

Evaluation and improvement on bicycle-friendly environment in the urban city center in a developed country (the case of Sapporo, Japan)

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Abstract

This study represents a key issue in the bicycle planning process for development of bicycle network plan. This step is very important for determining which streets should receive the highest priority for new bicycle facilities. The data from a questionnaire survey were used to study the characteristics of the travel behavior of all roadway users in the inner city center, in order to evaluate in which way roadways can be improved and how to make the environment more bicycle-friendly. The experience of bicycle-friendly cities in US and Western Europe was followed for giving conclusions and recommendations how to satisfy the needs of all roadway users. The conclusion is that existing roadway system must be modified. Our proposal for improvement with effective separation between cyclists and pedestrians by way of introducing bicycle lanes was accepted from pedestrians and cyclists. Drivers stay opponent to narrowing of their space on the road, but still, they declare themselves for giving priority to the cyclists in the case of realizing of this initiative.

Keywords: Bicycle, questionnaire survey, bicycle-friendly, transportation planning

Оценка и подобряване на средата, благоприятна за велосипеди в градските центри на развитите страни (Сапоро, Япония)

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Резюме

Настоящото проучване представлява ключов въпрос в процеса на велосипедното планиране за развитие на плана за велосипедната мрежа. Това е много важна стъпка за определяне на улиците, които трябва да получат най-висок приоритет за нови велосипедни патеки. Данните от анкетно проучване са били използвани, за да се запознаят с характеристиките на поведението при пътуване на всички потребители във вътрешноста на града, за да се оцени по какъв начин платното на движение може да се подобри и приспособи за велосипедно движение. Опитът на велосипедно – приспособени градове в САЩ и Западна Европа беше последвано от даване на заключения и препоръки как да се задоволят нуждите на всички участници в пътното платно. Изводът е, че съществуващата система на пътното платно трябва да бъде променена. Нашето предложение за подобряване со ефективно разделяне между велосипедисти и пешеходци по пътя на въвеждане на велосипедни алеи е приета от пешеходците и велосипедистите. Шофьорите обаче остават противник заради стесняване на тяхното пространство на пътя, но все пак, те се обявяват за даване на приоритет на велосипедистите в случай на реализиране на тази инициатива.

Кључови думи: велосипед, анкетно проучвање, благопријатна средa за велосипеди

Introduction

Bicycle is a transportation mode with very high importance in the urban city planning. Researchers and planners from developed countries put a significant accent for insisting of this kind of transport, because of no noise or air pollution, it requires only the energy provided directly by traveler, it offers valuable cardiovascular exercise, doesn't require much space, it's economical in both, direct user costs and public infrastructure costs, and enhance liveliness of urban environments, making them safer and more interesting.

Comparing with the evolution on motor vehicle traffic modeling, bicycle transportation planning theory, same as pedestrian, is in its formative years. The basic planning theories are evolving in last decade. One common misconception is that both bicycling and walking issues should be addressed under one heading. In reality they are separate and distinct modes of transportation that should be studied individually. For example, pedestrian access to transit will logically require more sidewalks connections and improvements to roadway crossings in the immediate vicinity of the station and bus stop, while bicycle improvements might include bike lanes in a wider radius and bike parking facilities at the station itself. Opportunities to provide accessible, safe, convenient and inviting environments for walking and bicycling should include adoption of effective land use planning and design standards. Land-use and housing policies that promote low-density sprawl generate long trip distances that make cycling impractical. High-speed roads, narrow or non-existent sidewalks, inadequate street crossings, and the absence of bike lanes obviously discourage cycling, and walking.

In Western European countries, the bicycle is treated as one of the major transportation modes in city areas, and there are many bicycle road networks. The Netherlands and Germany showed that bicycling could be made quite safe, by the very low fatality rates. Those countries recognized the importance of bicycle safety and over the past two decades they have undertaken a wide range of measures to improve it. The necessary technology and methods are already available, with decades of successful experience.

There are many reasons for the higher levels of walking and cycling in Europe. The more compact land-use patterns in European cities explain at least some of the difference in travel behavior compared with those in US, where that is not a case. There are growing efforts throughout US to improve conditions for bicycling. Congress recognized this need in 1991 when increase the responsibilities of local and state governments to plan and implement bicycle facilities. Unfortunately, public policies have done little for its promotion. The neglect of bicycle safety has made this mode dangerous way of getting around. High-rate bicycle facilities made bicycle safety to become a growing concern for many communities.

Safe, convenient and well-designed facilities are essential to encourage bicycle use, but there are other important elements of a comprehensive community approach, like bicycle safety education and training, encouraging bicycle use, and the application

and enforcement of the rules of the road.

In Japan, bicycles do not enjoy the same rights as the automobile and its importance is greatly disregarded. Every day, 30 million people ride bicycle and among all other transportation modes, bicycle usage is 15%, which means third in the world behind Holland and Denmark. But what makes it totally behind is that only 0.15% of total road length is dedicated to bicycle roads. This is only 1/60th of the level of Holland and less than 1/30th of the level of Germany. Those facts show that there are numerous bicycle users, but adequate bicycle facilities do not exist in urban areas.

In the city of Sapporo, in Japan, which is our example- case for this study, there are numerous bicycle users, but in fact, adequate bicycle facilities do not exist, especially in the inner CBD (Central Business District). Only a few studies have been conducted on evaluation methods or demand analysis of bicycle road networks. Most projects or studies focus on the bicycle parking facilities near railway and subway stations, because bicycles are mainly used as feeder transportation between homes and JR or subway stations. Huge numbers of bicycles are illegally left around attractive public places like department stores, restaurants, banks, shopping places etc. and cause serious congestion, restricting pedestrian flow.

Objectives of the study

In the local bicycle network plans, first step in improving local conditions is to determine where improvements should go and what they should consist of. In most communities, there is no shortage of locations that need sidewalks and bikeways, therefore, decisions must be made as to which locations should receive first priority for funding, and which improvements can be incorporated in other ongoing development projects. A bicycle transportation, planning and installing on-road bicycle facilities can help relieve conflicts between bicyclists and pedestrians in areas where sidewalk bicycling is common.

Following the necessary step of the planning process for developing a bicycle network plan and to make the decisions, evaluation of current conditions on candidate roadways is done. That means to collect data related to level of use, safety problems, suitability of the existing network of facilities, and policies and practices for non-motorized travel. Also, public opinion is examined, which is very important during the development of bicycle network plan not only for the sake of knowing the public's preferences for new facilities, but also in order to develop a base of popular support for alternative transportation.

The objectives of the study are:

- To collect new data about the actual situation of cycling, in order to provide engineers and planners information that can be used in future improving (planning, designing and constructing) roadways to be shared by motorists and cyclists. Those data are important for following the changes of conditions in the transportation systems and will contribute for making future decisions in the urban transportation city- planning;
- With the analysis of the opinions of the respondents to determine the characteristic of current problems and to evaluate the safety and utility of sidewalks like shared use facilities. The target is to see the attitude of surveyed people if they are

supporting the initiative for introducing bicycle lanes, like an idea for creation of more bicycle friendly atmosphere in the city center;

- Developing a base of popular support for alternative transportation from the public opinion;
- From the practice of well-experienced countries in developed countries, to give conclusions and recommendations how to satisfy the needs of the cyclists and how to make better environment for road users with making the city more bicycle-friendly.

Survey

Questionnaire survey was conducted on October 3rd, 4th, 10th and 11th, 2003. Three thousand questionnaires were distributed on the scrambled intersection near the Department Store “Marui Imai”, in the inner CBD of Sapporo. There were three types of questionnaires, each of them with 1000 samples, divided for cyclists, pedestrians and motor vehicle drivers, in the way to get the opinion of all different types of roadway users. Respondents were requested to return the answered questionnaires by mail. Total number of recovered questionnaires was 976 (32.53%). From them, 930 (31%) were analyzed. General questions were collected, about the age, gender, occupation, method of travel, purpose and frequency of coming in the CBD of Sapporo. People were asked about all problems that they have been experienced moving in that area (illegally parked bicycles, passing space and width limits on the shared sidewalks, obstacles, surface problems like potholes, cracks and ramps on intersections, awareness for the surrounding people and their insensitivity); about their experience in conflicts and accidents. Cyclists had questions about safety, represented with wearing of helmets and riding a bicycle with lights at night, with the purpose to evaluate their behavior. Also, they should give a rating about the bicycling conditions on the scale from very poor, poor, fair, good to very good. Pedestrians and drivers were asked for the reasons why they are not riding a bicycle. The most important questions for us were those regarding bicycle lanes: what do they think about the idea of introducing bicycle lanes, with the explanation of reasons why they disagree; and second, if they will start riding bicycle more often if bicycle lanes are introduced.

Results and Discussion

Description of respondents

Profiles of the respondents were set, composed of collection of age, gender, occupation, method of travel, purpose and frequency of coming in the inner CBD of Sapporo. The ages of the respondents were from all age groups, as shown on Figure 1. 30% of cyclists are over 50 years old and 39% are from 30 to 50 years old, which shows that cycling is a travel mode for everybody. The survey demonstrated that in Japan even the people over 50's ride a bicycle. Similar results have been published in Netherlands and Germany. Opposite of that, in USA bicycling is limited mainly to the young.

Cycling is regular- most cyclists drive in a familiar environment, because 51% of them are daily users and willing to ride from 2-5 km in one-way distance. 9.8% are enthusiastic to ride even more than 10 km in one-way. 37.7% of them use bicycle few times per week, and only 10% use it more seldom. This is strong evidence that urban cycling is very important travel mode in the CBD of Sapporo.

Distribution on transportation mode used for coming in CBD, shows that the most practical mode for pedestrians is subway. Drivers are the most dependent on their motor vehicles: in 74% from all cases.

Cycling conditions in inner CBD of Sapporo

In the term of comfort and convenience, more than half of the cyclists (52%) respond that cycling condition in inner CBD of Sapporo is poor, and only 7% answered that the situation is good. Relatively high percent (16% of all) think that the situation is even very poor. 72% of cyclists and 95% from pedestrians feel inconvenient to share the sidewalk. Only one respondent doesn't have any problem while riding the bicycle. Final judgment is that results about comfort and convenience are disappointing.

In the term of safety, we found satisfactory result that 77% of the cyclists always use lights while riding in the night. The result about wearing a helmet was like we expected: 100% of cyclists never use helmet. Involvement in accidents is disappointing because of the terrible conditions offered for urban cycling in the city center: only 50% of the cyclists have never experienced a conflict, while 24% of the drivers were involved in some conflict with cyclists and 40% from pedestrians. Distressful is the result that 94% of pedestrians are afraid from accidents which shows that they are exceptionally disturbed and troubled by cyclists on the sidewalk.

Many of the respondents in their free comments and suggestions noticed about the bad impression from the behavior of some cyclists and their unawareness and insensitivity. They feel this is the most serious problem and gave us advice that we have to give more priority and to find out a solution.

Introducing of bicycle lanes

Cyclists accept introducing of bicycle lanes – 71.4% agreed to use bicycle lanes if they are constructed and only 4% are worried about their safety. This is excellent rating, which gives green light for constructing of bicycle lanes.

Pedestrians also favor separated bicycle lanes- 60.8% think that bicycle lanes are good solution for solving the actual problems. Only 16.9% say that bicycle lanes are unnecessary, which shows that they know cycling conditions very well.

Even drivers support introducing of bicycle lanes- drivers who are leading opponents of narrowing the space of the road and are against sharing it with cyclists, inspiring 40.9% of them agree that they will give the priority to the cyclists if bicycle lanes are introduced, in order to make better environment for everybody.

All types of respondents will start using bicycle more often if bicycle lanes are introduced- all roadway users show interest in riding a bicycle if the traffic conditions become better with constructing bicycle lanes. In that way, Sapporo will win over new bicycle users and create more comfortable environment.

Illegally parked bicycles

Parked bicycles on the sidewalks are especially big problem- 91.4% of the pedestrians find difficulties with parked bicycles on the sidewalks. Those complaints are in serious rang and give an evidence that is final time for the next step in improvement of the current condition. 48.5% of the cyclist's respondents answered that parking of bicycles is one of the biggest problem that they have been experienced as a cyclists.

Conclusions and Recommendations

Bicycle is one of the important elements in transport systems in Sapporo and is

incredibly bicycle-friendly city regarding the number of bicycle users, but urban transportation plans treat bicycles and pedestrians as a single mode. In fact, existing bicycle facilities are not fulfilling the needs of users. The presented situation with the freedom and safety in moving in the inner CBD of Sapporo is not well accepted from the traffic participants: pedestrians feel unsafe on the sidewalks because of the shared use with the cyclists; cyclists cannot travel unobstructed and conflicts occur frequently.

On the basis of our research how to make more bicycle-friendly environment for roadway users, for the case of the city of Sapporo, we can conclude that the existing roadway system must be modified. Our proposal for improvement with separation between cyclists and pedestrians with bicycle lanes was accepted from all three types of roadway users. In that way, according to their needs and interest, we can expect significant increasing of number of bicycle users.

If bicycle lanes are introduced, for prevention of conflicts and accidents between cyclists and motor vehicle drivers, bicycle-friendly traffic laws should be created that will guarantee minimum delays and maximum safety and sufficient space for maneuver for everyone.

Following the experience of the bicycle-friendly cities in US and Western Europe, and implementations of conclusions and recommendations of this study, the needs of the cyclists will be satisfied, and the environment in inner CBD will be improved.

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