

A SURVEY OF PASSENGER REQUIREMENTS ON PRE-TRAVEL/TRAVEL INFORMATION IN THE PUBLIC TRANSPORT OF THE CITY OF ZAGREB

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ABSTRACT

Real-Time Passenger Information (RTPI) Displays have been recently introduced at the tram and bus stops/stations in the City of Zagreb. This represents a significant step forward in the pre-travel information services for public transport passengers. Based on a survey the paper analyses the satisfaction of travellers with the existing TIS (Traveller Information Services), and additional pre-travel/travel information requirements. The results of the survey emphasise the form and information attributes which are required by passengers in each phase before and during the journey.

In the first part of the paper, public transport system in Zagreb and different technologies of providing passenger information are described. The public transport network consists of 15 tram lines and 130 bus lines. In 2008 around 204,000,000 passengers travelled by tram and 94,000,000 by public bus transport. Travellers are informed via the Internet, call centres and radio stations at home, and over 147 RTPI displays at the tram/bus stations. In the second part the purposes of the survey and data collection techniques are described. The results of the survey are presented in the third part and as conclusion, recommendations for more user-friendly pre-travel/travel information systems are provided.

The survey was composed of four major queries. The first question considered the satisfaction level of passengers and information reliability of the new installed RTPI displays. The second had the purpose of getting an overview of current passenger information perception and the third one had the goal to determine which form and information attributes

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are the most reliable in the each phase of travelling. The last question dealt with the prospective use of public transport if real-time information is more trustful and available.

The sampling method was a non-probability convenience sampling called snowball sampling. The basic principle of the method is that you begin by identifying someone who meets the criteria for inclusion in your study. You then ask them to recommend others who they may know who also meet the criteria.

Apart from the existing solutions, at the end this paper recommends additional possibilities of raising passenger information level of service in the public transport system of the City of Zagreb.

Keywords: Real-Time Passenger Information (RTPI) Displays, survey, pre-travel/travel information

1. INTRODUCTION

As the capital of the Republic of Croatia, the City of Zagreb with 779,145 inhabitants is facing the problem of sudden increase in individual traffic, especially in residence - workplace trips, which results in forced traffic flows, as well as the reduction of the quality of living in the city itself.

In the City of Zagreb, as well as in other transitional cities there is a strong and constant growth of the level of motorisation. There are 0.90 passenger cars per household, and 417,213 passenger cars (2006) have been registered, with an annual growth rate of about 20,000 vehicles. The growth rate of motorisation is confirmed by the data that according to the Traffic Study for the City of Zagreb (MVA, 1998) the today's level of motorisation had been predicted for as late as 2020.

A significant step forward in order to raise the quality of service, as well as to increase the competitiveness of public urban transport was made by introducing the pre-travel passenger information using the displays at stops. Currently, there are 128 displays located on tram and bus stops, with a tendency of further spreading.

The usage of public transport is in significant correlation with the quality of pre-travel and travel information of public transport users. The provision of relevant, accurate and usable traffic and transport information is not just a service for the existing public transport users, but also a method of attracting new users.

Based on the survey, this paper presents the effects of pre-travel and travel information of passengers in the City of Zagreb, users' satisfaction thereof, and recommendations of improving the existing situation.

2. EXISTING PRE-TRAVEL AND TRAVEL INFORMATION SOLUTIONS IN THE CITY OF ZAGREB

In the last several years a significant step forward was made in pre-travel information of passengers, and a somewhat smaller one in travel information. The most significant development in pre-travel information was the introduction of the dynamic passenger information (DPI) system at stops.

The current possibilities of pre-travel information include:

- a) the Internet;
- b) Call Centre;
- c) RTPI displays at stops;
- d) paper-based schedules;
- e) TV/Radio.

In travel information there are only displays onboard trams and audio announcements of the next stops.

a) Internet

At the Zagreb Public Transport Authorities (ZET) website, one can find data about the schedules of tram and bus lines, maps of tram and bus lines and information about the planned works and closures of certain line sections.

Regarding today's possibilities of advanced communication technologies, the mentioned information is not sufficient, and it is primarily necessary to introduce interactive maps with real-time information about the condition on the network. Besides, it is necessary to set a trip planner on the website in order to enable the potential passengers to plan their trip while still at home.

The City of Zagreb has tourist aspirations, and due to constant increase in the number of tourist visitors, it is necessary to provide all the pre-travel information in several languages.

b) Call Centre

A year ago, a Call Centre was opened where the passengers may get information about:

- arrival of tram to a concrete – selected stop,
- schedule in bus transport,
- actual traffic conditions,
- traffic areas and zones,
- fares,
- history of public urban transport.

c) RTPI displays at stops

The most important improvement in the pre-travel passenger information is the introduction of RTPI displays at bus and tram stops that inform the users about the time of arrival of individual trams or buses. Currently, there are 128 displays, out of which 52 are at bus stops and 76 at tram stops.

The system functions on the basis of controlling the pre-input schedule, using odometer (measuring the intervals between the stops) and GPS system as positioning control. If there is time deviation during the travelling, the vehicle reports its position using the TETRA system.

Due to the technical design of the displays there is no possibility of providing information of longer delays and disturbances on the line, and the audio passenger information provided by the Centre for Control and Supervision of Traffic by means of displays is not yet actively performed.

d) Paper-based schedules

Schedules and graphical presentation of public urban transport lines can be found only at some stops. The brochures on schedules and route presentations do not exist, and they need to be introduced.

e) TV/Radio

The users may get information on real-time conditions on the network, i.e. about the delays, by means of TV and radio stations. Apart from the Call Centre this is, unfortunately, the only way of getting information about the current situation on the public urban transport network.

f) Displays onboard trams

Displays onboard trams provide travel information about the current stop and the next stop, which is accompanied by audio announcement. It is not possible to get information about the possible connections at stops and delays on the network. A drawback that may be mentioned is that there are no displays on buses, and neither is there travel information on bus lines.

3. SURVEY RESEARCH

The main objective of performing a survey research was primarily to determine how the users experienced the introduction of RTPI displays at stops and the level of users' satisfaction with their implementation. The objective was also to determine the passengers' needs for information in individual trip phases in order to provide recommendations to the Zagreb Public Transport Authorities to improve the pre-travel and travel passenger information.

Since the RTPI displays have been in official use for more than a year, it is possible to check their functionality among the users.

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The sampling method was a non-probability convenience sampling called snowball sampling. This method is very suitable for data collection from the respondents who have one or more common attributes, and in this case all of them use public urban transport of the City of Zagreb.

The survey was carried out among 251 public urban transport users of various ages, so that it was first given to the students, and then they distributed the survey to their relatives, friends and among passengers in the vehicles of public urban transport.

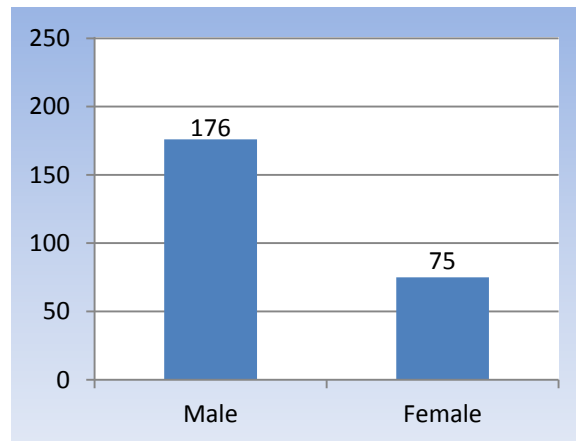


Figure 1 - Number of respondents per gender

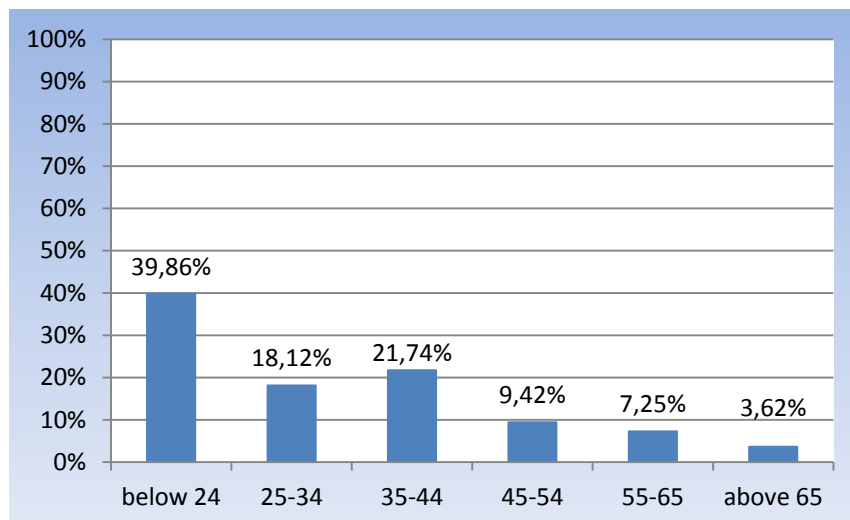


Figure 2 - Distribution of respondents according to age

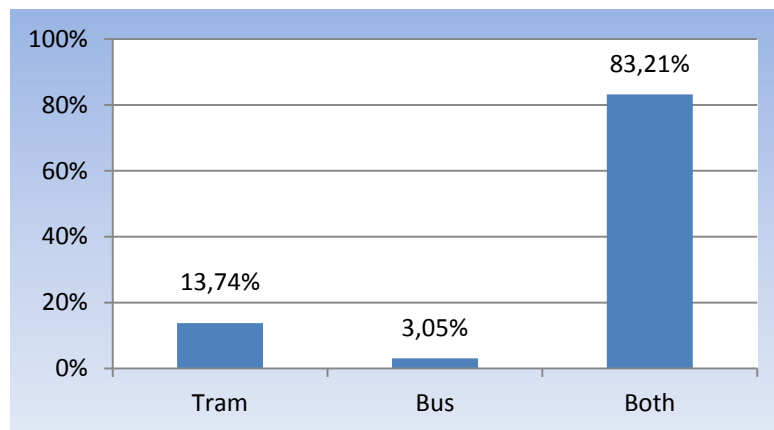


Figure 3 - Distribution of using public urban transport modes

4. RESULTS OF SURVEY RESEARCH

The questions in the survey were divided into four sections. The first section referred to pre-travel, and the second to travel information. The third section assigned priorities to single sources of information in single trip phases and in the end there are general assessments by the users regarding the quality of service of public urban transport of passengers in the City of Zagreb.

4.1 Pre-travel information

The answers to the first question determined the method of current pre-travel information in the City of Zagreb (several answers were optional). According to the obtained results the main sources of pre-travel information are the displays at stops (58.02%) and the Internet (57.25%). These data confirm the extreme significance of introducing the RTPI displays at stops since more than a half of the respondents do not seek information previous to travelling before getting to the stop, and then they are informed by means of displays. The high percentage of information via the Internet was expected since this is the fastest access to tram and bus lines schedules. What should, however, worry the Public Transport Authorities is the fact that not a single respondent gets information through the Call Centre. The reasons lie in a very poor marketing campaign and high price of calls made towards the Call Centre.

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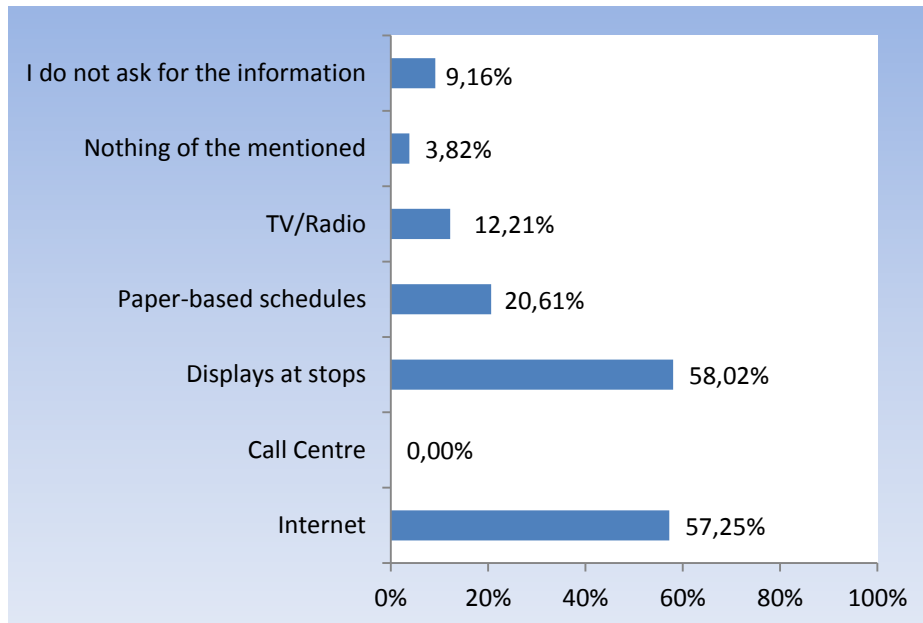


Figure 4 - Current distribution of pre-travel users information (several answers were possible)

The second question required the respondents to assess the satisfaction with the pre-travel information on the Zagreb Public Transport Authorities website. Precisely half of the respondents are neither satisfied nor unsatisfied with the information, which indicates the need of additional improvement in the quality of information and contents on the website. However, what is surprising is that only 13.08% of respondents are not satisfied or very unsatisfied, considering the fact that there are no real-time information on the website that are today standard in other European cities.

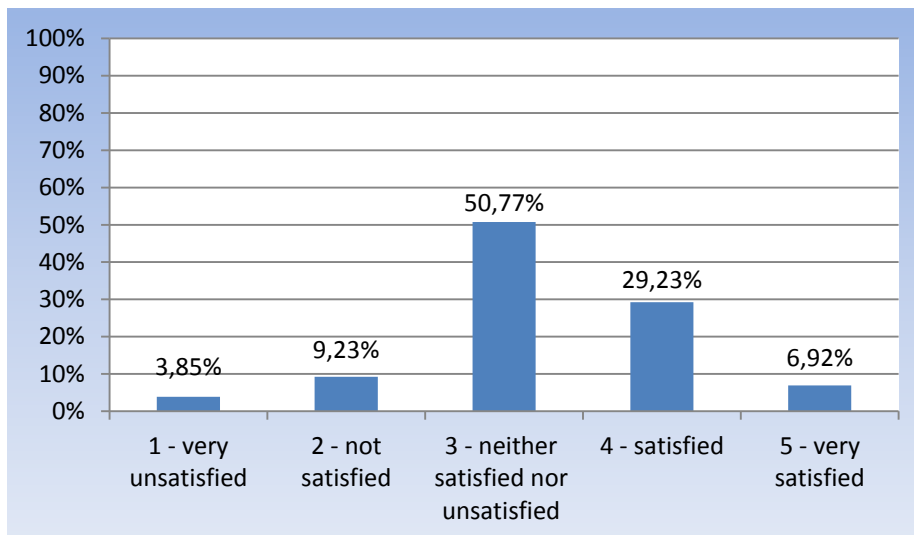


Figure 5 - Users' satisfaction with pre-travel information on Zagreb Public Transport Authorities website

The third question referred to the raising of the quality of service of the public urban transport in the city of Zagreb by introducing RTPi displays. The results confirm the assumption that the introduction of the displays has had influence on the raising of the total quality of service

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of the public transport in Zagreb. As many as 89.23% of respondents are of the opinion that there have been certain improvements in the quality of service.

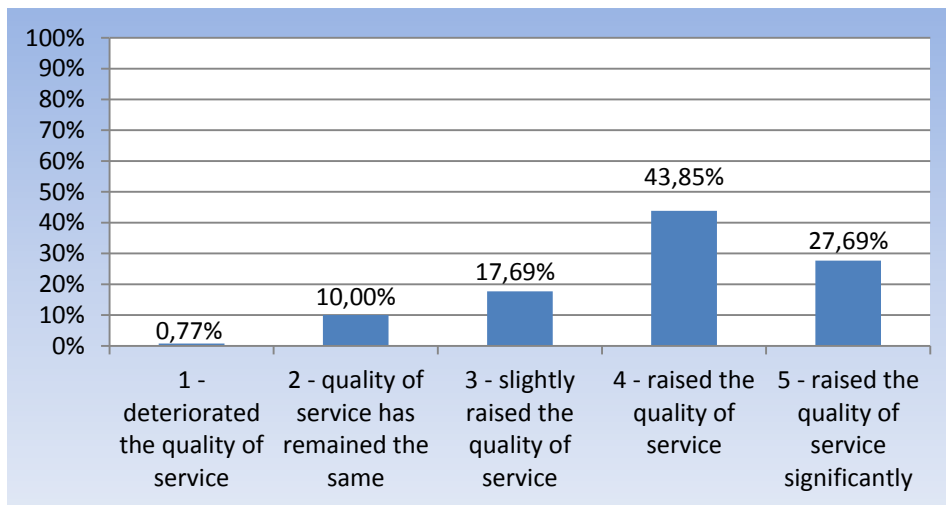


Figure 6 - Users' opinion about improvement of the quality of service of public transport in Zagreb after introducing RTPI displays

The key segment of implementing the telematic technologies is the reliability level of information provided to the users, and the users' confidence in the obtained information. It is very difficult to re-gain lost users' confidence. Since the RTPI display systems have been for a long time in the trial phase, and because of frequent commentaries on the unreliability of the system, one of the crucial motives of carrying out the survey was to determine the users' satisfaction with the reliability of information and the level of confidence in the information provided on the displays.

The obtained results show that as many as 47.33% of respondents consider that the information is more frequently reliable than unreliable, and 21.37% consider the information very rarely reliable and unreliable. This shows that the technical characteristics of the system should be further improved in order to increase the correctness of information on the display and increase the percentage of 31.3% respondents who consider the information reliable.

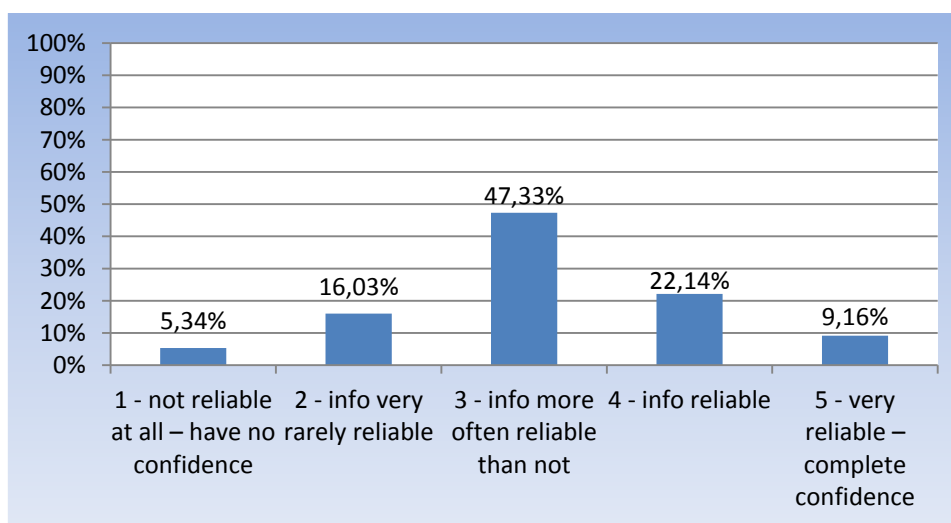


Figure 7 - Reliability of information on displays at stops and users' level of confidence in the obtained information

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One of the possible indirect influences of implementing displays at stops is also the increased usage of public urban transport. Although it was expected that in case of almost 70% of respondents the introduction of this system has not resulted in more frequent usage of public transport, it is very significant that as many as 30% of respondents answered that the implementation of displays did have such influence, even a significant one on their usage of tram and bus transport. This proves that raising the quality of service results in increased demand of transport, and thus also in increase of the revenues for the Public Transport Authorities.

The last question in the field of pre-travel information required the user to give a total grade for pre-travel information of passengers in the City of Zagreb (grades from 1 to 5, with 1 being the lowest grade). The results show that passengers are satisfied with pre-travel information, since as many as 45.80% assess the service as good, and 21.37% say that the service is very good and excellent. The percentage of 13.74% of unsatisfied users should provide incentive to the service provider to improve even more the current situation, especially regarding the contents on the website, and by increasing the reliability of information on the displays at the stops.

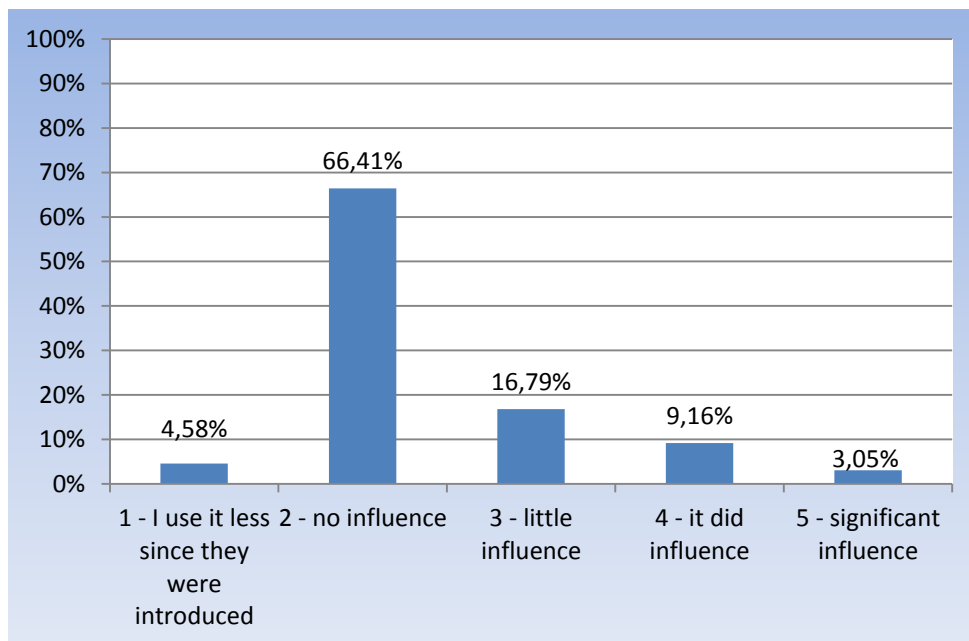


Figure 8 - Influence of implementation of displays at stops on the usage of public urban transport

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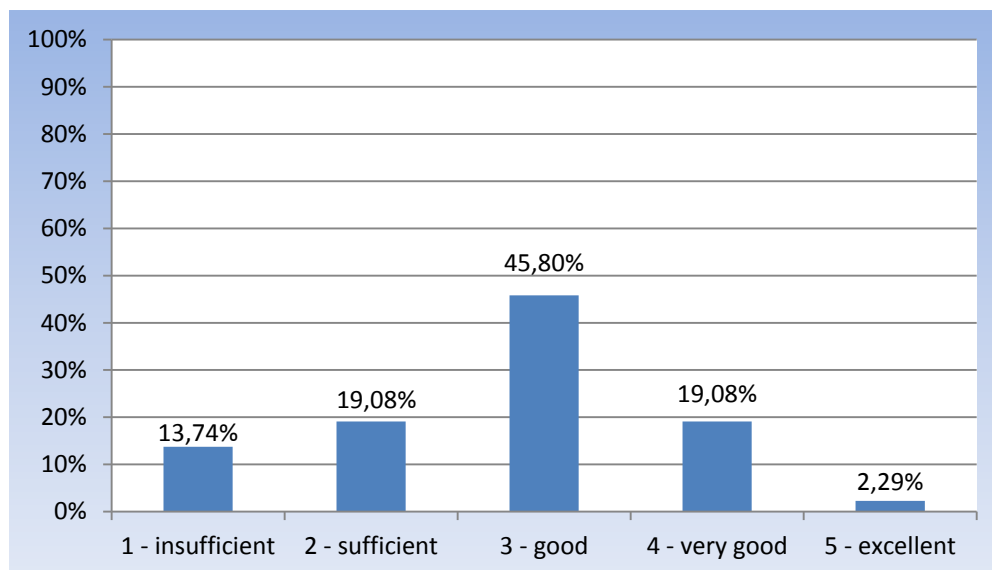


Figure 9 - Total grade of pre-travel information of passengers in the city of Zagreb

4.2 Travel information

Passenger travel information onboard vehicles is reduced only to presenting the first, last and the next stop on the display onboard vehicle and the audio announcements. Although the information is modest, the passengers are satisfied with travel information which is obvious from the results according to which 74% of respondents are satisfied or very satisfied with travel information.

One of the major drawbacks of the travel information in Zagreb is its absence in the bus transport, and the majority of respondents have supported the necessity of urgent implementation.

The respondents were required to assess with grades from 1 to 5 (1 – extremely unimportant, 5 – extremely important) which travel information should be implemented onboard vehicles of public urban transport according to their importance. As many as 91.54% of respondents consider that it is important and extremely important to introduce onboard vehicles the information on delays and disturbances in the traffic flow, and the second place belongs to the information on possible connections at stops with 75.38%. On the third place is the introduction of travel information on buses for which 73.84% of respondents think that they are an important supplement to the existing travel information system, and on the fourth place with 65.62% is the graphical presentation of the routes and stops. Regarding information about services and novelties of Public Transport Authorities the respondents are divided and most of them experience these pieces of information as neither important nor unimportant.

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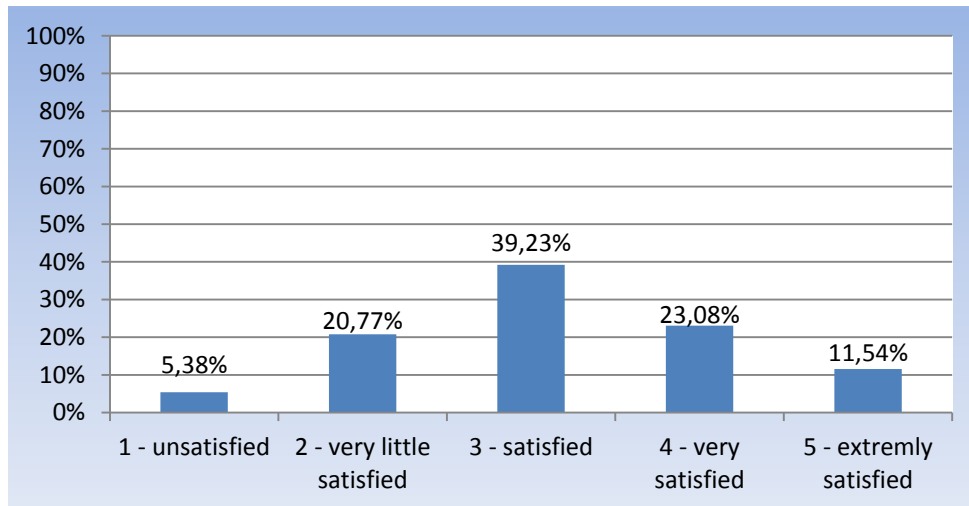


Figure 10 - Users' satisfaction with travel information onboard public urban transport vehicles

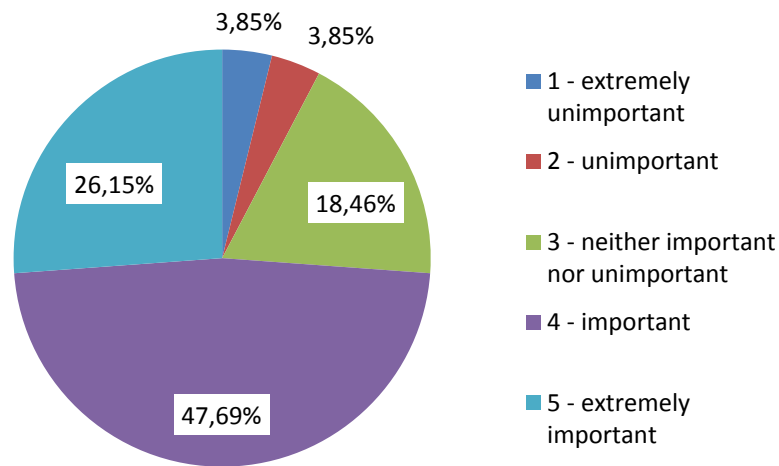


Figure 11 - Importance of introducing travel information on buses

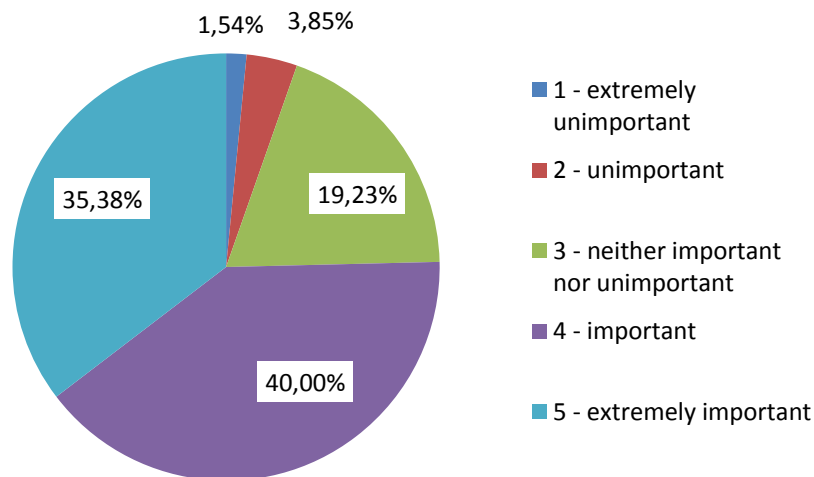


Figure 12 - Importance of information about possible connections at stops

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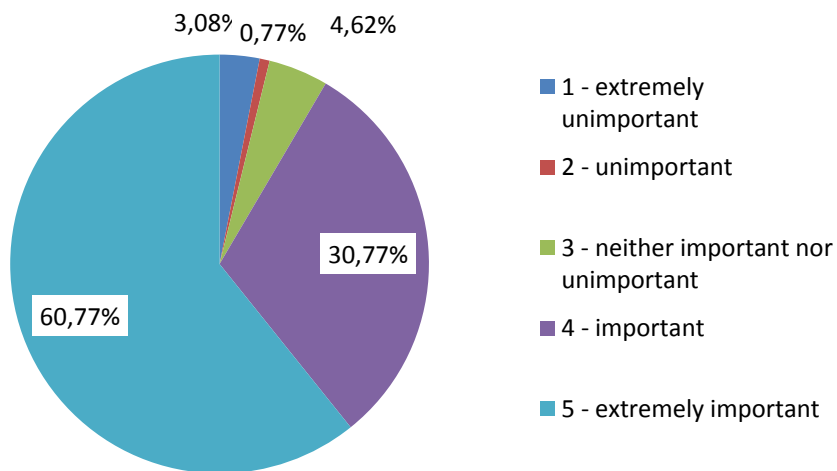


Figure 13 - Importance of introducing information on standstills in the network

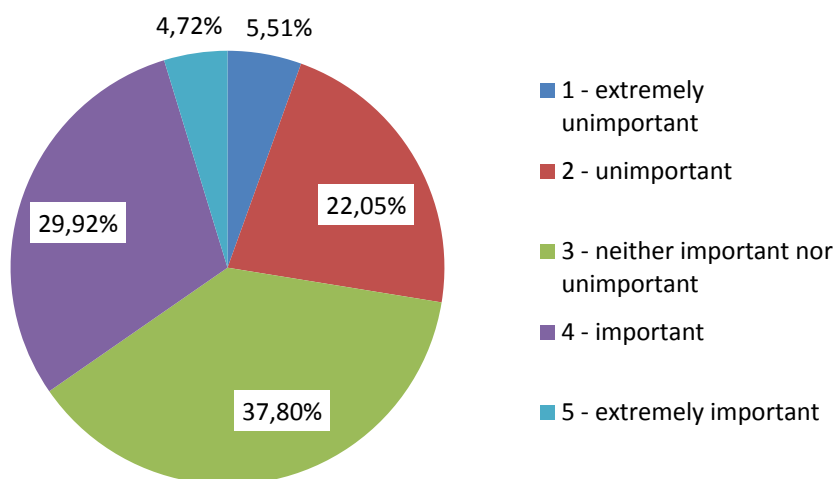


Figure 14 - Importance of introducing information about novelties and services

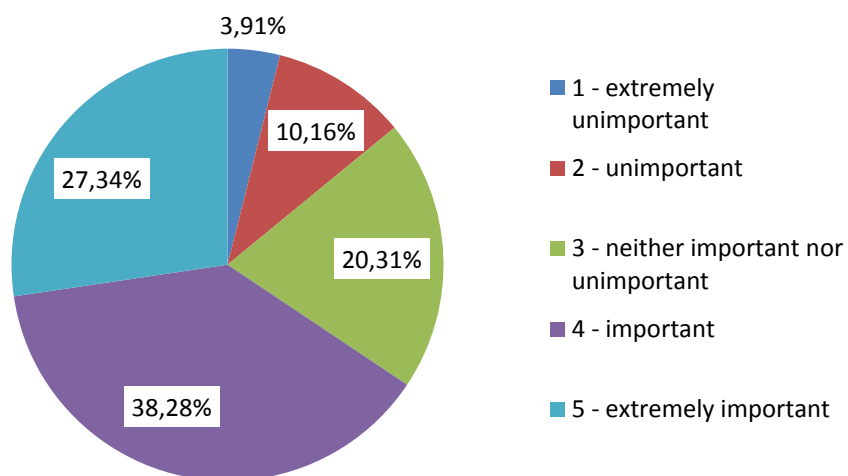


Figure 15 - Importance of introducing graphical presentation of routes and stops

4.3. Prioritization of information sources in individual travel phases

The trips of public urban transport users from origin to destination are divided into four phases:

1. Pre-travel information at trip origin (at home);
2. Pre-travel information at the stop;
3. Travel information onboard vehicle;
4. Pre-travel information at trip destination – return home.

The survey attempted to determine which information sources in certain trip phases are primarily used by the passengers. Here, the passengers did not assign priorities to the existing information sources in Zagreb, but rather to other sources that are currently unavailable, but could be introduced in the future. The objective was to stimulate Public Transport Authorities to use the assigned priorities in order to improve the current systems and introduce new ones.

During pre-travel information at home, the first choice is definitely the Internet with 60.77%, which should result in modernisation and upgrading of the existing Public Transport Authorities website. Other information sources have been almost uniformly distributed per other options and no exact prioritization is possible. However, the Call Centre should be highlighted for high percentages it obtained, and should be therefore adapted to the users' requirements offering also free access. Among the technologies currently not in use but that have achieved good results, one should mention the information via SMS about the schedules and delays.

In pre-travel passenger information at stops, as expected, with 71.21% the leading position belongs to the option of displays installed at stops. The second and third options are the paper-based schedules – brochures and info-kiosks. The info-kiosks do not exist in Zagreb, but the idea is to have a mainly automated system which would provide users at certain terminals and major stops with the possibility of organising their travel route, warn them about congestions, provide the possibility of buying tickets, and similar.

In travel information onboard vehicle, logically, the first choice of 54.68% of respondents were the displays onboard vehicles, but it is interesting that as many as 27.34% of respondents gave as their first choice the driver, which indicates the importance of face-to-face and personalised communication, as well as the fact that it is necessary to improve pre-travel and travel information.

In pre-travel information at the trip target (return home) the first choice highlights the Internet with 44.62%, but paper-based schedules – brochures as well, with 29.23% which are unfortunately unavailable in Zagreb, and should be printed considering the interest shown.

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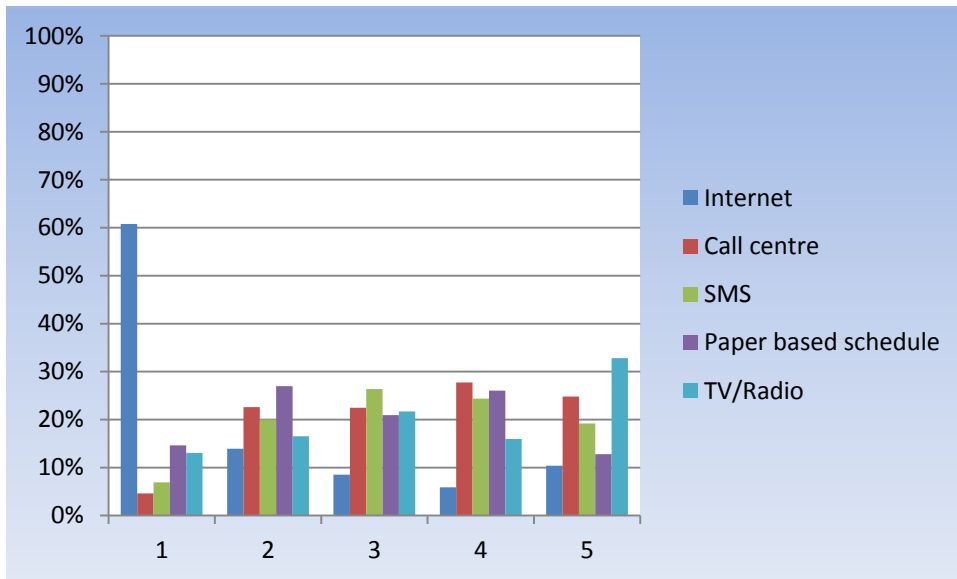


Figure 16 - Ranking of information sources in pre-travel information at home

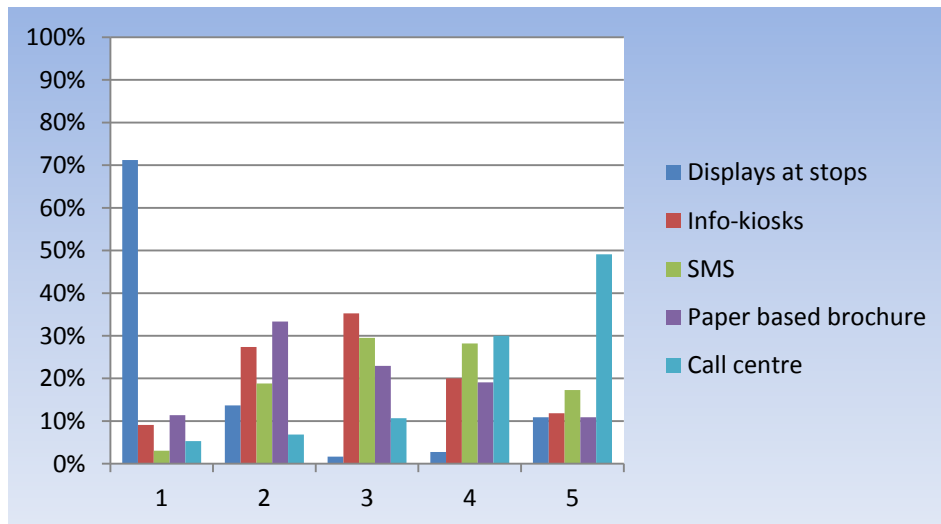


Figure 17 - Ranking of information sources in pre-travel information at stops

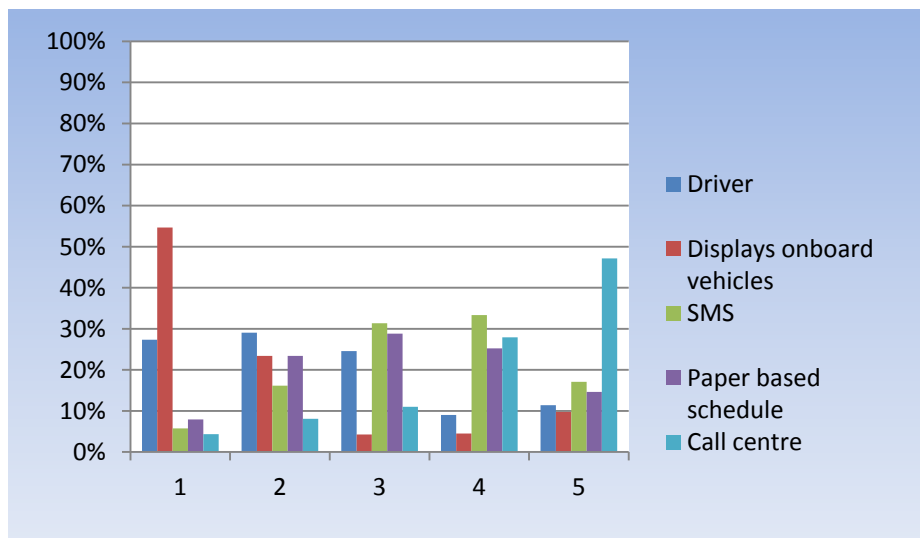


Figure 18 - Ranking of information sources in travel information onboard vehicle

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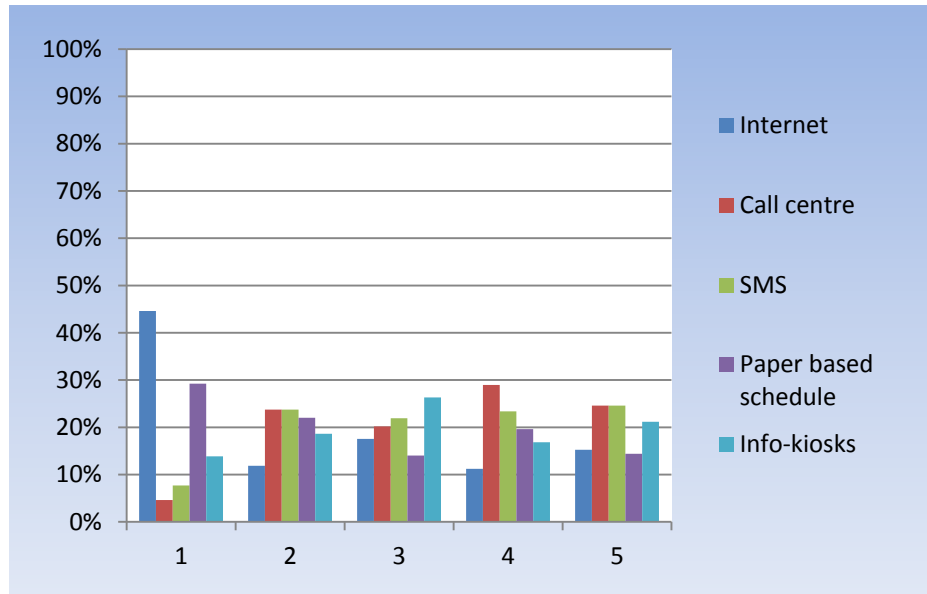


Figure 19 - Ranking of information sources in pre-travel information at trip target

4.4 Total users' satisfaction regarding quality of service of public urban transport in Zagreb

There were several questions in the questionnaire that attempted to find out the total users' impressions regarding public urban transport services in Zagreb. Regarding the high level of motorisation and the current lack of competitiveness of the public transport versus passenger car travel, it was interesting to notice how much the introduction of a reliable and more accessible pre-travel and travel information affects the potential users to opt for the public urban transport, rather than use passenger cars. The data according to which almost 63% of respondents would use public urban transport more often if the pre-travel and travel information was more reliable and easier to access, indicates that the demand for public urban transport services can be increased by financially more modest measures, and not only through expensive construction investments.

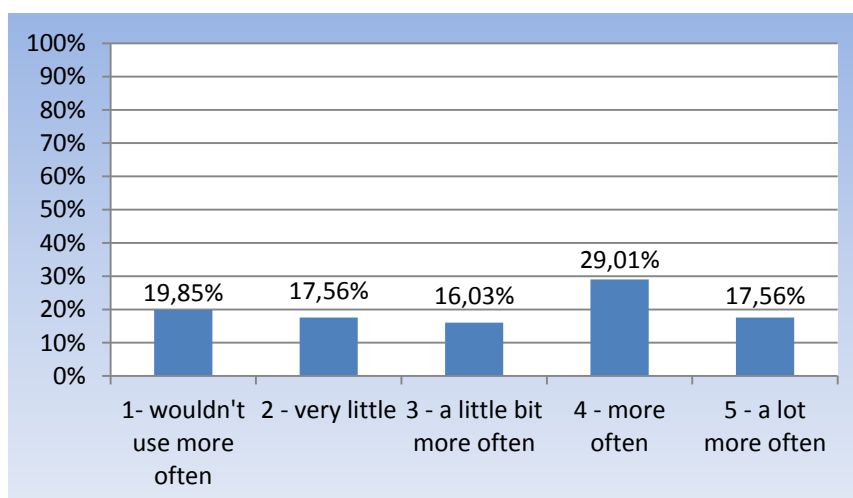


Figure 20 - Influence of improved reliability and accessibility to pre-travel and travel information on the frequency of using public urban transport

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In order to determine the actual users' satisfaction with the existing quality of public urban transport services, apart from direct inquiry, this was done also indirectly. The respondents were asked whether they would continue using public transport services if they had the possibility of using a passenger car. In this way an answer was obtained about the current level of competitiveness of the public transport versus passenger vehicles. According to the obtained results 29.01% of respondents would use equally both transport modes, 16.03% would use public transport more than passenger car, and only 3.05% of respondents would continue to use in the urban environment exclusively public urban transport. As many as 38.16% of respondents would stop using public transport completely or would use it very rarely. These results show that public transport still lacks competitiveness in relation to passenger cars, and it is necessary to undertake additional efforts to raise the quality of its service.

Public Transport Authorities can be satisfied with the users' answers to the direct question of how they would assess the total quality of the public urban transport service. There are more respondents satisfied with the current service than those who are not satisfied. According to the results 39.23% of the respondents consider that the quality of service is good, and 24.62% think that the service is very good or excellent. Only 7.69% of respondents have said that the service is unsatisfactory.

The last survey question required the respondents to answer whether they would be willing to pay a higher fare for the purpose of improving the level and the quality of service of the public transport. Almost 50% of respondents said that they would not be willing, and only 17.56% would be willing to pay a higher fare, which is certainly not going to make the Public Transport Authorities in the City of Zagreb happy.

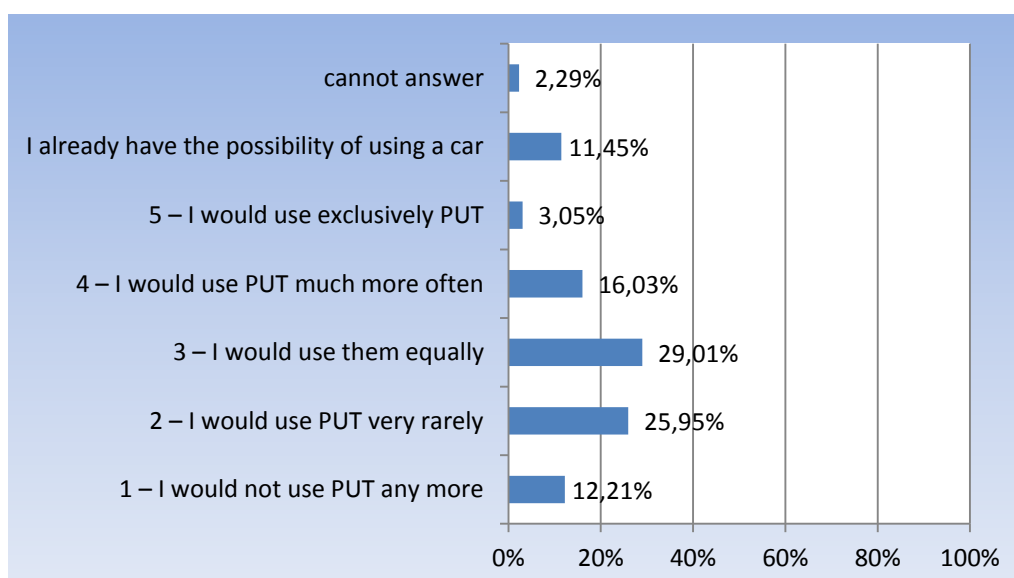


Figure 21 - Influence of the possibility of using passenger cars on the usage of public urban transport (PUT)

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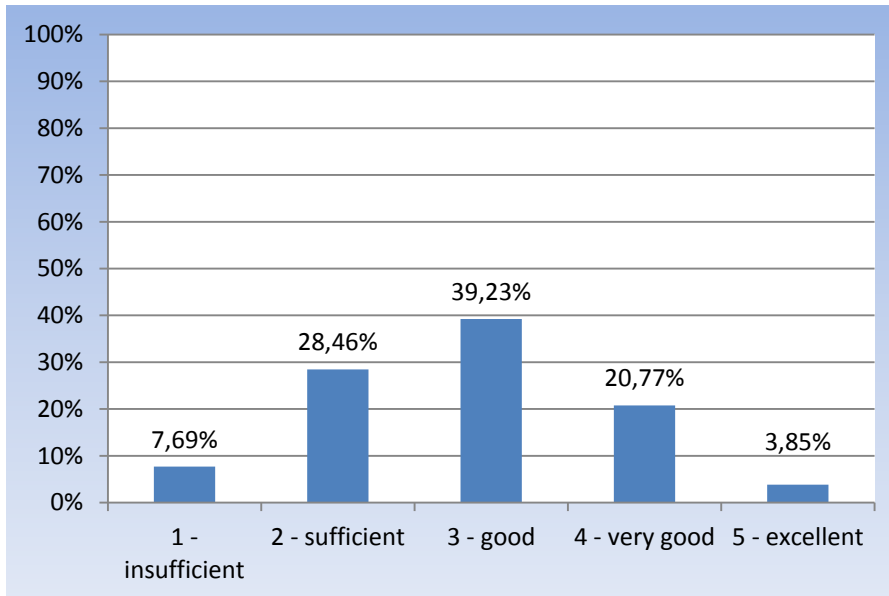


Figure 22 - Total assessment of the quality of service of the public urban transport in the City of Zagreb

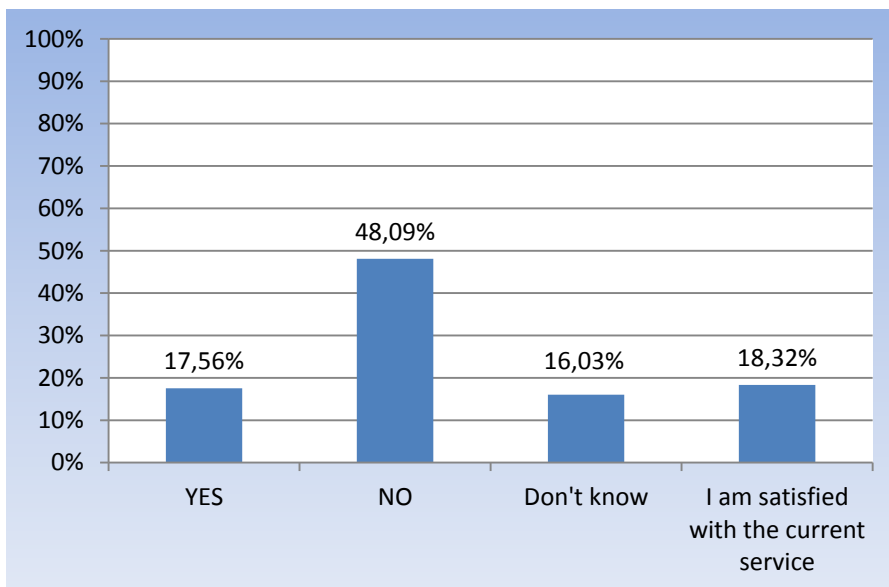


Figure 23 - Users' readiness to pay higher fares in order to raise the level and the quality of service of the public transport in Zagreb

5. CONCLUSION

After having analysed the survey results, the main conclusion is the fact that the introduction of RTPi displays at stops has significantly improved the level of service of tram and bus transport in the City of Zagreb. Almost 60% of respondents use pre-travel information provided by the displays at stops, and with the increase in the information reliability this percentage is bound to increase. The obtained results are not of local character and a general conclusion can be made for other cities that have not yet introduced RTPi displays at stops that high-quality and reliable pre-travel information of passengers results in an increase of demand for public urban transport services.

The biggest surprise obtained from the processed data is the high level of users' satisfaction with travel information onboard vehicles, since this refers only to the display of the start, end and the next stop, and has not been implemented in bus transport. The reason lies probably in the fact that the users are not sufficiently informed about all the aspects and the possibilities offered by travel information that can be found in some European cities.

Regarding all this, Zagreb Public Transport Authorities should undertake the following steps towards additional improvement of the pre-travel and travel information of passengers:

1. Improve the contents offered on their website by providing an interactive map with an overview of the current standstills and works on the network, a journey planner to facilitate route selection from the origin to destination and all this provided also in the English language for tourist purposes.
2. Provide free Call Centre service.
3. Continue with the installation of displays at tram and bus stops, but, due to the technical drawbacks of display presentations, use also audio announcements about standstills and delays on the lines.
4. Print pocket brochures with tram and bus line schedules.
5. Install travel information displays onboard buses.
6. Install onboard vehicles graphical presentation of the routes with stops.
7. As part of travel information, inform the users about standstills on the network, as well as about the possible connections at certain stops.
8. Install automated info-kiosks at very busy stops and terminals, providing contents similar to those on the website.

By implementing the possibilities of the telematic technologies in the form of pre-travel and travel information, and by certain modest construction works, as well as regulatory measures, it is possible to achieve significant results regarding an increase in the usage of public urban transport in relation to individual transport, and all this at very low financial costs.

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