Measure title: **Carpooling system in Krakow**

City: **Krakow** *Project:* **Caravel** *Measure number:* **9.2**

A Introduction

A1 Objectives

The measure objectives are:

- Increasing the amount of shared spaces in private cars and as a result a reduction of the number of cars parking at Krakow University of Technology
- Introducing a new form of vehicle use for University employees and students
- Designing a new internet-based data information about free car spaces and potential clients
- Remove the mobility car single users to rider share car users
- Achieving high acceptance by users, close to zero-cost operation
- Contributing to a reduction of traffic congestion around Cracow University of Technology

A2 Description

The objective of this measure is to implement the carpooling system for commuters, working at Krakow University of Technology. Thanks to the system it will be possible to increase the amount of shared spaces in private cars (according to Comprehensive Travel Study conducted in Krakow in 2003, the average number of persons in private cars is equal to 1,2). The system also requires the introduction of a new internet based data information about free car spaces.

Carpooling is connected with the activity of the mobility consultant (Measure 11.9).

There is no official carpooling system in Krakow. But it is well known between students of many universities, who exchange information about their trips, especially regarding their trips to their home owns. Among groups of students and workers of the university, internet is well known and a recognized mean of exchanging information and data. So, initial implementation of data base including information about free places in private cars for shared use of cars will be done at Krakow University of Technology. Putting that information on Krakow's main internet site should make it more accessible also for people not connected with the University. In Krakow as in all Central European countries an alternative to the very strong trend of increasing car ownership (and its associated psychological attractions) especially for

young people, will require to collect first experiences with carpooling, and only later move to a possibly innovative form of adapted car sharing in the CEE.

A carpooling database will first be implemented at the Krakow University of Technology and then expanded to all citizens, via the main internet site of the Municipality and the new mobility information website. Proposed activities can be divided into two main groups: research activities – analysing of existing car pooling systems and services (e.g. in Europe – Stuttgart and in USA – Baltimore), developing the organisational concept of the car-pooling system and the management software, which arranges trips on demand. This software can be developed, based on the software for mobility services or the car-pooling system in Stuttgart; demonstration activities - operation and testing of the car-pooling system for chosen large institution in Krakow.

The name of the system is “Jedźmy razem” (“Let’s ride together”).

B Measure implementation

B1 Innovative aspects

The innovative aspects of the measure are:

- **New mode of transport** – Carpooling as a mode of transport is quite popular in Poland, but mainly within groups of friends. Moreover persons who use carpooling are no aware of it's name and idea. Many people in Poland still remember so called "autostop" which was in fact hitchhiking. The innovative aspect of the measure is to present carpooling as a new mode of transport, different from hitchhiking, with it's idea and assumptions and accent put on the fact that carpooling gives benefits to all users (driver and passengers).
- **Targeting specific user groups** – Carpooling system in Krakow is targeting few specific groups of users. First group are all PK students (fulltime and extra-mural). The system will enable for fulltime students to organize in common weekend journeys to home cities. For extra-mural students the system will be the place where they can find commuters for common journeys to University. Second group are PK employees. There are three PK campuses in Krakow were over 2000 employees are hired. Thanks to the system employees will be able to use their cars in common.
- **New organisational arrangements or relationships** – The "Jedźmy razem" carpooling system will be the first official service in Krakow where people can exchange information about free places in their own cars.

B2 Situation before CIVITAS

There is no official carpooling system in Krakow. It is well known between students of many universities, who exchange information about their trips, especially journey to their family cities. Also in group of students and workers of university, internet is well known and recognized mean of exchanging information and data.

There are some internet services developed by private persons where interested people can find free spaces in others cars. However those services are available for everyone number of users is still low. Moreover functionalities of those services are very often not sufficient.

In Krakow as in all Central European countries an alternative to the very strong trend of increasing car ownership (and its associated psychological attractions) especially for young people, will require to collect first experiences with car pooling (for which a limited scheme already exists in Krakow).

B3 Actual implementation of the measure

The measure was implemented in the following stages:

- **Stage 1: Preparation to software development** (01.10.2006 -31.01.2007) – Working document D.9.2.1 „Software specification for carpooling system in Krakow" was created. Organizational meeting with person responsible for software development took place. During this meeting verification of software specification was conducted and working plan was established.
- **Stage 2: Identification of the situation "before" measure implementation** (31.01.2007 -30.06.2007) – The inquiry about traffic behaviour an preferences was conducted among Cracow University of Technology students and employees. One of the objectives of inquiry was to identify carpooling awareness and readiness to use the carpooling system. Also preferences about "Jedźmy razem" system of future users were investigated. Working document D.9.2.2 „ Analysis of potential users of carpooling in Krakow – PK students and employees" was prepared.
- **Stage 3: Software development** (01.02.2007 – 30.11.2007) – During this period "Jedźmy razem" website as well as software and database needed to it's correct working were created.
- **Stage 4: Preparation to start of "Jedźmy razem" carpooling system** (01.12.2007 – 31.01.2008) – The "Jedźmy razem" website was uploaded on server. Errors and mistakes were corrected. The advertising campaign was prepared. Within the campaign poster and leaflet were designed.
- **Stage 5: Live implementation of the scheme** (31.01.2008 – 31.01.2009) – Till start of carpooling system website service works properly. All comments and suggestions from registered users are being collected.
- **Stage 6: Analysis of results of "Jedźmy razem" carpooling system implementation** (01.05.2007 – 31.10.2008) – Within analysis of results of carpooling system implementation the situation "before" and "after" measure implementation was investigated. The values of selected indicators "before" and "after" measure implementation were compared.

B4 Deviations from the original plan

The deviations from the original plan comprised:

- **Delay of system start** – The website of "Jedźmy razem" carpooling system was uploaded on PK server. The 3 month delay was a result of problems with server configuration and correction of website appearance and content.

B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- **Measure 11.9** – Carpooling is connected with the activity of the mobility consultant. The role of mobility consultant is to suggest to person who ask for the best route and mode of transport from chosen location to chosen destination. On of the modes that will be taken into consideration is carpooling. Carpooling is also a part of Integrated mobility plan for Cracow University of Technology.

C Evaluation – methodology and results

C1 Measurement methodology

C1.1 Impacts and Indicators

Table 1 – Table of Indicators

Evaluation Category	N°	Indicator	Units	Source of data	Methodology for indicator construction (survey, modelling, etc)	Baseline date
Economy	Own	Operating costs	€/pkm	PK	Modelling/Survey	06.2007
Energy	Own	Fuel consumption	€/pkm	PK	Modelling/Survey	06.2007
Society	13	Awareness level	%	PK	Survey	05.2007
	14	Acceptance level	%	PK	Survey	05.2007
	15	Perception of service accessibility	Index	PK	Survey	06.2007
	17	Perception of security	Index	PK	Survey	06.2007
	Own	Number of persons interested in carpooling	No.	PK	Survey	06.2007
Transport	26,27	Average modal split	%	PK	Survey	06.2007
	28	Average occupancy	pers/veh	PK	Measurement/Survey	06.2007
	Own	Average number of passengers (in car pooling)	pass/veh	PK	Survey	06.2007

	Own	Frequency of travelling in car pooling	trips/week	PK	Survey	06.2007
	Own	Number of persons using car Pooling in commuting	%	PK	Survey	06.2007
	Own	Number of system users	No.	PK	Survey	06.2007
	Own	Number of parking places	%	PK	Measurement	06.2007
	Own	Average travel length	vkm/pers	PK	Survey/Modelling	06.2007

Detailed description of the indicator methodologies:

- **Operating cost** – Operating cost is defined as the ratio of total operating costs incurred by service (personnel costs, users' costs e.g. fuel) divided by the total passenger-km travelled in "Jedźmy razem" (carpooling) system; the unit of indicator is €/pkm. Method of measurement is survey (inquiry) among students and employees of PK who will use "Jedźmy razem" (carpooling) system and modelling. Estimation of indicator in situation "before" and "after" is based on the same inquiry sent to registered users of carpooling system. All registered users (about 300) were asked to fill the questionnaire – 15 inquiries were back.
- **Fuel consumption** – Fuel consumption is defined as average fuel consumption per one person using "Jedźmy razem" (carpooling) system; the unit of indicator is €/pkm. Method of measurement is survey (inquiry) among students and employees of PK who will use "Jedźmy razem" (carpooling) system and modelling. Estimation of indicator in situation "before" and "after" is based on the same inquiry sent to registered users of carpooling system. All registered users (about 300) were asked to fill the questionnaire – 15 inquiries were back.
- **Awareness level** – Awareness level is defined as the percentage of the population (students and employees of PK) with knowledge of a measure 9.2 "Car pooling system in Krakow" on account of provided information; the unit of indicator is % (percent). The

method of measurement is survey (inquiry) among students and employees of PK. The survey in situation "before" (baseline) has been conducted from April till June 2007. The survey (inquiry) "after" was conducted in June 2008.

- Sample size for situation "before" was set on:
  - Employees: For sampling error 4% and significance level 0,10 – 420 inquiries were needed; 600 inquiries were given to employees, 263 inquiries were back.
  - Students: For sampling error 4% and significance level 0,10 – 420 inquiries were needed among both groups: fulltime and extra-mural students; 420 inquiries were given to fulltime students, 386 inquiries was back; 420 inquiries were given to extra-mural students, 384 inquiries were back.
- Sample size for situation "after" was set on:
  - Employees: For sampling error 4% and significance level 0,10 – 420 inquiries are needed. Inquiry was not given to employees because of the vacation during carpooling inquiry and future inquiry related with Measure 11.9 (to many inquiries given to employees can cause very low return rate).
  - Students: For sampling error 4% and significance level 0,10 – 420 inquiries are needed among both groups: fulltime and extra-mural students; 117 inquiries were gained among fulltime students and 54 inquiries were gained among extra-mural students.

- **Acceptance level** – Acceptance level is defined as the percentage of the population (students and employees of PK) who favourable receive or approve Measure 9.2 "Car pooling system in Krakow"; the unit of indicator is % (percent). The method of measurement is survey (inquiry) among students and employees of PK who will use "Jedźmy razem" (carpooling) system. The survey in situation "before" are not possible because carpooling service is not available now. The survey (inquiry) in situation "after" was conducted in June 2008. All registered users (about 300) were asked to fill the questionnaire – 15 inquiries were back.
- **Perception of service accessibility** – Perception of service accessibility is defined as the user's perception of the physical accessibility of "Jedźmy razem" (carpooling) system; the unit of indicator is index of "accessibility perception" on a 5-point scale (Very easy, Quite easy, Neither easy nor difficult, Quite difficult, Very difficult, Don't know). The method of measurement is survey (inquiry) among students and employees of PK who will use "Jedźmy razem" (carpooling) system. The survey in situation "before" are not possible because carpooling service is not available now. The survey (inquiry) in situation

"after" was conducted in June 2008. All registered users (about 300) were asked to fill the questionnaire – 15 inquiries were back.

- **Perception of security** – Perception of security is defined as the perceived security of "Jedźmy razem" (carpooling) system by its users; unit of indicator is index on a 5-point scale (Very safe, Quite safe, Neither safe nor unsafe, Quite unsafe, Very unsafe, Don't know). The method of measurement is survey (inquiry) among students and employees of PK who will use "Jedźmy razem" (carpooling) system. The survey in situation "before" are not possible because carpooling service is not available now. The survey (inquiry) in situation "after" was conducted in June 2008. All registered users (about 300) were asked to fill the questionnaire – 15 inquiries were back.
- **Number of persons interested in carpooling** – Number of persons interested in carpooling is defined as percentage of car owners and others inquired students and employees of PK who are interested in exchanging data about free places in their cars and travel in commuting; the unit of indicator is No. (Number). The method of measurement is survey (inquiry) among students and employees of PK. The survey in situation "before" (baseline) has been conducted from April till June 2007. The survey (inquiry) in situation "after" was conducted in June 2008. Sample size for "before" and "after" data is the same as for indicator Awareness level.
- **Average modal split** – Average modal split is defined as a percentage of students and employees who travel by individual transport mode (PT, car, bikes, carpooling, walking trips) in their trips to and from PK campuses. Indicator for "before" situation was determined during inquiry about students' and employees' travel behaviours and preferences (November 2006 – January 2007). Indicator for situation "after" measure implementation was determined during inquiry about students' and employees' travel behaviours and preferences which was carried out in October 2008.
- **Average occupancy** – Average occupancy is defined as average number of persons per one vehicle per trip; the unit of indicator is persons/vehicle. The method of the indicator estimation are measurements at the parking gates. The measurements in situation "before" (baseline) has been conducted from March till June 2007. The survey (inquiry) in situation "after" was conducted in October 2008. Those surveys will be supported by results of inquiry and measurements that were conducted within Measure 11.9 "An integrated mobility plan for Technical University of Krakow".
- **Average number of passengers (in carpooling)** – Average number of passengers (in carpooling) is defined as average number of persons who are not car owner, but travel this car. For indicator estimation registered ("Jedźmy razem" system users) and not registered persons will be taken into account; the unit of indicator is passengers/vehicle. The method of measurement is survey (inquiry) among students and employees of PK.

The survey in situation "before" (baseline) has been conducted from April till June 2007. The survey (inquiry) in situation "after" was conducted in June 2008. Sample size for "before" and "after" data is the same as for indicator Awareness level.

- **Frequency of travelling in carpooling** – Frequency of travelling in carpooling is defined as average number of trips, made by car, with one or more other persons during one month; the unit of indicator trips/month. The method of measurement is survey (inquiry) among students and employees of PK. The survey in situation "before" (baseline) has been conducted from April till June 2007. The survey (inquiry) in situation "after" was conducted in June 2008. Sample size for "before" and "after" data is the same as for indicator Awareness level.
- **Number of persons using carpooling in commuting** – Number of persons using carpooling in commuting is defined as total number of persons who travel to University by car in which two or more persons ride; the unit of indicator is No. (Number). The method of measurement is survey (inquiry) among students and employees of PK. The survey in situation "before" (baseline) has been conducted from April till June 2007. The survey (inquiry) in situation "after" was conducted in June 2008. Sample size for "before" and "after" data is the same as for indicator Awareness level.
- **Number of users** – Number of users is defined as total number of students and employees who will register and use "Jedźmy razem" (carpooling) system; the unit of indicator is No. (Number). Number of system users will be checked every month, from "Jedźmy razem" system implementation till end of the project. For the final value of indicator number of users on 15th October 2008.
- **Number of parking places** – Number of parking places is defined as a percentage change of free parking places available, at the main Campus of Cracow University of Technology at Warszawska street, during peek hour, before and after measure implementation; the unit of indicator is % (percent). The method of measurement is direct measurements at University conducted "before" and "after" implementation of "Jedźmy razem" (carpooling) system.
- **Average travel length** – Average travel length is defined as vehicle kilometres travelled per on passenger. The unit of indicator is vkm/pass. The method of measurement is survey (inquiry) among students and employees of PK. Estimation of indicator in situation "before" and "after" is based on the same inquiry sent to registered users of carpooling system. All registered users (about 300) were asked to fill the questionnaire – 15 inquiries were back.

C1.2 Establishing a baseline

Primary baseline data was established three months before "Jedźmy razem" system start. Approximately it was May and June 2007. However system start delay the difference between baseline data and system start grown up to 6 months it will not affect evaluation methodology and results.

C1.3 Building the business-as-usual scenario

However implementation of carpooling system did not brought significant changes in reduction of occupied parking places at University or congestion around CUT Campuses or the "soft" effects of measure implementation are also quite important.

If the carpooling system had not been developed, numerous dissemination reportages in mass media wouldn't be emitted. As an effect of those more people are familiar with term of carpooling. Moreover some new internet based services that in fact are carpooling website have been developed as individual initiative.

If the development of carpooling system would not succeed as well as all dissemination activities taken at University would not took place employees and students wouldn't be so aware like they're now about advantages of carpooling for them as the users and for environment.

In case of lack of official carpooling system there are two possible scenarios:

- There is no internet based carpooling systems. All potential users either use carpooling unofficially (with colleagues) or give up using carpooling
- New internet based service are developed. People who used carpooling in unofficial way register in chosen service. Some of those who have not used carpooling till now register in new services.

Both scenarios can occur with the same probability.

C2 Measure results

The measure results will presented in situation "before" and "after" measure implementation. All measure results will be presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, society and transport.

C2.1 Economy

- **Operating cost**

Operating cost was calculated with assumptions that all system users which registered at least one trip in carpooling website travelled alone before the implementation of the system.

Assuming that 1 € = 3.5 PLN operating cost before measure implementation equals 0,14 [€/pkm].

According to an inquiry which was conducted among carpooling system users it was stated that 33 % of them found 1 passenger. Those assumption were used to calculate the value of indicator.

Assuming that 1 € = 3.5 PLN operating cost after measure implementation equals 0,11 [€/pkm].

Operating cost has been reduced by 27 %. This value has to be taken with caution.

C2.2 Energy

- **Fuel consumption**

Fuel consumption was calculated with assumptions that all system users which registered trip in carpooling website travelled alone before the implementation of the system.

Fuel consumption before measure implementation equals 0,070 [l/pkm].

According to an inquiry which was conducted among carpooling system users it was stated that 33 % of them found 1 passenger. Those assumption were used to calculate the value of indicator.

Fuel consumption after measure implementation equals: 0,053 [l/pkm].

However fuel consumption has been reduced by 32 % it should be taken with caution, as well as operating cost.

C2.3 Environment

C2.4 Transport

- **Average modal split**

Average modal split is taken from MERS of Measure 11.9 “An Integrated Mobility Plan for PK”.

Average modal split before and after measure implementation among employees were presented on figures below:

Figure 1 – Modal split among employees before measure implementation

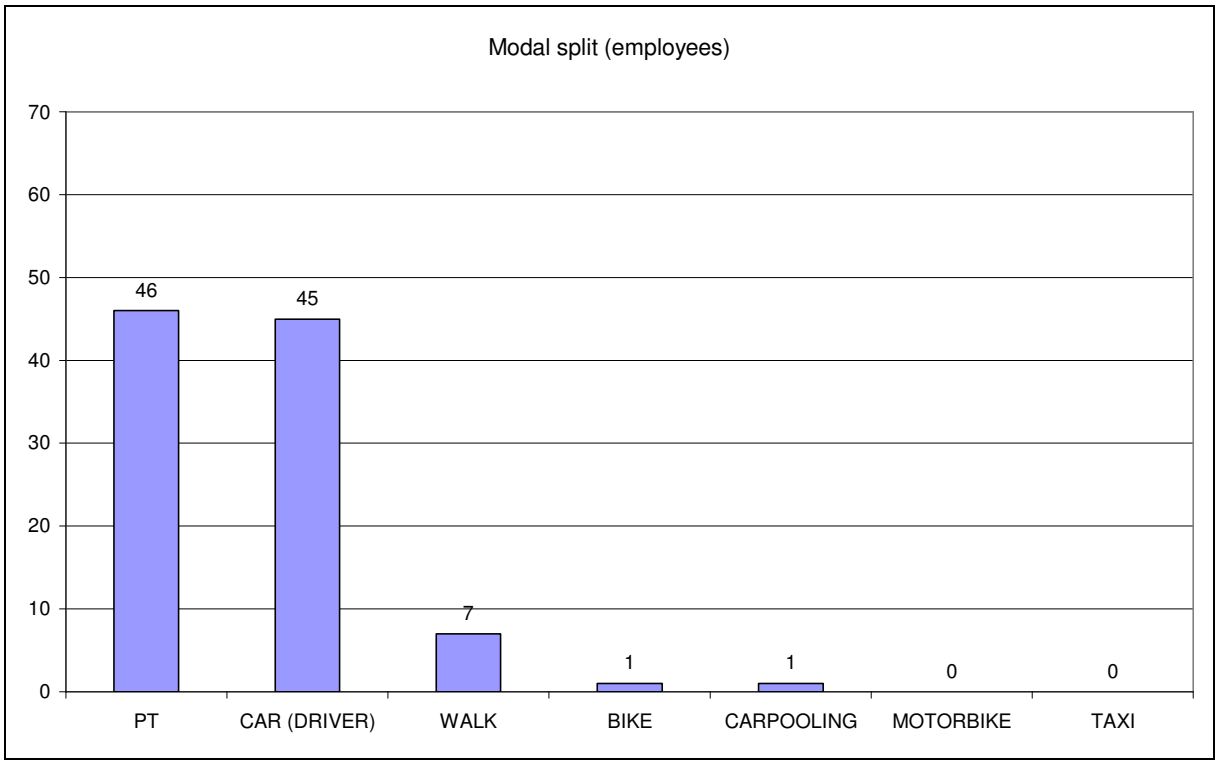
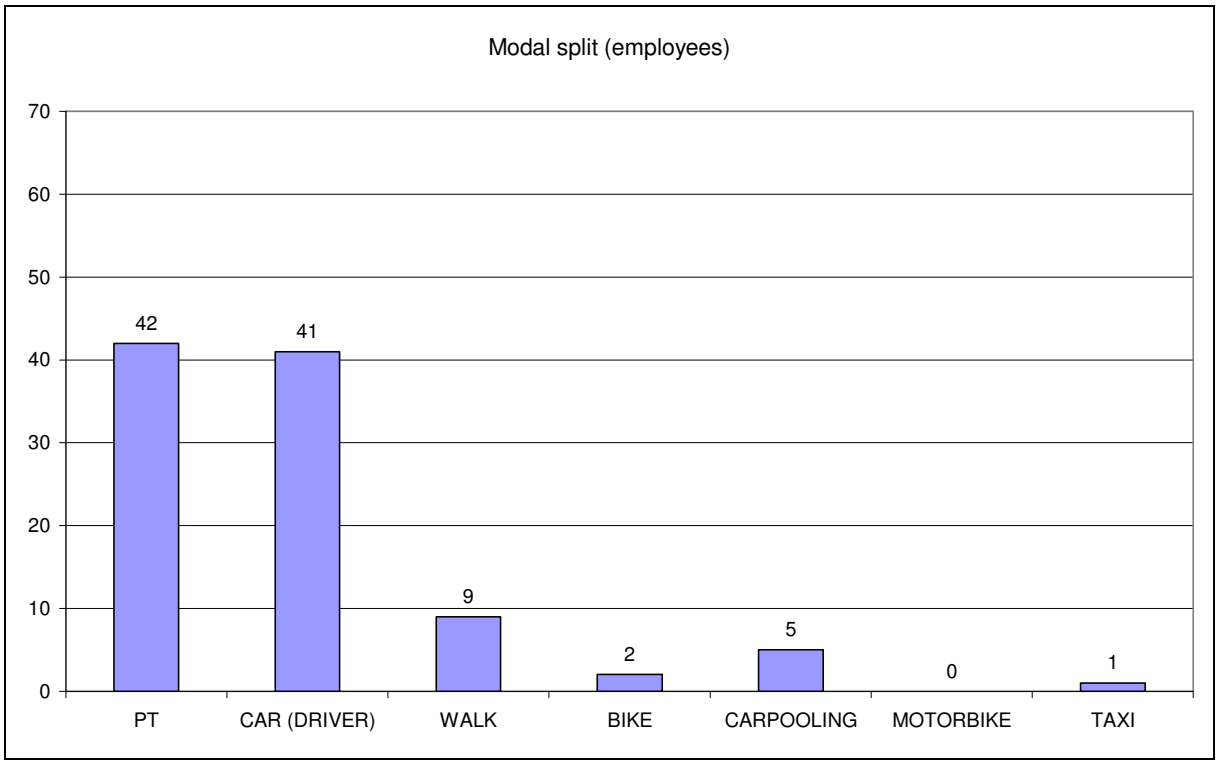


Figure 2 – Modal split among employees after measure implementation



Average modal split before and after measure implementation among fulltime students were presented on figures below:

Figure 3 – Modal split among fulltime students before measure implementation

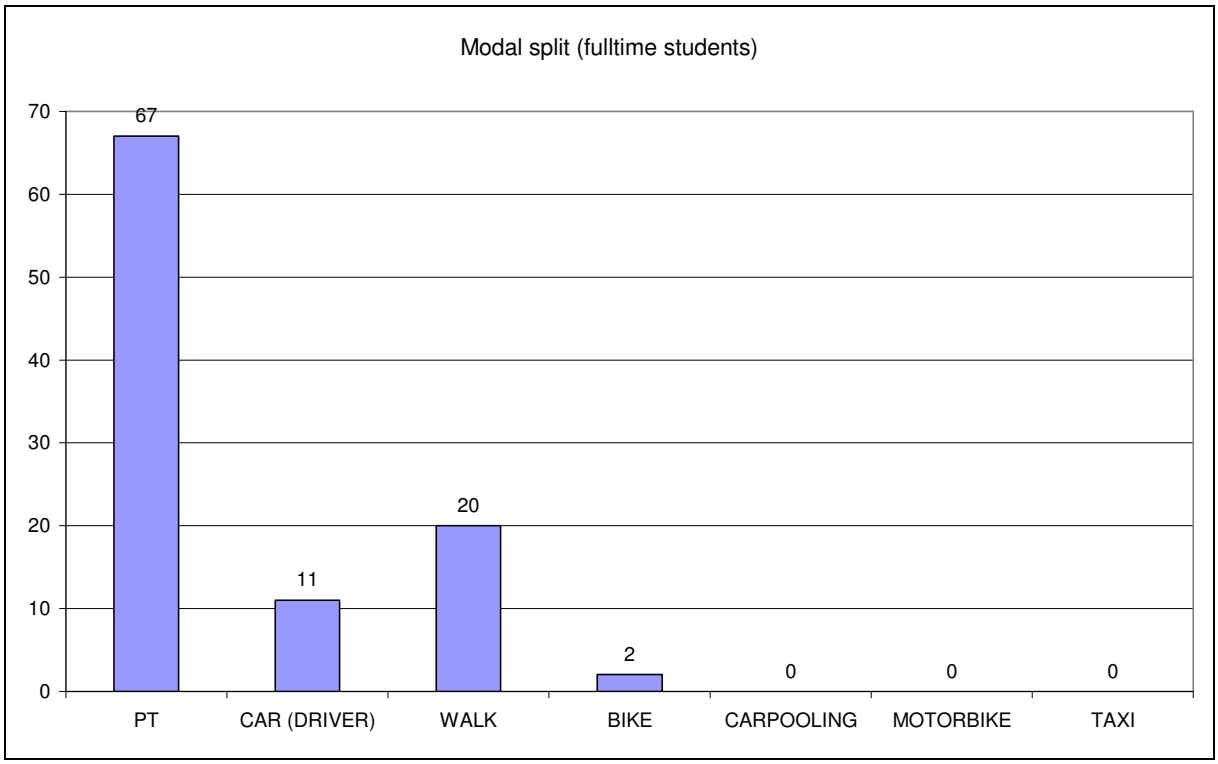
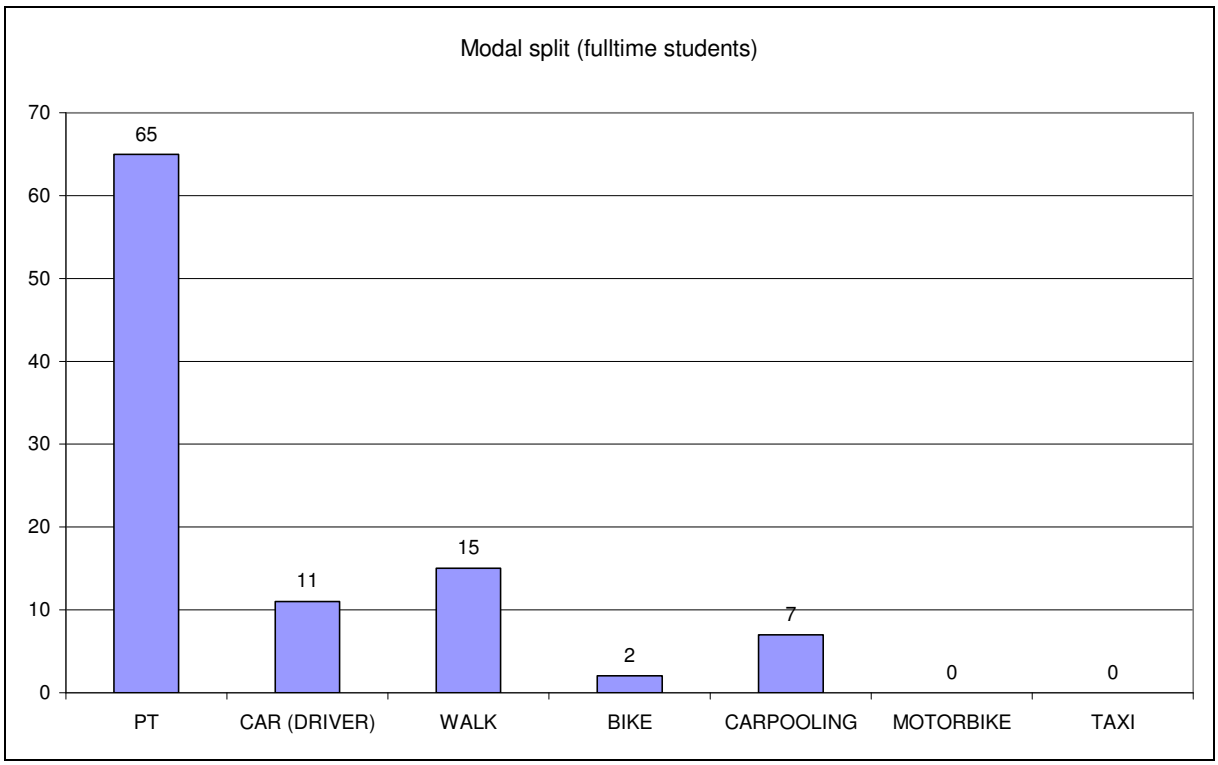


Figure 4 – Modal split among fulltime students after measure implementation



Average modal split before and after measure implementation among fulltime students were presented on figures below:

Figure 5 – Modal split among extramural students before measure implementation

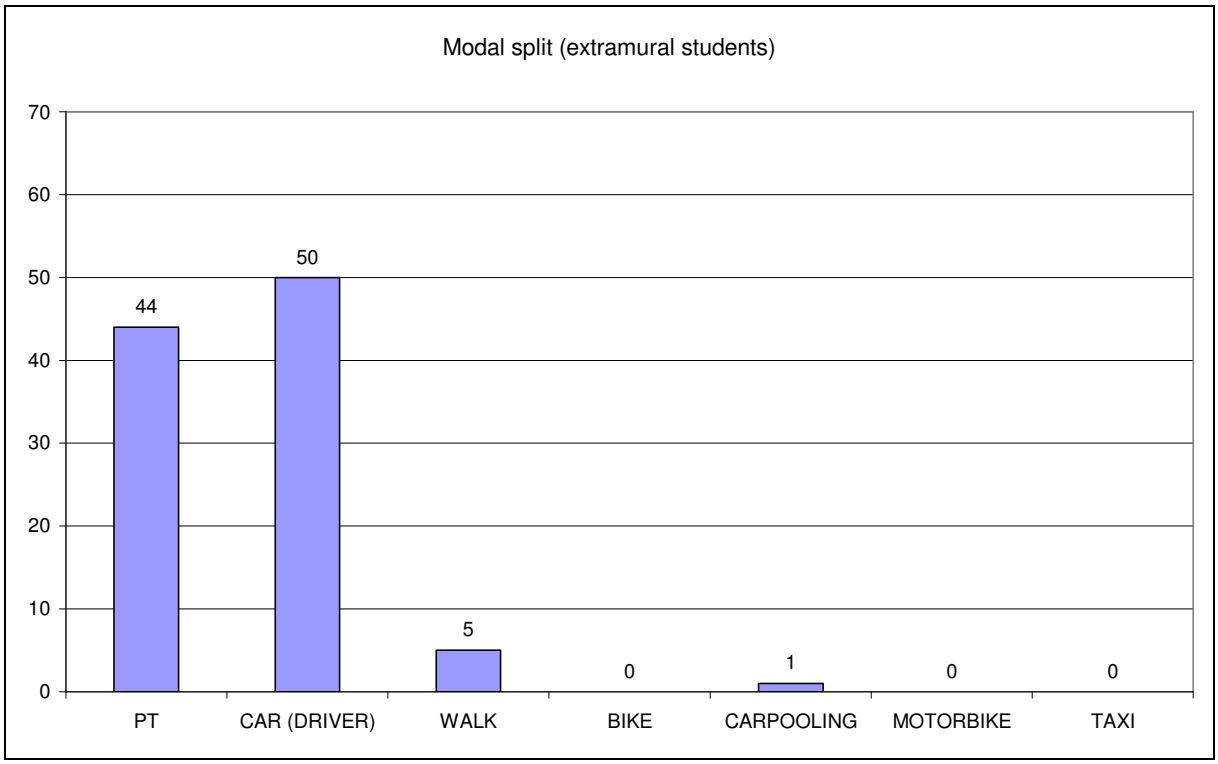
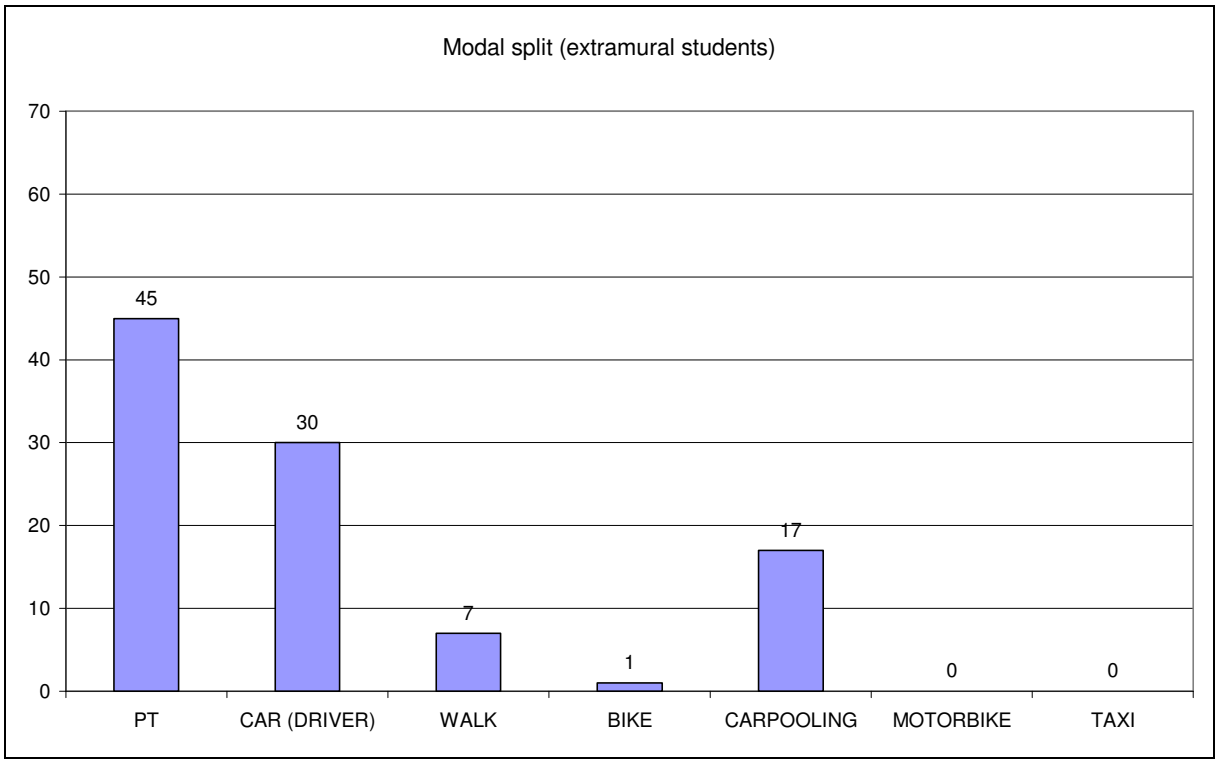


Figure 6 – Modal split among extramural students after measure implementation



Low number of persons who declare travelling in carpooling may be caused by misunderstandings of term of carpooling. As can be seen value of indicator awareness level before measure implementation is quite low. This can explain low number of persons travelling in carpooling – they may travel in carpooling but may not know that they use carpooling.

Share of carpooling trips in modal split significantly increased. It is caused mainly by increased awareness level. However before measure implementation many people used carpooling they were not aware about it. Another reason is that carpooling is becoming more popular among students, especially fulltime students who can park illegally close to University main Campus.

- **Average occupancy**

Average occupancy before measure implementation equals:

- for workdays 1,11 [persons/vehicle],
- for weekends 1,47 [persons/vehicle].

Average occupancy after measure implementation equals:

- for workdays 1,19 [persons/vehicle],
- for weekends 1,40 [persons/vehicle].

This indicator shows average occupancy of all vehicles that enter gates at the main Campus of CUT at Warszawska Street. During workdays only employees are allowed to enter the area; on weekends also extra-mural students can use the parking.

Average vehicle occupancy on weekday grew by 7,2 %. Value of indicator after measure implementation is close to average vehicle occupancy estimated during Comprehensive Traffic Study conducted in Krakow in 2003. For weekend days average vehicle occupancy has been reduced by 4,8 %. Two reasons of this reduction can be identified. First is the time of measurement – the measurement "before" was conducted during regular academic classes while the measurement "after" took place close to the end of academic year when some students do not have to go to University. Second reason is that extra-mural students did not gain enough information about carpooling system or they are already matched into "carpooling crews".

- **Average number of passengers (in carpooling)**

Average number of passengers in carpooling before measure implementation was presented in table below.

Table 2 – Average number of passengers in carpooling before measure implementation

Target group	Sample size	Average number of passengers [passengers/vehicle]
Employees	263	1,90
Fulltime students	385	2,17
Extramural students	384	2,17
Total	**1032**	**2,08**

Average number of passengers in carpooling after measure implementation was presented in table below.

Table 3 – Average number of passengers in carpooling after measure implementation

Target group	Sample size	Average number of passengers [passengers/vehicle]
Employees	-	-
Fulltime students	117	1,68
Extramural students	54	1,93
Total	**171**	**1,81**

Average number of passengers in carpooling decreased for fulltime students and extramural students as well. For fulltime students it is 22,6 % reduction, for extramural students it is 11,1 % reduction. At the same time frequency of travelling in carpooling increased (see next bullet). It explains reduction of number of passengers in carpooling – however new carpooling trips appeared number of passengers in those trips decreased. It can be seen for both groups – fulltime and extramural students.

- **Frequency of travelling in carpooling**

Frequency of travelling in carpooling before measure implementation was presented in table below.

Table 4 – Frequency of travelling in carpooling before measure implementation

Target group	Sample size	Frequency of travelling in carpooling [trips/week]
Employees	263	3,50
Fulltime students	385	2,32
Extramural students	384	1,86

Total	**1032**	**2,56**

Frequency of travelling in carpooling after measure implementation was presented in table below.

Table 5 – Frequency of travelling in carpooling after measure implementation

Target group	Sample size	Frequency of travelling in carpooling [trips/week]
Employees	-	-
Fulltime students	117	2,90
Extramural students	54	2,03
Total	**171**	**2,46**

Frequency of travelling in carpooling increased for fulltime students by 25,0 % and for extramural students by 9,1 %. For full time students it is caused by available free parking lots close to main Campus of CUT and many possibilities to park own car at other Campuses. Moreover it can be noticed that percentage of all students possessing own car is growing every year. The reasons are cheaper cars and more wealthy students. However students own cars they still search ways to reduce trip cots and that is one of the reasons that frequency of travelling in carpooling grew, even if those trips were not registered in carpooling website.

- **Number of persons using carpooling in commuting**

Number of persons using carpooling in commuting before measure implementation was presented in table below.

Table 6 – Number of persons using carpooling in commuting before measure implementation

Target group	Sample size	Percentage of target group that use carpooling [%]
Employees	263	19,4
Fulltime students	385	8,0
Extramural students	384	24,2
Total	**1032**	**16,9**

Analysing the table above it can be seen that number of persons that use carpooling is bigger than in modal split. It is caused by the very wide information about carpooling

added to questionnaire. The respondents could identify that if they travel with colleagues on the basis of the attached information. In inquiry that asses modal split information about carpooling was very short.

Number of persons using carpooling in commuting before measure implementation was presented in table below.

Table 7 – Number of persons using carpooling in commuting after measure implementation

Target group	Sample size	Percentage of target group that use carpooling [%]
Employees	-	-
Fulltime students	117	24,5
Extramural students	54	55,6
Total	**171**	**34,3**

Number of persons using carpooling in commuting increased more than twice for fulltime students and extramural students as well. The value of indicator in situation "after" is very high for both target groups and seems to be overestimated. The reason is that many respondents that answered "yes" for the question if they carpool, use this form of mobility only occasionally. However many students use carpooling within groups of colleagues, not via the carpooling website, and many of those trips are made from time to time, the value of indicator is very satisfying.

- **Number of registered users**

Number of registered users of carpooling system before measure implementation equals 0, because the official system was not available.
Number of registered users after measure implementation, on 15th October 2008, equals 524. this number is about 3 % of employees and students of CUT.
The number of registered is still growing and by the end of the CARAVEL project it is predicted to be over 700. However number of users is significant it does not guarantee high number of trips offered via carpooling website. At now there are about 10 trips (single and regular) offered on carpooling website.

- **Number of parking places**

Number of free parking places available at main Campus of University at Warszawska Street before measure implementation at peak hour equals 47, what is 9,4 % of all

parking places. Total number of parking places at main Campus equals 500. On other campuses there are no significant problems with parking.

Number of free parking places available at main Campus of University after measure implementation at peak hour equals 60, what is 12% of all parking places.

It was planned to built the Main Library at CUT Campus at Warszawska Street that would decrease number of available parking places. The Main Library was not built so the number of parking places is still the same. The number of free available parking places increased by 13 (2,6 % of all available parking places). More free parking places means that either there is more carpooling trips or some employees changed modes of transport.

- **Average travel length**

Average travel length was calculated with assumptions that all system users which registered trip in carpooling website travelled alone before the implementation of the system.

Average travel length after measure implementation equals 138,8 [vkm/person].

According to an inquiry which was conducted among carpooling system users it was stated that 33 % of them found 1 passenger. Those assumption were used to calculate the value of indicator.

Average travel length after measure implementation equals 104,4 [vkm/person].

Taking into consideration average travel length it can be seen that in carpooling system mostly long trips are offered. However there are some regular (e.g. every day what equals 5 trips per week) short trips system interprets them like single journey.

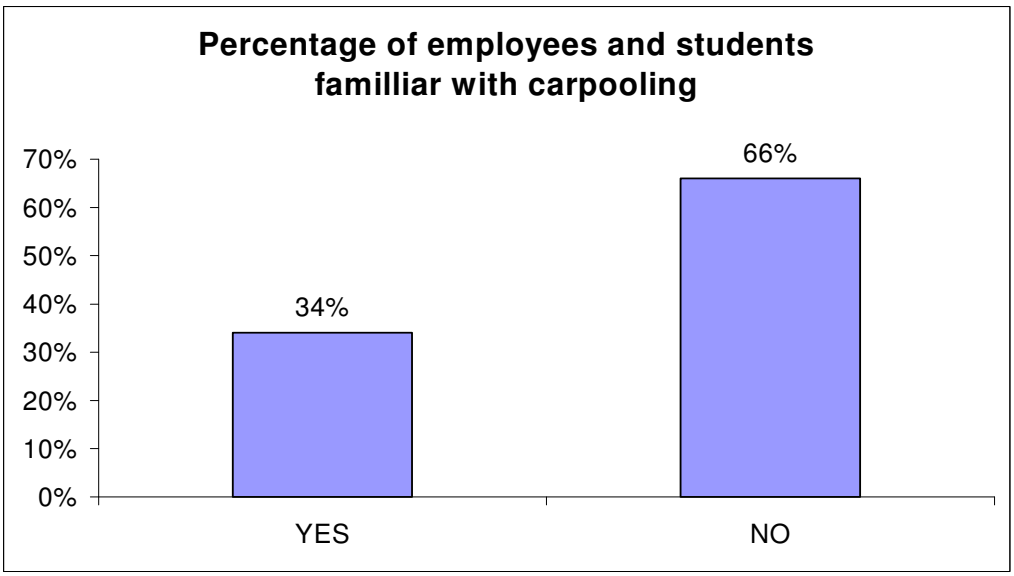
The average travel length after measure implementation has to be interpret with caution as well as Operation costs and Fuel consumption.

C2.5 Society

- **Awareness level**

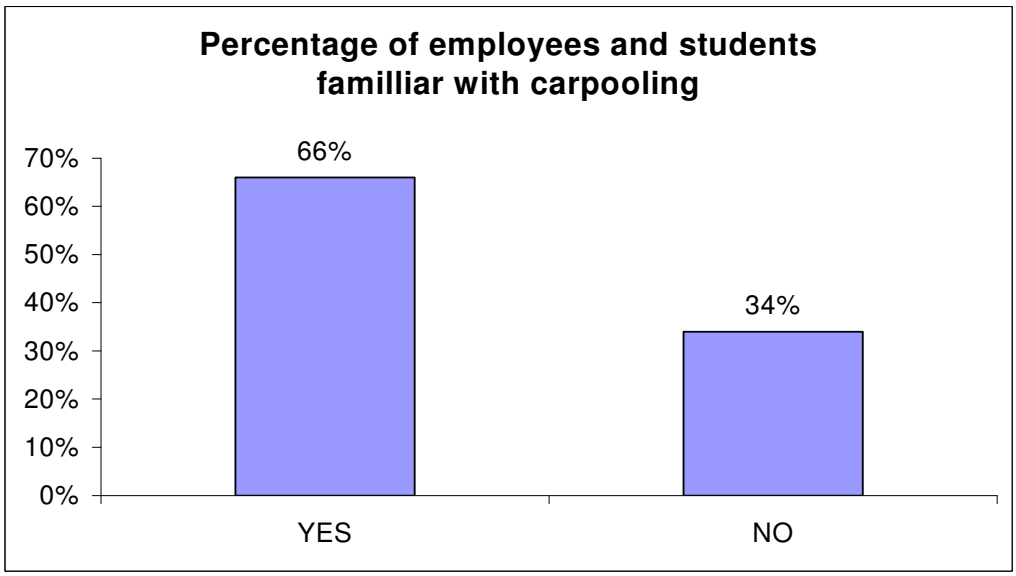
Percentage of students at CUT who are familiar with carpooling (answer YES), before measure implementation is presented at chart below.

Figure 7 – Percentage of employees and students familiar with carpooling



It can be seen that only about 30 % of employees and students do not now what the carpooling is.

Figure 8 – Percentage of employees and students at CUT familiar with carpooling

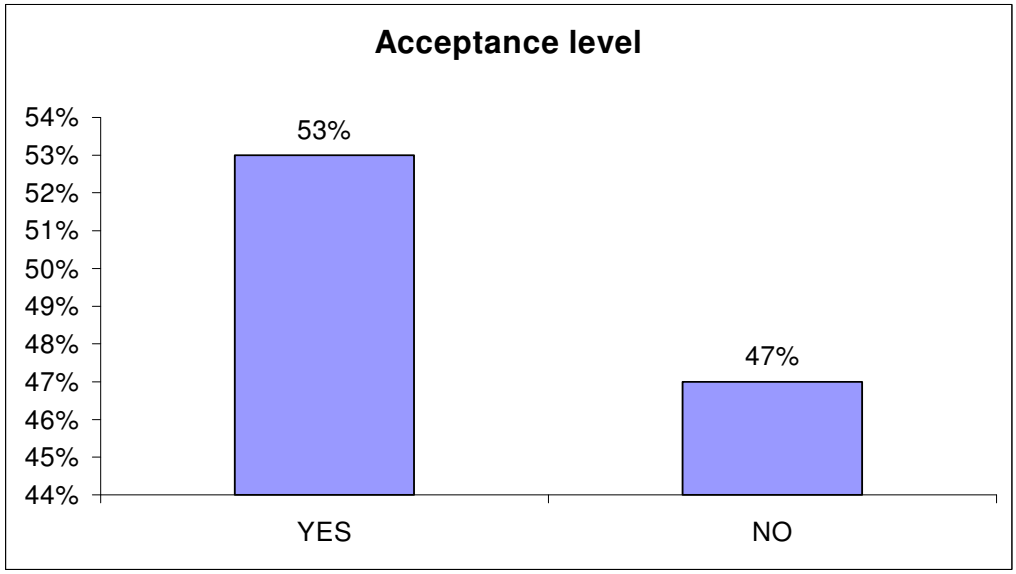


Number of employees and students who are familiar with carpooling grew more than twice. Value of indicator is very satisfying. It is mainly caused by dissemination activities which occurred during measure implementation.

- **Acceptance level** – Unable to estimate indicator in situation before measure implementation.

Percentage of employees and students who favourable perceive measure implementation (answer YES) is presented at the chart below.

Figure 9 – Percentage of employees and students who favourable perceive measure implementation

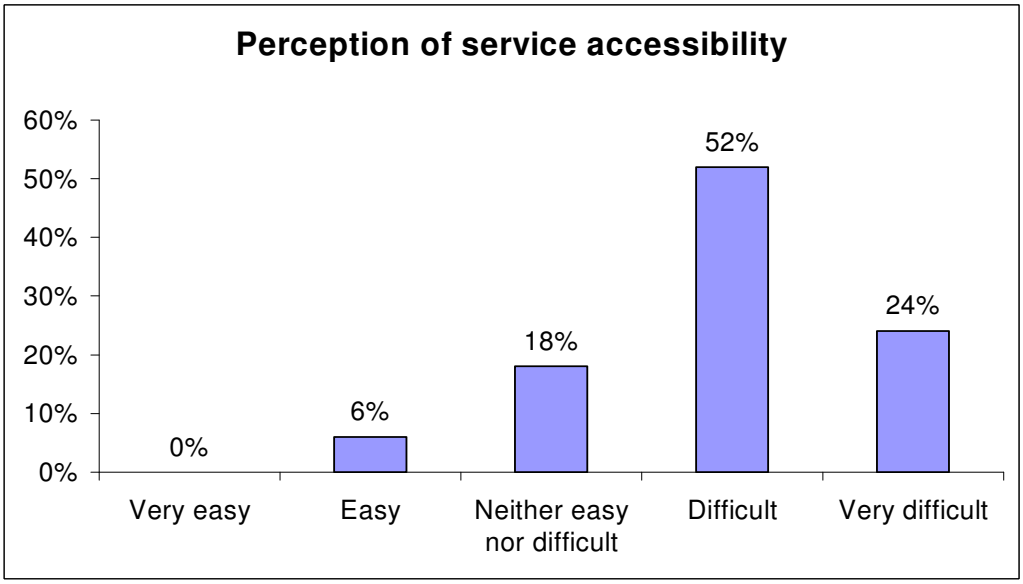


However more than half of carpooling system users assess positively implementation of carpooling system there is still 47 % percent who negatively perceived measure implementation. It can be caused by misunderstanding of question. Some people assess rather website (its appearance and functionalities) than measure implementation as whole activities taken.

- **Perception of service accessibility** – Unable to estimate indicator in situation before measure implementation.

Perception of service accessibility among users of carpooling system after measure implementation is presented at the chart below.

Figure 10 – Perception of service accessibility



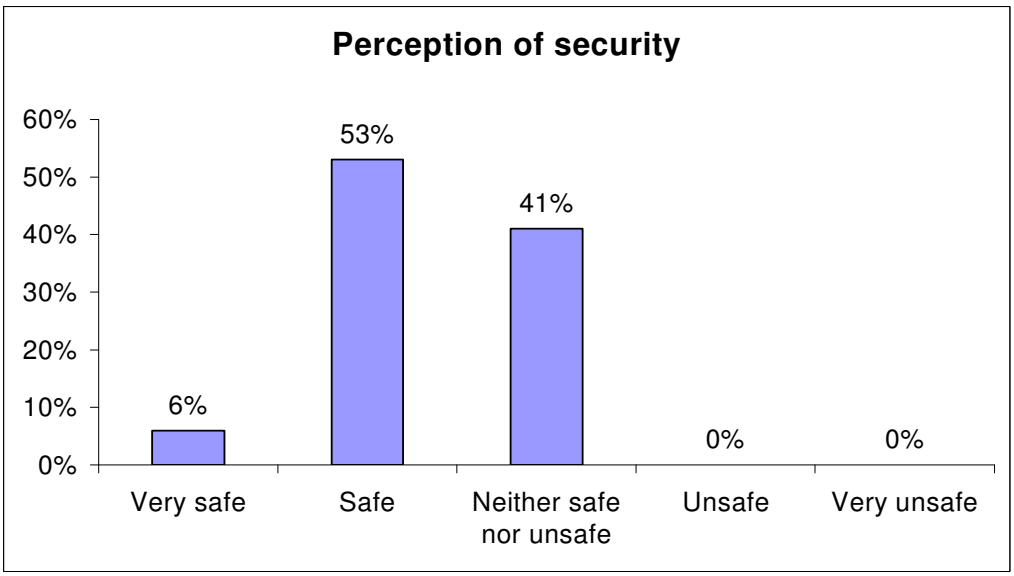
Perception of service accessibility was assessed rather negatively. More than 75 % percent of respondents claim that service accessibility is difficult or very difficult. Concerning is that not even 10 % think that the system is easily accessible.

- **Perception of service security**

Unable to estimate indicator in situation before measure implementation.

Perception of service security among users of carpooling system after measure implementation is presented at the chart below.

Figure 11 – Perception of service security



However there are no special safety procedures within carpooling system (e.g. address or ID verification) more than 50 % of users perceive system as safe or very save. Satisfying is the result that no one perceive system as unsafe or very unsafe.

- **Number of persons interested in carpooling** – The value of indicator is presented in the table below.

Table 8 – Number of persons interested in carpooling

Target group	Sample size	Percentage of target group interested in carpooling [%]
Employees	263	29,3
Fulltime students	385	69,4
Extramural students	384	64,8
Total	**1032**	**57,5**

- **Number of persons interested in carpooling** – The value of indicator is presented in the table below.

Table 9 – Number of persons interested in carpooling

Target group	Sample size	Percentage of target group interested in carpooling [%]
Employees	-	-
Fulltime students	117	67,8
Extramural students	54	63,0

Total	**171**	**66,3**

Number of persons interested in carpooling did not changed significantly. It means that the potential number o system users within specific target group is at the same level. In other words – number of persons who do not use and moreover will not use carpooling is constant.

C3 Achievement of quantifiable targets

Table 10 – Achievement of quantifiable targets

No.	Target	Rating
1	Introducing a new form of vehicle use for University employees and students	★
2	Remove the mobility car single users to rider share car users	**NA**
3	Achieving high acceptance by users, close to zero-cost operation	★★
4	Increasing the amount of shared spaces (it will result in decreasing the number of cars parking at University.)	**NA**
5	Designing a new internet-based data information about free car spaces and potential clients	★★
6	Contributing to a reduction of traffic congestion around University	**NA**
NA=Not achieved, ★=Substantially achieved, ★★=Achieved in full, ★★★=Exceeded		

C4 Up-scaling of results

At first the idea of a carpooling system in Krakow was to develop an Internet-based carpooling system for students and employees of Cracow University of Technology. However the current version of carpooling system is addressed mainly to students and employees of CUT (location of CUT campuses and internet domain pk.edu.pl) it can be easily extended to all city.

There are two possibilities to up-scale the results.

First is to implement a similar system in other universities or private companies. The software can be easily transferred or can be developed by the institutions with help of CUT. Taking into consideration the number of registered users and registered trips in carpooling system at CUT there is a risk that the development of small dispersed carpooling systems at different universities and companies can induce the system to not work properly (not enough number of users).

A second approach is to extend the existing carpooling system to the whole city of Krakow and Krakow's suburban area. It can be achieved by implementing changes in carpooling

website software, registering carpooling system in .pl domain and other extensions pointed below. This approach is recommended.

- Upgrade of carpooling system:
  - Geographically referenced route mapping,
  - Redefinition of trips starts and ends,
  - New possibilities of communication between users, e.g. via sms.
- Dissemination and advertising campaign of carpooling system:
  - Advertising campaign in local media (broadcast, television, newspapers) and using billboards, citylights etc,
  - Dissemination in companies which are not yet interested in introducing carpooling but can be after presentation of advantages of carpooling system.
- New areas to use carpooling:
  - Event oriented system e.g. big events in city, soccer games, concerts.
- Cooperation with:
  - Municipality of Krakow – website maintenance and advertisement, extension of system to all city,
  - Local media (Radio Krakow, TV Krakow, Gazeta Krakowska) – carpooling system dissemination and media partner.

The possible effects of introducing carpooling system in a wider area are difficult to predict. It can be stated that effects of carpooling system implementation at Cracow University of Technology are not very significant. Extrapolation of those results would not be appropriate.

C5 Appraisal of evaluation approach

In general the approach to measure evaluation is appropriate. The comparison of situation “before” and “after” measure implementation is the most common method of evaluation. However, in general, approach seems to be adequate some indicators do not properly asses how the car pooling system works at Cracow University of Technology. The indicators like Operating cost and Fuel consumption seem to be unnecessary and are quite difficult to estimate. Nevertheless those indicators were estimated and give view about possible reduction of operating costs and fuel consumption as effect of introducing carpooling system.
All indicators from category Society are appropriate to evaluate the carpooling system. However indicators from the transport category evaluate the implementation of car pooling system well due to the small area of system implementation and only 3 month system working period differences between estimated values of indicators “before” and “after” measure implementation might be statistically not significant.

The indicator Number of parking places (available parking places) was not necessary because number of parking places at all CUT Campuses did not change. The definition of the indicator was changed to number of available free parking places. It was planed to build The University Library at Campus at Warszawska Street, that would reduce 1/3 of parking places, but till now works did not start. Most appropriate indicator seems to be Number of needed parking places. The most appropriate indicator and the easiest one to estimated is Number of system users. In addition another indicators should be introduced e.g. Number of registered trips on the website, Percent of trips registered that were effectively made.

C6 Summary of evaluation results

The key results are as follows:

- **Key result 1** –The value of indicator "Awareness level" increased after measure implementation almost twice.
- **Key result 2** – 365 users registered in carpooling system till 30th June 2008, 524 users registered in carpooling system till 15th October 2008.
- **Key result 3** – about 30 trips registered in carpooling system every month.
- **Key result 4** – 53 % of respondents favourably receive or approve the implementation of carpooling system.
- **Key result 5** – Number of persons which are interested in carpooling did not significantly changed as a result of measure implementation.
- **Key result 6** – Average vehicle occupancy at weekdays increased from 1,11 to 1,19 [pers/veh] what is 7 % growth. However average vehicle occupancy at weekend days decreased by 5 % (from 1,47 to 1,40) it is not the negative result of measure implementation. The reason of this change can be the date of measurement – measurements in situation after were conducted when there was no regular classes.
- **Key result 7** – However there is no security procedure that verifies address data of registered users more that 50 % of users think that the system is safe.
- **Key result 8** – Number of persons using carpooling grew, depending on target group, from 9 to 25 % for fulltime students and from 25 to 56 % for extramural students.In spite of the fact that there is a large number of persons using carpooling probably only few of them use developed carpooling website.
- **Key result 9** – Frequency of travelling in carpooling increased from 2,32 to 2,90 [trips/week] (25 %) for fulltime students and from 1,86 to 2,03 [trips/week] (9 %) for extramural students. For fulltime students it is mainly caused by unofficial parking localized close to University.

- **Key result 10** – However frequency of travelling in carpooling increased the average number of passengers in carpooling decreased. It can be caused by increasing number of cars among students which are not familiar with carpooling or simply do not want to use carpooling.

D Lessons learned

D1 Barriers and drivers

D1.1 Barriers

- **Lack of appropriate software** – Lack of appropriate software can cause that the carpooling system won't be popular and searching of potential drivers and passengers would be very difficult. Moreover website that is not interesting can not encourage to visit it again. In Krakow case there was suggestions from users about website functionalities e.g. regular trips, editing of trips, more advanced system of comments, personal data verification to ensure higher safety level. However carpooling website software that had been developed give possibility to match "carpooling crew" it still not very attractive (mainly appearance) and there are no actual information about e.g. events where carpooling can be used.
- **Redevelopment of street network surrounding PK campus at Warszawska Street** – Investments around main CUT Campus caused disturbances in estimation of some indicators. At now street network around main CUT Campus is well developed – even overdeveloped. Traffic conditions changed and from some regions of Krakow it is faster to get to CUT Campuses by car than by PT or bike. As a result some indicators may show that carpooling system did not brought predicted effects.
- **Different working hours** – More than half of PK employees have different (floating) working hours. In effect it causes difficulties in setting carpooling crew. Quite often it is very difficult to predict when the one will live workplace. For carpooling system, where trips have to be offered in advance, it is a big barrier. In other cases, where carpooling is rather informal or in a stage where carpool crew matched for the first time by internet service and then personally it is advantage – one of the persons can wait for others or leave earlier work. Moreover in inquiry conducted at CUT in the group of employees who were not interested about using carpooling 14 % gave as the reason floating working hours.
- **Lack of readiness among potential users to offer place in their cars** – In Poland there is still dislike to share free places in car with others. Moreover some reasons of not taking others, even registered in carpooling system, are related with personal safety. Due to inquiry conducted at CUT in the group of employees who were not interested in carpooling 11 % gave as the reason preferring to ride alone. In both groups of students only 4 % gave the same answer.

- **Problems with measure dissemination** – To achieve high level of interest of carpooling system as well as high number of registered users dissemination activities should be make at big scale. However many television and broadcast reportages as well as newspapers articles and internet publications were given about carpooling system there is still a need to advertise system at billboards, city lights etc. Even the best reportages are not sufficient to ensure wide popularity of carpooling system.
- **Lack of interest of private companies to develop carpooling systems** – Private companies are very often not interested in development of carpooling system even if it can cause reduction of needed parking places. It was easy to identify when Carpooling Transferability Workshops were organized. Only two of almost 50 companies answered to invitation email. One asked to delete its address from database because they already have a partner that deals with transportation problems of company and employees. The other one company representatives attend the workshops.

D1.2 Drivers

- **Students are interested in carpooling** – CUT students are the most promising target group. They are very interested in idea of carpooling and would like to register and use carpooling system. Due to inquiries most of registered carpooling users are CUT students. They are also more susceptible to share free spaces in their cars with other people that employees. The same situation can be seen among other young people who are interested in carpooling and opened to changed their transportation behaviours.
- **The media in Poland became very interested in carpooling** – A dozen or so of interviews were given by Measure team members. As a result of those interviews two articles in local newspapers were published, three television and few broadcast reportages were emitted. Those dissemination activities enlarged popularity of carpooling as an idea an the carpooling system developed at CUT as well.

D2 Participation of stakeholders

- **Students** – Students are very interested in carpooling system. They are the main group that use carpooling system.
- **Employees** – However about 30 % of CUT employees declared willingness to use carpooling system current number of employees using carpooling system is low.

D3 Recommendations

- **Recommendation 1** – To work properly carpooling system should gather as much registered users as possible. Dissemination and advertising of carpooling system is one of the most important aspects of the project – it can help to encourage people to use carpooling and to join to system as a registered user. Well organized advertising campaign id even more important than development of appropriate internet based service.
- **Recommendation 2** – However high value of indicators "Awareness level" and "Number of persons interested in car pooling" estimated in inquiries shows level of interest of target group in carpooling those do not guarantee achievement of assumed effects of carpooling system implementation. The one always have to be careful when interpret results of inquiry.
- **Recommendation 3** – Carpooling website has to be actualize quite often (at least once a week). There is also a need to publish information about events where carpooling can be used.
- **Recommendation 4** – If it is possible municipality should be involved in maintaining and disseminating the system in case its developed for the city. It makes the system more reliable and secure for users.
- **Recommendation 5** – Carpooling website should be simple and offer minimum of functionalities needed. Then suggestions from users should be gained and introduced if possible.

D4 Future activities relating to the measure

Future activities related to measure can be stated as below:

- Extension of carpooling system to whole city. It is planned to put the carpooling website on servers of municipality, but it is not for sure.
- Final corrections of carpooling website software.
- Increase of users personal safety.
- More dissemination and advertising activities.