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THE PROBLEM OF THE CHOICE OF TRANSPORT MEANS BY THE POZNAN UNIVERSITY OF TECHNOLOGY STUDENTS

Poznan University of Technology is an important center of education which attracts students from distant cities. The university significantly affects the economy of the city of Poznan, as well as the nearby towns. The majority of the students rent apartments or rooms, use public transport to commute to the college, buy in Poznan stores, visit cultural centers or dine in restaurants, etc.

Currently over 20,000, both full-time and part-time students, attend Poznan University of Technology. Among them are the residents of Poznan, commuters from nearby towns, as well as those coming from distant cities. Therefore the dilemma of choosing the proper means of transport appears [5].

In the article the Poznan University of Technology students' preferences regarding the choice of means of transport in order to travel to the university, and also the available means of transport were described and compared.

Keywords: transport, choice of means of transport, Poznan University of Technology students, transport preferences of students

1. MEANS OF TRANSPORT

Depending on whether Poznan University of Technology (PUT) students are residents of Poznan, commute from nearby towns or come from distant cities, they can use different means of transport. Students who live in Poznan (have their own flat/family home or rent an apartment/flat) choose different means of transport than students who have to arrive from other locations (other towns or villages).

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1.1. Means of transport used by students who live in Poznan

Students who live in Poznan can choose between either public or individual means of transport.

MPK Poznan Sp. z o.o. is a carrier that provides transport service in Poznan and is managed by ZTM in Poznan which is the organizer of the public transport in the city. MPK Poznan offers both urban bus, as well as tram transport services. The carrier owns 325 buses and 226 trams (317 wagons) (as of 31/12/2013). MPK Poznan Sp. z o.o. offers [3]:

- bus transport services – there are 56 bus lines going during the day and 20 night bus lines. There are two bus terminals close to the university: Rataje and Śródka (figure 1). Bus terminal Śródka serves of 9 bus lines, while Rataje of 10. One bus stop is located closest to the Technical University – Baraniaka, which consists of 2 bus lines (from Baraniaka bus stop you can get to Śródka bus terminal). You can reach both bus terminals from different parts of the city. Śródka bus terminal is located approximately 1 km from the university so students have to walk 10–15 minutes to get there. Rataje bus terminal is located 850 m from PUT and it will also take about 10 minutes to get to the university [2].

Fig. 1. Bus and tram network and bicycle rental arrangements in the center of Poznan [7]
The problem of the choice of transport means…

- tram transport services – there are 21 tram lines running during the day and 1 night tram line. Near the campus Piotrowo there are 3 tram stops: Politechnika, Kórnicka and Baraniaka (figure 1). On Kórnicka street there are 2 tram stops going in two directions. In total, 9 trams from almost all directions of the city stop on these tram stop. Many students can arrive directly (non-stop) at the university from distant districts of the city. Tram stop Politechnika is located about 250 m from university and student can get to PUT in about 3 minutes. From Kórnicka tram stop students can get to the university in about 7–8 minutes (tram stops are located 550–650 m from the university. Finally, Baraniaka tram stop is located about 400 m from Piotrowo campus and it takes 5 minutes to get there [2].

ZTM Poznan also offers bicycle rental. Rental points are placed in various locations in the city. There are two rental points near Poznan University of Technology: on Śródka and Rataje traffic circle (figure 1). Student who find ZTM offer attractive can rent the bicycle in one place and return it in another one [7]. Śródka traffic circle is located approximately 1 km from the Piotrowo Campus, so a student who choose bicycle rental has to walk 10–15 minutes to get to the university [2].

Students can use various individual means of transport to get to the university. Among the individual means of transport there are:
- a car,
- a bicycle,
- a motorcycle.

Individual means of transport have a lot of advantages as well as disadvantages. The most important advantages are the fact that user of these means of transport can start his journey any time or place, do not have to wait on the stop, do not depend on other people, can travel directly to the destination. However, individual means of transport are more expensive, there can be also a problem to find parking place, you can also spend a lot of time in traffic jams, have to plan your route of the journey, and be focused on driving (you can not relax, read a book or sleep during the journey).

1.2. Means of transport used by students who live outside of Poznan

Students who arrive outside of Poznan can also use individual and public means of transport. However, means of transport used by those students are different than used by students who live in Poznan.

Public means of transport include train and bus and individual means of transport include car, motorcycle and bicycle. Choice and possibility of the use of selected means of transport mostly depends on the distance and the availability. Main bus and train stations are located approximately 4 km from the university. Hence students also use public transport to get to the university. Walk to the PUT takes in fact about 40 minutes.
In Poland, PKP Group is engaged in the management and modernization of railway infrastructure as well as services of passenger transport (PKP Intercity SA, PKP SKM in Trójmiasto) [4].

PKP SA manages more than 2.5 thousand railway stations, of which nearly 600 handle passenger traffic and manages the synchronization of traffic approximately 6.5 thousand passenger and freight trains, develops and updates the timetable of trains across the country, and also manages a national network of railway line with a length of more than 19 thousand km [4]. Poznan has rail connections with a lot of cities in Poland. From Poznan we can go by train in 8 different directions of the country (figure 2).

![A map of train routes to Poznan](image)

Fig. 2. A map of train routes to Poznan [6]

Bus companies provide complementary transportation of persons in relation to carriage by rail. Bus stations are located in larger cities, and traffic routes are different than in the case of railways. Buses also go through locations where there are no train stations. Buses are often the only available option of public transport in a given locality or a village.
2. RESULTS OF THE SURVEY

The main tool used in a survey was a questionnaire in Polish designed by the author of the present article. The survey was carried out among 105 full-time students who attend university every day. The analysis of the data collected during the survey revealed many essential factors that were further taken into account when assessing students characteristics and their travel preferences. Responses given by students to the first fourteen queries regarded the means of transport which are chosen by the polled students to commute to the university. The remaining four questions made it possible to collect some background information about the polled sample group.

2.1. Characteristics of Poznan University of Technology students

72% (76 students) of respondents were male, while 28% – female (29 students). It is quite common in Poland that much more males than females study in technical universities.

Most of the students rent a room or apartment in Poznan and once a week or less frequently come back home. Nearly the same number of students live in Poznan or commute every day to the University form the nearby town/village (figure 3).

![Fig. 3. Place of residence of students during their studies (own study)](image)

Respondents who commute to the university cover the distance from 10–60 km every day. Students who rent a room/apartment come from the towns/villages about 50–370 km away from Poznan.
Students who participated in the survey come from the villages, as well as from small, medium and big cities. The participation of each group is presented in figure 4.

![Figure 4. Place of permanent residence of students (own study)](image)

### 2.2. Commuting time to the university

Students of Poznan University of Technology arrive to the university from different directions and cover different distances. Therefore their commuting time is different. In the survey students were asked to specify how much time does it take them to get to the university. Results are presented in figure 5.

![Figure 5. Commuting time to the university (own study)](image)
Most of the students arrive to the university in less than 15 minutes. That group consists mostly of students who go on foot (10 students) and also of those who commute by tram (24 students). 30% of students need 15–30 minutes to arrive to the university. 18 students commute by tram every day, 7 by bus and the other students by car, on foot or use a tram and a bus. 26% of the students arrive to the university in 30–60 minutes. That group of students mostly use two or more means of transport to get to the university. 7 students arrive by tram and bus, 4 – by tram, 3 – by car or bus, 2 by car and tram, just train, train, bus and tram or by train and tram. 6% of students need more than 60 minutes to arrive to the university. However, 2 of them need even 120 minutes every day to get to the university. Most of the people in that group use a train and a bus or a tram as the modes of transport to get to the university. 5 students from that group arrive every day to the university from home outside Poznan. One respondent lives in Poznan but 10 km away from the university and a journey by tram and bus takes him 90 minutes.

Students were also asked if they think that commuting time could be shorter. 54% of respondents indicated that with some changes they could get to the university faster – a journey would take them less time. On the other hand, 46% of respondents stated that it is impossible to get to the university faster.

The next question was addressed to students who thought that the journey time could be shorter. They were asked to submit suggestions for changes that could be introduced. Suggestions of possible changes were as follows:

− improvements in the existing infrastructure, such as the completion of road and tram tracks repairs, improvements in the functioning of the traffic lights, introduction of direct connections to all districts of the city, reduction of traffic on the streets in order to discharge traffic jams,
− investments, e.g. the introduction of bus lanes, tram network expansion, tram track modernization, building bicycle paths,
− organization: greater punctuality of arrivals, larger frequency, more experienced drivers of different modes of transport, the introduction of different organization of traffic on the busiest and congested streets.

2.3. Preferences of Poznan University of Technology students

Students of Poznan University of Technology can choose between a number of means of transport. They can decide to choose one (or more) public means of transport, individual means of transport or can come to the university on foot. Before the journey, students compare advantages and disadvantages of several means of transport like e.g. the cost, time of a journey or comfort, and accordingly decide on the best option. It is sometimes necessary to test a particular mean of transport to check its punctuality or reliability. After that people decide whether to use or not to use that specific mean of transport.
The aim of the next question was to find out about means of transport which are chosen most often, by the sample group, to get to the university. They could select one or more answers. Large number of students prefer means of public transport: a tram, an urban bus or a train. Almost one-quarter of students go to the university on foot. Every fourth respondent uses individual means of transport like a car, a bicycle or a motorcycle. Accurate results are presented in figure 6.

Fig. 6. Popularity of means of transport (own study)

The questionnaire was also intended to check the reason of the choice of particular means of transport. That was an open question and students had to provide their answers without any tips. Most of the students replied that the time of a journey is the most important reason which determines their choice. Next significant causes are the cost of a journey and convenient connection. Results of the survey are presented in figure 7.

Fig. 7. Reason of the choice of means of transport (own study)
Moreover, students were asked about criteria they take into consideration when choosing a mode of transport to commute to the University. They had to select one or more answers from the list. For the students the most important factors were travel time, cost and availability of the mode of transport. The least important was safety. Results of the survey are presented in figure 8.

Fig. 8. Criteria taken into consideration while choosing a mode of transport (own study)

The next question concerned the possibility of selecting a different means of transport. 59% of the students were not in favour of such an idea while 41% could decide on a different one if they had a possibility.

Students who answered positively had to reply which mean of transport would they choose and justify their choice. Most of the students (22) would choose a car because of its convenience, comfort of a journey and shorter travel time. Other students indicated a tram (5 people), a train (4 people), an airplane (3), a motorcycle (2) a bicycle (2) and the other ones (5 students). The most important reasons were shorter time and the cost of a journey.

Next question was an open one in which students were asked about the factors contributing to the fact that they rarely or never use certain means of transport in order to get to the University. Students who live in Poznan had to choose means of transport possible to use by them, but students who commute every day to the university explained why they do not use or rarely use all of the listed options.

11 respondents walk to the university, because they live close (in a dormitory) and do not have to use any mean of transport.

Students who don’t use a tram indicated two main reasons: its unavailability (9 answers) and a large distance from home to the tram stop (3 students). It should be noted that many respondents use this means of transport and that’s why there were few answers. Respondents do not use the city bus mostly because of the lack of suitable connections (16 answers), the unavailability of the bus at the place of
residence (14 students) and long journey time (7 responders). Students who took part in a survey do not ride to the university by bicycle because of: the lack of bikes in Poznan (34 students), a large distance between the place of residence and the university (18 answers), changing weather conditions (7 respondents), lack of adequate infrastructure (6 answers) and the fact that cycling is too demanding (4 students). Finally, the respondents enumerated several reasons of not driving a car to the university. Students do not use that mean of transport mostly because of high costs (28 answers), lack of own car (25 students), traffic jams (6 respondents) and the lack of a sufficient number of parking places near the university (5 answers).

2.4. Cost of the journey

The cost of a journey depends on the type of transport preferred by students, as well as the frequency of its use.

Students who use public transport can buy one ticket and commute by tram or bus. The cost of the ticket depends on its type (personal bearer), the period of validity (one-way, 24-hour, monthly, quarterly, etc.), zones (A, B, C, A + B, B + C, etc), the amount of stops, number of lines, of which the student declares to use. Students have a 50% discount on the basic price of the ticket and for example, monthly ticket in zone A costs 53.50 PLN (PUT is located in zone A) [7].

Cost of transport by car depends among others on the distance, fuel consumption, fuel prices, traffic volume and the number of people who travel by car. Average retail prices of fuels in Poland in May 2014 were as follows: Pb 98 – 5,63 PLN; Pb 95 – 5,37 PLN; ON – 5,34 PLN; LPG – 2,52 PLN [1]. For instance student who commute every day from a town 50 km away from the university, drive a diesel car, with fuel consumption of 5 l/100 km, have to pay almost 14 PLN for one way journey. If more people commute, the cost of a journey is subdivided and shared by all the passengers.

Students up to 26 years of age are entitled to 51% discount on the basic price on train rides. Ticket price is determined depending on the connection type (normal, fast trains, Express), class (I or II) and the type of a ticket (one-time, periodic, e.g. monthly or network) [4].

Students who commute to the university by public transport (bus or tram) declared that the monthly pay for journeys is less than 60 PLN (depending on whether they have a monthly pass, or use single tickets). Respondents who commute by other means of transport declared that the monthly cost of commuting amounts to 70–500 PLN. Most often, however, students who commute to the university from distant cities pay 100–150 PLN per month. The charge depends on the distance, frequency of returning home, as well as means of transport, which the student de-
3. CONCLUSION

Poznan University of Technology attracts students from all over the country, as well as from abroad. However, most of the students come from nearby cities. As far as the respondents are concerned, one person has to cover the distance of almost 400 km to study at the Poznan University. Most of the students (73%) are from outside of Poznan (rent a room in Poznan or commute every day to Poznan).

To travel to the university students use both public and individual transport. However, most of the students mainly use public transport – trams or buses (in Poznan) or train (to travel to Poznan).

Commuting to the university takes less than 30 minutes for the majority of the students from the sample group (68%) and it seems not to be cumbersome for this group of the students. Among respondents, however, were respondents for whom commuting takes much more time – 6% of the respondents need more than an hour to get to the university.

Despite the fact that most students commute in less than 30 minutes, they have a lot of ideas to speed up the travel time, i.e.: reorganization of the existing infrastructure, its development, and the restructuring of the transport processes.

For students the most important criteria for the selection of the means of transport are time and cost of the journey and availability of the mode of transport. Hence, a lot of students use a tram as a mode of transport. Tram is one of the cheapest, fastest and most available means of public transport. Besides tram stops are closer to the university than the bus stops or train stations.

Taking into consideration price criterion, it would seem that a bicycle is a good option. Lack of adequate infrastructure – both linear and point, however, discourages students from choosing that means of transport. In this case, variability of the weather typical for our country also has significant influence on this choice.

A car is considered to be the fastest mean of transport (outside rush hours). Convenient, with direct access to the destination and no need to wait at the bus stop. These advantages are opposed to the high cost of exploitation, problems with finding a parking place or traffic jams. A number of students cannot, however, afford their own car or even do not have a driving licence.

Train is the mean of transport used by students commuting from outside of Poznan. It is regarded as relatively cheap and fast, but it is not available for all passengers due to the specific network connections. Intercity connections which are not supported by the railways are often handled by the bus operators. The bus is considered to be uncomfortable and a journey time increases, because buses stop in every town / village on their route.
Streszczenie

Problem wyboru środka transportu jest dobrze znany studentom, którzy codziennie dojeżdżają na uczelnię. W oparciu o kryteria wyboru podejmują oni decyzję co do rodzaju środka transportu, z którego skorzystają.

W artykule opisano możliwe do wyboru środki transportu, zarówno indywidualnego, jak i zbiorowego, w celu dojazdu na Politechnikę Poznańską. Podano wyniki badania ankietowego przeprowadzonego wśród studentów uczelni. Przedstawiono charakterystykę studentów – miejsce zamieszkania, czas dojazdu i odległość, jaką muszą pokonać od miejsca zamieszkania do uczelni. Opisano również preferencje studentów i czynniki przesądzące o wyborze danego środka transportu, a także przedstawiono wyniki dotyczące kosztów podróży.