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Integration Possibility of Urban Public Bus System and Cable Car in Maribor

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Abstract: Combination of a bus system and cable car system can reduce the overall congestion of traffic in urban areas, where surrounding hills or mountains hold larger settlements or tourist and recreational infrastructure. With this kind of integration number of individual car trips can be significantly reduced. In this paper, the authors present an analysis of the pilot project implementation, which was held in Maribor. The authors conducted a limited test trial of two means of transportation, combining them into a single operating transport offer for inhabitants and tourists. Combined transport option proved to be a good starting point for reduction of traffic and parking congestion during winter tourist season and beyond. Method used in the research, in order to gain actual potential of integrating two systems and improving public transport offer, was establishment and implementation of the pilot project in Maribor during January 2011. Data was gathered through interviews of two interest groups. The first covered the users who were brought to the foothills of Pohorje's ski center by bus. The second covered the cable car users that were traveling to the top of Pohorje. For a limited time period, a trial principle of a single ticket was established, which gave ski-pass holders free bus ride on bus line No. 6. With the aim of reducing CO_2, test drives of hybrid bus and compressed natural gas bus were conducted alongside many promotional activities with which users were informed of importance of environmentally friendly mobility options.

Key words: Public transport, bus system, cable car, integration, combined ticket, single ticket, compressed natural gas, CO_2 reduction.

1. Introduction

The issue of motorized transport is not only its abundance but also its stimulation of stationary traffic in the vicinity of major centers and other entertainment and recreation infrastructure. A higher percentage of modal split in favor of car trips and the amount of parking in the vicinity of tourist areas are influencing efforts of local authorities to implement transport policies and further development, which improves public transport links and motorized traffic, and in return reduces congestions on roads and allows a drastic change in daily trip habits or methods by which residents and visitors arrive at the desired destination in the city [1].

For getting to and from tourist spot or its vicinity, a car is a primary means of transport when it comes to poor public transport links and where integration of different systems does not exist; especially at junction points for suburban and urban public transport connections, or railway and urban public transport connections (rail-bus). Of course, problems do not only occur with conventional systems, but also when it comes to integrating specific systems, such as ski lifts and cable cars, into the city's public transport system.

This paper analyzes the case of such cable car system integration with the urban public transport and the creation of a new public transport offer, in order to determine whether such integration is meaningful and sustainable in long-term, and at the same time provide useful information for potential new integration in other locations around Slovenia.

The paper examines an example of unexploited integration of two systems, urban bus service and cable car at Pohorje, which is a tourist and recreational hot spot in Maribor and surrounding area.

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In particular, a trend of increased number of car trips to the foothills of Pohorje can be detected in winter season, when public transport does not effectively meet needs for a good transport alternative, and at daily peak hours, when residents prefer to use their own means of transportation to commute to and from work or school.

Examples of good practices show that an integration of public transport network and cable car system for daily trips, sightseeing and recreational activates, as well as daily commute to and from work, can offer a transport option, which can be equal or even compete with car traffic [2]. Many resorts and winter sport centers in Europe have proven that this kind of transport combination is possible for tourism and leisure activities, and individual examples from South and North America also show that this is possible for daily commute of people to and from work [3]. Thus, in the case of Caracas in Venezuela, Medellin in Columbia [4] and Portland in the United States [5], where a successful integration of the cable car system with subway, tram or bus lines is already present, we can see a direct reduction of travel time between populated areas and urban centers, and reduced percentage of motorized traffic [6]. As is the case of South America, urban cable car systems are used to reduce social exclusion of the poorest segments of the population, who do not have access to a car or other transport modes and in return elevate their mobility [7-9].

This paper also addresses the specific case of the introduction of a single ticket system between cable car and urban bus transport in the area, where use of combined ticket for existing transport systems has not yet been introduced or recognized, with the aim of reducing the impact on the number of car trips and thus the modal split in the area. From this perspective, this paper differs from the previously cited works, that deal with the expansion of existing transportation facilities and integration of cable car systems into the existing public transport systems for specific groups of users (tourists) or purpose of travel (leisure, sport), or is introduced as a social corrective measure for the poorest segments of the population.

2. Existing Circumstances and Research Goal

Based on the analysis of a pilot case, the purpose of this paper is therefore to determine what is the actual potential of measures (dealing with the integration of cable and bus systems) to reduce the share car trips in areas, where a single ticket system is yet to be integrated with existing public transport systems. The aim is to provide relevant findings and contribute to the improvement of the planning process and decision-making for existing case and new forms of integration between different transport systems in Slovenia.

The purpose of the pilot project in Maribor, which was carried out in the scope of European project CO_2NeuTrAlp, was to explore the possibility of improving modal split towards higher use of public transport, for trips from city center to the foothill and the top of Pohorje, and to improve public transport offer, which would allow users a cheaper and environmentally friendly transport option.

On the other hand, it served as a foundation for more realistic assessments of the actual potential of future actions that would help integrate urban bus and cable car services. Based on the latter, the Municipality of Maribor, together with University of Maribor's Institute for traffic science, public transport operator and cable car operator, decided to establish a pilot project between Jan. 3, 2011 and Jan. 31, 2011, which connected two different transport systems in the most effective way. Tourists and residents were offered a bus and cable car combination to reach the center of Maribor, residential areas on Pohorje and major ski resort. For a limited time, a principle of a single ticket was established, which offered holders of a valid ski ticket free bus use, from city center to the foothill of Pohorje, and free cable car use to the top of

Pohorje. Users were thus offered a higher quality and environmentally friendly transport option. This kind of combination of cable car and bus system can reduce the usual distance needed to travel from center of Maribor to the top of Pohorje by half. Total distance of about 22 km would be reduced by 13 km to about 9 km (Fig. 1) [10].

During the peak winter season Pohorje is visited by 70,000 visitors a month (Fig. 2). Of those 80% arrive by car, 16% by public bus or taxi service and 4% by bicycle or on foot.

The measured average occupancy of cars among the visitors of Pohorje is equal to 2.3 passengers per car, which means that on an average Pohorje's foothill (or top station) is frequently visited by 800 cars. They, in addition to increased emissions of motorized traffic, cause significant parking problems. On the other hand there is a substantial reserve in occupancy of buses on bus line No. 6 and circular cable car, which could be perceived as a real alternative to car travel.

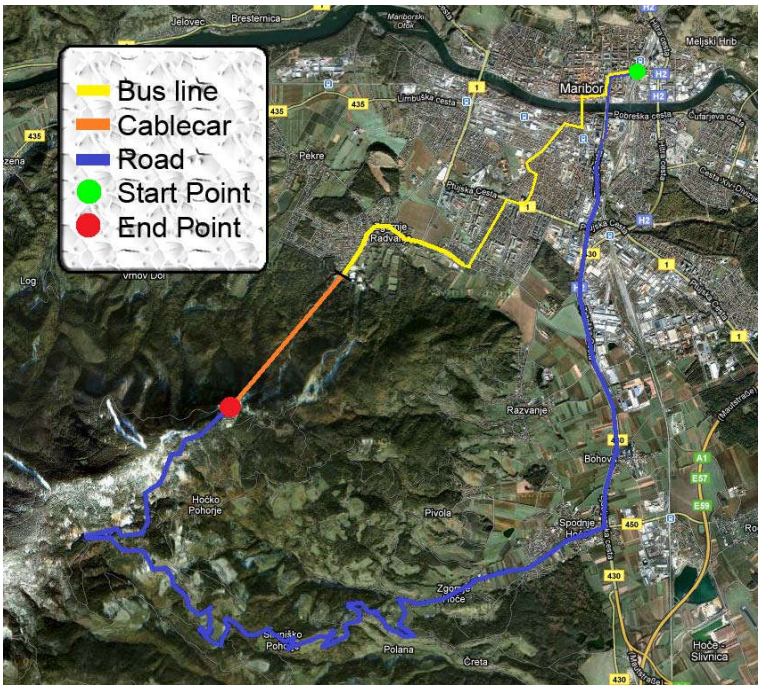


Fig. 1 Distance between bus/cable car combination and road section to Pohorje.

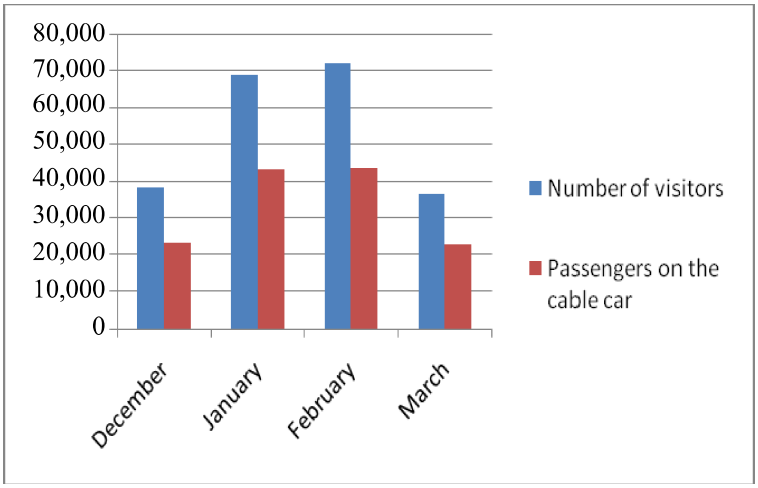


Fig. 2 Number of visitors to Maribor's Pohorje and number of cable car users in winter season.

3. Methodology

Methodology, which was established through the pilot project, conducted in Maribor during January 2011, and conducted in order to gain actual potential of integrating two systems and improving public transport offer, consisted of data gathering through interviewing two interest groups. The first group consisted of users, who were brought to the foothills of Pohorje by bus, and the second one covered the cable car users that were travelling to the top of Pohorje. For a limited time period a trial principle of a single ticket was established, which gave ski-pass holders free bus ride on bus line No. 6. With the aim of reducing CO_2, test drives of hybrid bus and compressed natural gas bus were conducted alongside many promotional activities to inform users of importance of environmentally friendly mobility options. The survey of bus users included 264 passengers, of whom 85 travelled by hybrid bus and compressed natural gas bus and the survey of cable car users included 355 cable car users (mainly Slovenian citizens).

4. Results

Gained results can represent a starting point in creating new and similar pilot projects, and what is more important, they can become a basis for establishing a single ticket system for the public transport in Municipality of Maribor. From all of the interviewed bus users, who had a valid ski ticket, 47.2% had an annual ski ticket. 30.56% travelled with a daily ski ticket, and 22.2% travelled with other kind of valid ski ticket. Results show that the most likely users of public transport option were those, who opted for an annual ticket. Cost-benefit ratio is in favor of public transport due to regular visits to Pohorje. In the frame of pilot project, 41,082 passengers used the bus line No. 6, of which 2,106 passengers used the possibility of the single ticket solution (Fig. 3).

This represents 5% of all passengers on the line No. 6 during the implementation of the pilot project (Fig. 4) or 78 passengers per day on average. Analysis did not include the period from Jan. 15-16, 2011, due to the annual international ski event Zlata Lisica, which was held at Maribor Pohorje.

71% passengers, who used the single ticket offer, already used bus or taxi services before the start of the pilot project, 20% of those users stopped using cars and opted for bus travel, and 9% of users stopped traveling on foot or by bicycle.

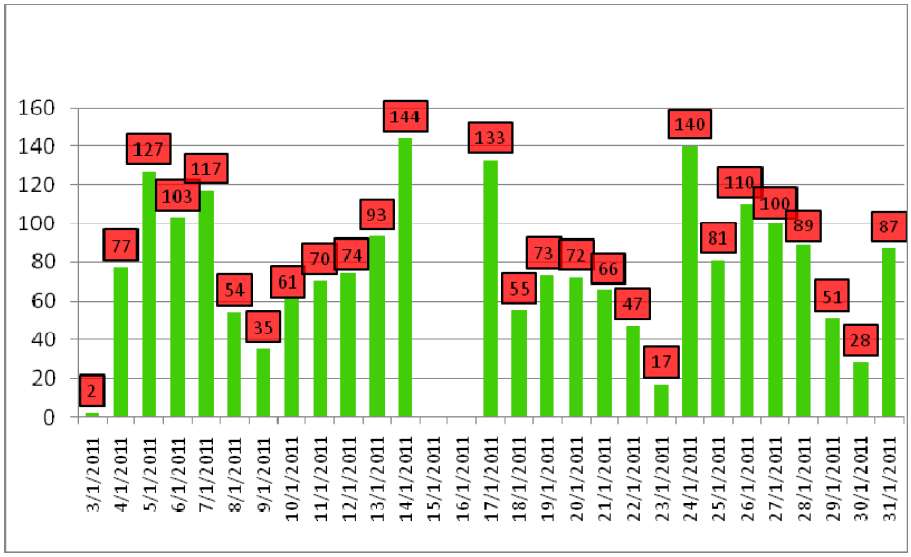


Fig. 3 Total passengers on Bus line No. 6 and number of passengers, who used the single ticket solution from Jan. 3 to Jan. 31, 2011.

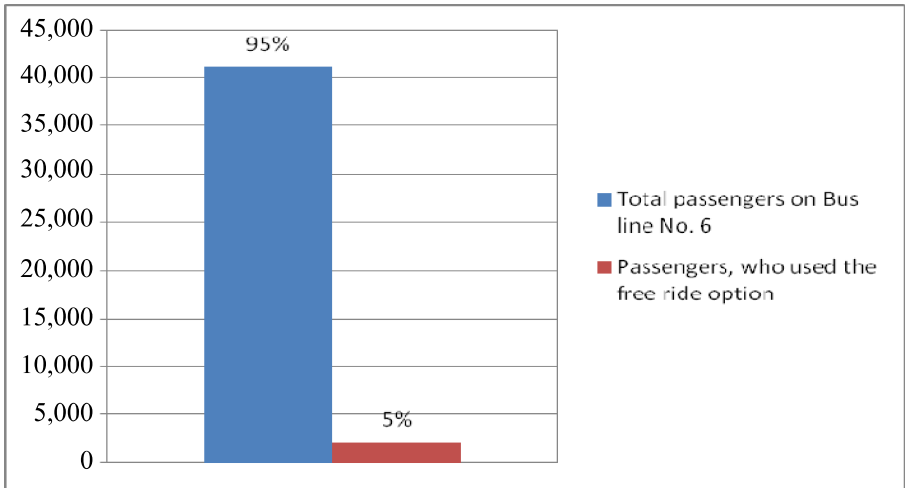


Fig. 4 Number of passengers who used the single ticket option on bus line No. 6 during the pilot project.

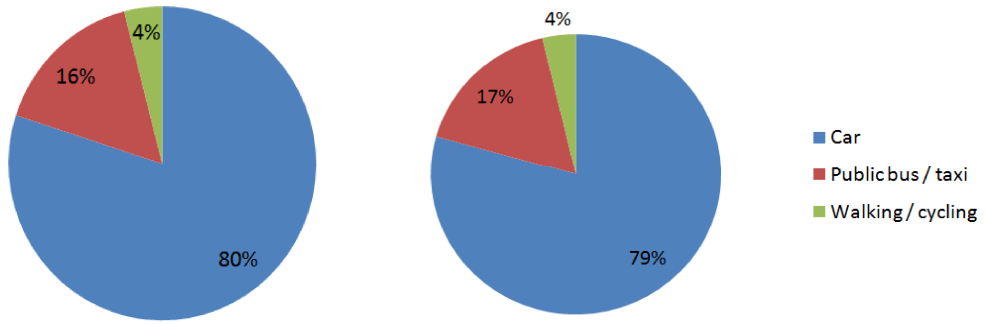
During the pilot project the measured modal split (from city center to Pohorje's foothill and back) changed minimally, for one percent in favor of public bus travel (Fig. 5).

The transfer possibility from electric cable car to bus and vice versa represents a very important priority for all users. This is backed up by results, which shows that for more than 70% of interviewed bus users this option would present a very important priority. For 21.6% and 3.2% interviewed bus users, this option was less important or entirely unimportant to their needs.

In case of establishing a long-term ticketing system, which enables buying a combined bus-cable car ticket at lower prices, 13.6% of all interviewed bus users would very often use this possibility. 22% of interviewed bus users would use this possibility only occasionally and 32.4% from time to time. 21.2% of interviewed bus users' would not use this possibility and 10.8% did not have an opinion on the topic.

During the pilot project implementation, 51.3% of interviewed cable car users came from Maribor and its surroundings. 19.2% of them are living near or close to Bus line No. 6 (up to 20 km from the target destination). 38.5% interviewed users came from broader regions of Slovenia (20-80 km) and 9.6% of interviewed cable car users were foreigners or came from remote regions of Slovenia. 70% of visitors to Pohorje came from Maribor and its nearby surroundings, which represents a considerable potential to increase bus use on route No. 6.

The aim for future should be reducing the number of individual trips through various awareness raising activities and other measures. For this to happen, a short list of actions was prepared, which would increase the use of public transportation services and



(a) (b)

Fig. 5 (a) Modal split before ; (b) during the pilot project.

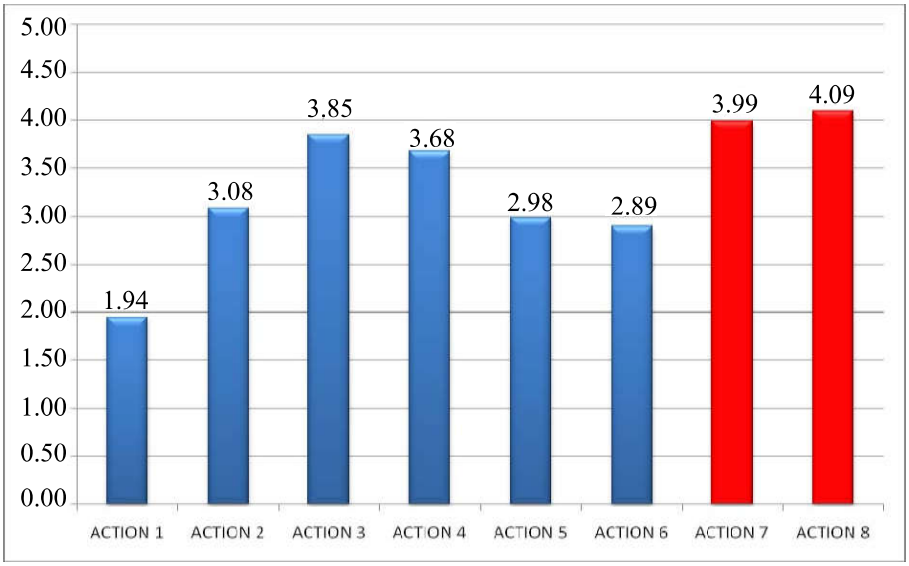


Fig. 6 Average score of proposed actions.

gain more users [11, 12]. The proposed actions relate only to local public transportation system, which is carried out on Bus line No. 6. Among proposed actions passengers on Bus line No. 6 were offered to choose the most viable actions that are important for them. They highlighted the following two actions (Fig. 6). First one relates to carrying out the possibility of safe storage of ski equipment on the bus during travel, and the second one relates to development and integration of new and cheaper combined ticket (bus-cable car). Due to the complexity of the proposed actions and because of the integration of wider population, these actions could be used on all local bus lines in Maribor. Actions highlighted in red should be looked into more thoroughly in the future [11].

In Fig. 2, ACTION 1: charge a parking fee for cars at the lower station of the cable car; ACTION 2: increase the frequency of bus arrivals/departures on bus line No. 6; ACTION 3: free bus ticket on bus line No. 6; ACTION 4: heated dressing rooms with locks for storage of ski equipment at the lower station of Pohorje. These way skiers will not have to carry equipment with them on the bus and vice versa; ACTION 5: increase ride comfort on the bus in terms of unsuited ride due to braking and acceleration; ACTION 6: reduction of noise and vibration levels on the bus; ACTION 7: carrying out the possibility of a safe storage of ski equipment on the bus during travel; ACTION 8: development of a new and cheaper combined ticket (bus-cable car).

5. Conclusions

Due to the number of carried passengers, assumption can be made that the pilot project, which established a trail single ticket principle between urban Bus line No. 6 and Pohorje's cable car , was a success.

The surveys show that users of urban public transport and Pohorje's cable car were eager to adopt the new environmentally friendly transport offer. However, doubts remain because the real modal shift effect, from car travel to bus and cable car, was minimal. The modal split of daily travel from city center to Pohorje's foothill and back changed only for one percent in favor of public bus travel. The main reason for this result is certainly a very short duration of the pilot project. Period of one month is too short to really integrate the new transport supply and change the mean of transport. However, the greatest benefits can occur due to the symbolic value of the integration of two systems and establishing new environmentally friendly travel option. Integration of different transport systems, and even within individual systems,

offers a great potential for Municipality of Maribor and its surroundings in the future.

Although the system was set up for a limited time only, and reduced number of car trips was minimal, Pilot project clearly illustrated in what direction urban public transport in Maribor should develop. In the future, local stakeholders, Municipality of Maribor and residents will need to invest considerable efforts to integrate different transport systems and recognize that the Pohorje's cable car is not only a part of the ski system, but also public transport system, which can provide cost-beneficial and environmentally friendly transport.

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