and has a population of 390,000. Toyonaka station district, a main town centre area in Toyonaka city, was formed around the station of Hankyu private railway connecting the Osaka town centre (Figure 1).

![Figure 1 Toyonaka station district](image)
This town centre is an old-fashioned style shopping area, consisting of narrow shopping streets; Ginza street and Ichiban-gai street linked to a railway station. In this area, there is a relief road; Oh-ike school road, connecting to the regional trunk road (National Route 176) which has quite a large volume of traffic. Unfortunately, due to the large number of motorized vehicles and, along with much on-street bicycle and trade-vehicle parking, it has made the area undesirable for shoppers. The relief road is also congested by through traffic due to it not being wide enough.

3. Vision of Town Centre Proposed by Residents Group

Toyonaka city government adopted the citizens participation system in town planning. They are supporting the establishment of a council made up of residents and local businesses in order to study and solve town problems by themselves. By employing this kind of support, The Toyonaka Station District Council was established in 1993 after getting the consent of over half of the residents in the district. Many study meetings and discussion forums to search for practical measures have taken place up to the present.

A vision of town centre improvement was published by the council in 1995 and was proposed to the city authority[6]. This contains traffic management measures to create street enhancement for pedestrians and relief road construction to realize the pedestrian mall. The Toyonaka municipal government submitted a policy plan for the Toyonaka station district in 1997[7], which refers to the council's vision and aims at the improvement of pedestrian space along shopping streets and the reform of a junction of relief road and trunk road.

4. Demonstration Experiment 2000.4.26

People believe that the improvement of relief roads is necessary to realize the complete plan, although it takes several years to do so. Thus the council and government are keen to implement some first phase plan without long term investment. In order to realize the pedestrian oriented shopping areas mentioned in the policy plan, traffic demand management is inevitable where car access to the centre is restrained and public transport access is promoted without the need for investment for expanding traffic capacity.

The Toyonaka municipal government and the Ministry of Construction has begun research into an experimental project which aims to find the effects of TDM (Transport Demand Management) packages and get public approval of town centre enhancement policy. An experimental scheme was carried out for 4 days in April 2000. Packages of traffic capacity reduction by using traffic regulation on shopping streets and public transport promoting measures were introduced in this experiment to enhance the quality of streets for shoppers and reduce traffic congestion. This package scheme includes the following measures as shown in Figures 2 and 3.
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Figure 2
Package measures in the experiment (1)

Figure 3
Package measures in the experiment (2)

Picture 1 Ginza transit mall
Picture 2 Ichiban-gai shopping mall
4.1 Pedestrian mall and traffic control

1) Transit mall: One of the shopping streets (Ginza shopping street) is converted into a two-way bus only street from a one-way street. (Picture 1)
2) Full pedestrian mall: The other shopping street (Ichiban gai) is converted into a full mall. (Picture 2). These traffic regulations were implemented from 12:00 to 19:00 in order to avoid traffic congestion during peak hours in the morning.
3) Junction treatment: New lane layout was tested at the junction of an exiting relief road (Oh-ike school road) and truck road (Route 176).

4.2 Public transport promotion

1) New bus service: 2 new bus routes are introduced. During the experiment, these services are operated at free of charge.
2) Complimentary public transportation: The council of Toyonaka station district agreed to give a free bus ticket to shoppers who spent over 3000 yen in the area. Hankyu railway Co. also provided a discount fare for transfer travel by bus and train at Toyonaka station, environment season ticket system (half discounting of accompanying person’s fare), and two day ticket sales at the same price of one day ticket during the experiment.
3) Park and ride: At Sibahara monorail station, free parking spaces are provided for a park and ride system using the municipal hospital’s parking spaces.

4.3 Promotion of cycle use

On street bicycle parking hinders walking on narrow sidewalks, although retaining convenience for bicycle parking is a key to promote green mode access to the town centre. During the experiment, new bicycle parking spaces were built at three locations using back street and temporarily rented land.

4.4 Loading space

In order to secure loading and unloading areas for stores along the mall streets, 3 private parking spaces were temporarily converted into public loading bays.

4.5 Public Awareness and Information

Informing the public is a key issue for the success of such demonstration experiments. From about 1 month before the experiment, publicity of the experiment began by way of local newspapers, community papers published by residents associations, outdoor advertisements, distributing leaflets. During the experiment, local TV program and real time traffic information on the radio or roadside variable sign appealed the practice of experiment and traffic situations.

Over 80% of people acknowledged the experiment on various kinds of surveys as a result of the publicity as shown in Figure 4. This is quite high ratio compared with other examples of such demonstration experiments in Japan.
5. Results of the Experiment

5.1 Traffic situation

The traffic demand management package with road capacity reduction resulted in green mode promotions beyond expectations and there was no serious traffic congestion.

1) Traffic volume
Although the traffic capacity of roads was reduced by the experiment, there was neither serious troubles in traffic situation or traffic congestion, except on the first day when a slight traffic jam occurred on the National Route 176.

*Figure 5* shows the change of traffic volume before and during the experiment on weekdays. A traffic reduction of 22% on week days and 16% on weekends was evident during the experiment from northbound areas of the district days. A traffic reduction of 22% on week days and 16% on weekends was evident during the experiment from northbound areas of the district.
2) Pedestrian volume
On Ichiban-gai street, where a full pedestrian mall was introduced, pedestrian traffic volume doubled during the period of the experiment. Even on Ginza street, along a transit mall using dual-way bus operation, pedestrian volume increased over 20% on weekdays and 40% on weekends as shown in Figure 6.

3) Bus passengers
Figure 7 shows the change in the number of bus passengers. It increased over 20% on weekdays and 60% on weekends during the experiment, though the ordinary bus service was operated at the same fare as before.

5.2 Public evaluations
1) Users' evaluation
Over 70% of pedestrians evaluated the improvement of street environment for walkers as shown in Figure 8.

According to the bus users, two thirds of people reported that the bus operation became smooth during experiment (Figure 9).
2) Public evaluation of the experiment

Over 90% of pedestrians, bus users and residents evaluated the experiment or regarded it as no problem as is shown in Figure 10. On the other hand, 20% of drivers who came during the experiment regarded it as being inappropriate.

![Figure 10 Evaluation of the experiment](image)

3) Public acceptance of the policy

Over 80% of pedestrians and bus users along with 70% of local residents accepted the policy of traffic demand management and public transport promotion as is shown in Figure 11. On the other hand, 40% of drivers who came during the experiment were opposed to it.

![Figure 11 Evaluation of the transport policy for Toyonaka station district](image)
6. Summary

The traffic experiment described in this paper presented only a 4-day demonstration. Thus the results for trip behaviour should be regarded as being related to an event or festival.

Many people agreed, however, that the experiment was very useful for establishing broad public involvement in the greening of the transport planning. It contributed greatly to the regeneration planning of the Toyonaka station town centre.

The council made up of by local businesses and residents has initiated discussion meetings to search for a practical solution with local businesses who previously had not participated in the council. Some local businesses have also started a feasibility study of the cooperate loading/unloading system to reduce on-street parking for trade vehicles on the shopping streets.

In Toyonaka municipal government, the proposed project of improvement at the relief road junction was accelerated due to the support of policy members after the experiment.

The authors intend to clarify social effects of the experiment in future research.

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References