

Chapter 5: Considered Data, Research Variables and Methods Used

5.1 Preliminary Papers

Two preliminary papers were executed in order to better define the frame of this study, to understand the extent of the problem of traffic management at the study area and develop cartographic material that could be used for the study on PPP/UPP. Data gathered and analyzed for the first paper, "Proposal for a Land-Use Plan and Concept for One of the Study Centers of Chiang Mai University Campus", was used to establish a research method based on TEA, OBEA and semi-structured interviews in combination with a questionnaire. The second paper, "Vehicle Parking at Chiang Mai University Campus", was employed to establish a relationship between qualitative behavioral data gathered by the questionnaire of the first paper and objective physical conditions at the study site. The papers were written under supervision of Ass. Prof. Udsadanka Porananond and Prof. Dr. Suthenee Dontree, respectively.

- **"Proposal for a Land-Use Plan and Concept for One of the Study Centers of Chiang Mai University Campus."**

Objectives and expected results were:

1. Assess the situation of traffic in a selected study area
2. Establish the points of view of concerned groups at the target site regarding traffic and transportation
3. Develop a land-use plan based on the proposals and ideas of concerned groups
4. Identify possible conflicts of interest and recommend topics for further studies.

Methodology:

The methods used were:

1. A questionnaire
2. Interviews
3. Observer based assessment (OBEA) through field observations
4. Technical based assessment (TEA)

The questionnaire was written with the help of one Master degree student and two Bachelor degree students at the university. Five topics were addressed:

- General information about the students
- Transportation at the study area and the university in general
- The current land-use
- General, physical characteristics of the study site regarding transportation
- Pollution

The questionnaire was conducted between the 1st of September 1999 and the 1st of October 1999. 40 % of the questionnaires were collected at the premises of the Social Science and Humanities Faculties. Participants were chosen at random and/or groups of people of at least four were approached. 16 % of the questionnaires were collected at the premises of the central library. Participants were chosen at random. 12 % of the questionnaire were acquired at the graduate school. 32 % of the questionnaires were collected at random at the study site (excluding the premises of the Social Science and Humanities Faculties) and adjoining areas for student activities and dormitories.

- The average age of the participants was 22.975 or 23 years.
- 47 % of the participants were male and 53 % of the participants female.

- Social position of participants were given with
 1. Teachers 7 %
 2. Administration 0.5 %
 3. BA students 71 %
 4. MA students 20 %
 5. University personnel 1 %
 6. Personnel from the private sector 1 %

Some topics of the questionnaire were asked to be answered in the participants' own words⁶⁷. This category of questions was employed as a feedback-mode to evaluate the questionnaire itself and to improve data selection for the study on the Polluter Pays Principle. Answers of the questionnaire that needed no personal wording by participants were evaluated by percent-distribution.

Interviews were conducted with teachers, students, guards and the administration. Interview partners of each group were chosen at random.

Field observations (OBEA) were conducted on numerous occasions. All together 22 field trips were made to establish information concerning this paper.

Technical based assessment (TEA) is based on documents from the university administration, and the department of geography.

Data used:

Information regarding current land-use was taken from the university land-use master-plan 1992-1996. Due to the age of this document field-trips have been undertaken to compare the actual land-use with the use proposed by the master-plan. This was done especially in regard to parking habits at the target site.

Current areas of construction were also taken under consideration, as well as buildings that had not been finished or constructed by the time the master plan was printed.

The number of students at the target site has been derived from a population census of the administration for the year 1997. The actual numbers for the target site were taken from this report and an estimated number of commuters was added (2670 heads). This number was verified with various teachers and the administration of the library, as well as through OBEA.

The maps and graphs of this paper are based on maps of the study site from the geography department of the university. Changes have been made by the author to update those maps. Some buildings added might be slightly off scale, as they are computer generated images and not based on GIS coordinates. However, miss-scaling does not occur to a degree that might compromise the information given in the maps, which has been verified by numerous field trips.

Some roads shown on existing maps were not accurate or missing completely. Where necessary, the author has added their outline to the maps. Their general direction and number of bends is verified by field trips, but their exact location is not given according to GIS data. However, width and condition of all the roads concerning possible changes or integration into the proposed management concept have been assessed through field-trips. The field-work undertaken for this paper was carried out on foot, by bicycle and by motorbike.

OBEA information concerning land-use was transferred onto maps provided by the university's geography department. After updating those maps with the help of computer software, a second round of field-trips was undertaken to verify changes made by the author. Only after that, field-trips concerning the traffic management concept were taken and OBEA information was then transferred onto the corrected maps and developed from there.

⁶⁷ A complete list of those answers can be found in the appendix, chapter A5.

- **“Vehicle Parking at Chiang Mai University Campus”**

Objectives and expected results

To identify some of the factors that can lead to parking in unauthorized areas an assessment and a basic analysis were undertaken for the site in question. Through comparison of the structure and physical appearance of areas used for any form of parking, indicators could be developed. They were used to define criteria for parking area design and to develop definitions of correct/incorrect parking modes. By showing the relationship between parking lot design and the mode of parking a model for an optimal design and possible improvements for existing lots could be derived⁶⁸.

Objectives:

1. Show a possible spatial relationship between parking lot design and parking in unauthorized areas.
2. Find criteria that can be used to develop a parking lot design concept for the study site.
3. Explain and define the occurrence of “wild parking”.

Expected results:

- A graphic description of areas used for parking at the site
- Define different categories of parking space found at the target site
- A graphic description of “best” and “worst” parking scenarios
- Develop a parking lot design concept

Methods used:

Technical based assessment (TEA)

- Photographic images
- Quantitative data

Observer based assessment (OBEA)

- Graphic description
- Qualitative data

TEA was applied by combining photographic images with numeric information. Pictures have been taken on two independent occasions. First, during the national university sports activity week in 1999, with a minimum of parked vehicles present at the study site. Second, during a normal day of study activities within the same month. The image data was projected on a grid of the target area and classified according to the selected variables for the assessment, concerning the situational factor and the objective physical conditions of the parking sites. Each image was given a qualitative value derived from the assessment. The qualitative value was established through a grade system, which used between 2 and 4 value divisions, differing individually for each variable. The sum value of all variables provided a group of digits. The lower the digit was for a site, the better the quality in regard to environmental perception. All sites were then divided into six groups, which were:

- excellent quality
- very good quality
- good quality
- medium quality

⁶⁸ See appendixes, chapter A6.

- temporarily acceptable bad quality in need of adaptation
- unacceptable quality in urgent need of adaptation

The result was transferred onto the grid to establish a spatial relationship between parking lot design and parking behavior as expressed in "wild parking". The parking sites and their individual values were compared with locations where wild parking is observed. A definition in relation to the parking system could be obtained.

During the second step of analyses, by means of OBEA, the site values were integrated to establish the current system of circulation at the site and were set into relation to the overall infrastructure. Land-use and site planning criteria were employed descriptively to link findings with environmental criteria of the assessment that could be used to develop a concept for parking lot design. In the last step, the synthesis, all findings were considered on the basis of "The Commons" to develop a concept for a parking site system⁶⁹.

5.2 Mitigating the Traffic Problem at Chiang Mai University Through Environment Management Measures Based on the Polluter Pays Principle

Data and data source:

- Data: qualitative and quantitative
- Data sources: university administration, faculties and research

Research in form of questionnaires was conducted by a sample size giving a 97,5 % and 95% confidence level⁷⁰ for an assumed population of 10.000 heads for the target area.

- Selective techniques: stratified and random sampling

Data collecting tools:

- Questionnaire
- Semi-structured interviews
- TEA
- OBEA

Organization of data groups (Data Treatment):

The users of the transportation system at the study area are divided into 5 groups

- Students
- Teachers
- Administration
- University personnel, research assistants & others

However, for the data collection, at times more than those 4 groups were considered by dividing them into sub-groups, like BA students and MA students. First, the assumed number of 10.000 users would be separated into three sub-groups:

- Students
- Non-students
- Commuters⁷¹

⁶⁹ See appendixes, chapters A6 and A11.

⁷⁰ Based on: AREA Mini Presentation, David Mendel, April 1977. From "Geographical Research Methodology", Manas Suwan, Odeon Store, 1989.

⁷¹ People that are not registered in one of the resident institutions or faculties of the target area, but use the premises.

Students were separated according to their faculty, and the number of samples taken from each group represented the percent distribution of an assumed 10,000 users of the target area. Non-Students were separated into the following groups and again the samples taken represented the percent distribution:

- Teachers
- Faculty/Research assistants
- Administration personnel
- Regularly employed personnel
- Private employees

Commuters constituted a control group and the samples were taken at random at the study site. The result for this group was then compared with the overall result of the questionnaire.

Data Analysis:

- Contain analysis of quantitative and qualitative data
- Descriptive analysis (percentage and frequency distribution)
- Triangulation⁷²

For the data analysis, one important characteristics of PPP had to be considered: its measures in environment management are not punitive and do not favor any special group of interest. Minorities and majorities are therefore of only relative importance. Looking for common denominators in each group, independent of its size, is the foremost concern of data analysis incorporating PPP ideas.

To find those denominators based on a study concept using qualitative and quantitative data, a method called "Triangulation" is used. Because qualitative data is often criticized for its limited objectivity and reliability and thus validity, the study uses triangulation cross-checking to minimize such shortcomings. Two types of triangulation are used:

- data triangulation by using documents, observations and discussions/ interviews. (One important aspect of data triangulation is that quantitative data is intended to play an important role in verifying the qualitative information.)
- case triangulation by including reference groups or activity examples.

In order to meet the study objectives, a sequence of analytical steps follows the data collection and as a first step the opinion and experience of the target groups were considered using an identical structure:

- The origin and social position of the groups
- Objectives (in transportation needs)
- Opinions and visions
- Practiced behavior regarding traffic and transportation
- Proposals regarding transportation
- Benefits from proposed changes

In a second step, these results were compared with the data obtained by TEA and SSI of the transportation management system. Both sets of data were then compared for possible contradictions and conflicts were identified, providing a basis to describe common denominators. This information formed the guidelines for developing the pilot project concept together with information concerning the transportation infrastructure collected by TEA/OBEA.

⁷²Mikkelsen, B. (1997): *Methods for Development Work and Research*, p. 209

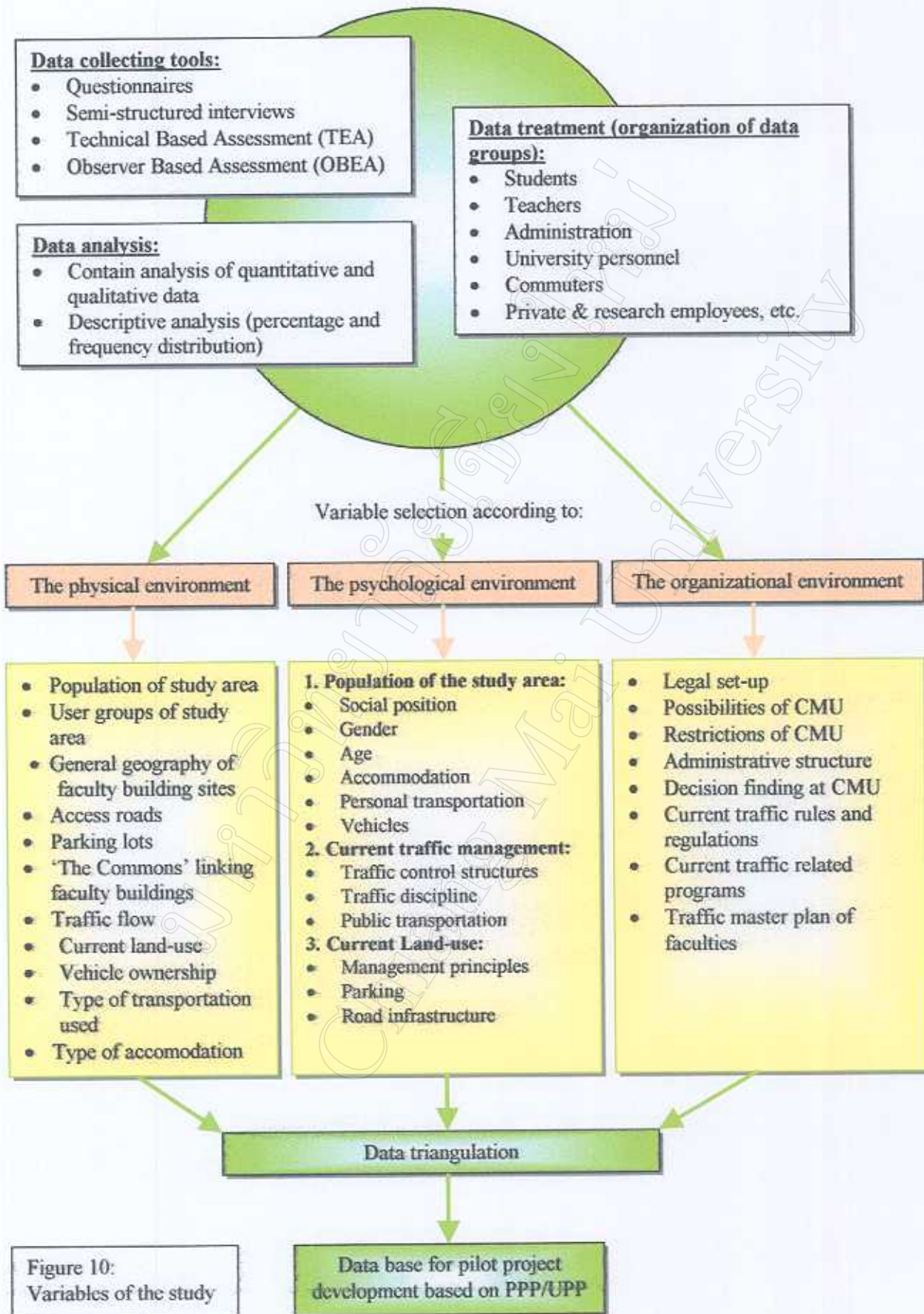


Figure 10:
Variables of the study

The pilot project was the basis for the third phase of data analysis, the feedback phase. In order to verify the study results and to give all concerned groups the opportunity to reflect on the content and the study process, a final evaluation of the proposed pilot project was carried out.

Together with personal observations and experience during the study implementation, this evaluation is the basis for recommendations and concept outlines regarding the use of PPP/UPP measure in mitigating the traffic Problems at CMU.

5.3 Methodology According to Considered Environments

5.3.a The Physical Environment of the Study Site

Objectives applied in data selection:

Selected data

- must have direct relevance for traffic management
- must be able to present the current traffic management system sufficiently

Variables considered:

The variables considered were

- Population of study area,
- User groups of study area,
- General geography of faculty building sites,
- Access roads,
- Parking lots,
- "The Commons" linking faculty buildings,
- Traffic flow,
- Current Land-use,
- Vehicle ownership,
- Type of transportation, and
- Type of accommodation.

Methods used:

1. TEA (Technical Based Assessment) based on

- Maps⁷³
- Data from university and faculty administration⁷⁴
- Data from preliminary papers

2. OBEA (Observer Based Assessment) based on

- Photographic images: Pictures were taken between October 1999 (ninety-nine) and June 2000.
- Field-trips: Field trips were conducted between October 1998 (ninety-eight) and June 2000.
- Random interviews and SSI: Interviews were conducted with teachers, students, guards and the administration. Interview partners of each group were either chosen at random or selected for SSI. For the latter type of interview, 18

⁷³ In part taken from preliminary paper 1: "Proposal for a Land-Use Plan and Concept for One of the Study Centers of Chiang Mai University Campus"

⁷⁴ From central administration, Bundit Graduate School, Department of Geography, the main library and all faculties at the study site

representatives of all user groups were chosen according to their technical expertise, experience and/or social position⁷⁵.

3. Questionnaire 1

For the physical environment especially regarding vehicle ownership, type of transportation and type of accommodation. The number of questionnaires was based on a data confidence level of 97.5 % and was conducted between February and March 2000. The program used for analysis was SPSS. The researcher or a research assistant collected all data (details see next chapter).

5.3.b The Psychological or Attitudinal Environment

The description of the psychological environment for transportation related issues is considered important for the assessment and pilot project development alike. It reflects consumer satisfaction and attitude and gives a frame for project and indicator development.

Objectives applied in data selection:

Selected data

- must have direct relevance for traffic management
- must be able to establish the perceived efficiency of the current management system
- must be able to reflect environmental and traffic perception of the campus users themselves
- must be able to give a frame for suggested PPP measures and probability of acceptance

Variables considered:

The variables considered were

- Population of study area, here
 - Social position
 - Gender
 - Age
 - Accommodation
 - Personal transportation vehicles
- Current traffic management, here
 - Traffic control structures
 - Traffic discipline
 - Public transportation
- Current Land-use, here
 - General management principles
 - Parking
 - Road infrastructure

Methods used and data treatment:

The number of questionnaires was based on a 97.5% confidence level with a statistical accuracy of ± 0.5 for a population of 10.000⁷⁶ heads at the study site. Participants were chosen according to user-groups and ,here, individuals and/or groups of people of at least four were approached at random.

⁷⁵ For a detailed list of topics and a summative transcription of the interviews, see appendixes, chapter A4.

⁷⁶ See chapter 6.1: Assessment of study area, population.

All data was collected by the researcher or a research assistant.
 The data was analyzed for mean percent distribution.
 The software program SPSS was used for data analysis.

The number of questionnaires for a 97.5% confidence level for this population is 478⁷⁷. Due to calculation in two-digit percent points, the actual total number calculated was 480. The number per user group is given as follows:

No. of questionnaire per sub-group: No per group:	BA students	MA students/ doctoral students	Teachers	Research Assistants	Adminis- tration	Full-time employees
Faculty of Humanities: 119	95	10	9	1	2	2
Faculty of Science: 147	97	22 + 3 for doctoral students	13	2	5	5
Faculty of Social Sciences: 91	65	19	4	1	1	1
Faculty of Economics: 36	22	12	2	-	-	-
Computer Center: 2	-	-	-	1	1	-
Library: 9	-	-	-	2	4	3
Student registration: 3	-	-	-	1	1	1
Sum:	279	66	28	8	14	12
Sub-Total:	407					
Estimated (daily) Commuters and others: 73	73	Table 1: Number of questionnaires according to user groups				
Total	480					

5.3.c The Organizational Environment

The organizational environment describes the implementation environment of traffic related measures. Here, two objectives were applied in data selection:

1. Describe the current frame of existing traffic measures, and
2. Describe a possible frame for future traffic measures.

⁷⁷ Source: AREA mini presentation, Darwin Mendel, April 1977

Variables considered:

The variables considered were

- Legal set-up and possibilities/restrictions of CMU
- Administrative structure of CMU
- Decision-making at CMU
- Current traffic rules and regulations
- Current traffic related programs
- Traffic master plan of faculties

Methods used:

Most information was collected via SSI. In some instances written data was available. The data was then transferred onto tables or brought together in a descriptive summary.

5.4 SSI⁷⁸Participant selection:

Participants were chosen according to one or more of the following criteria:

1. Member of one of the user groups
2. Specialist in a study related field(s)
3. Active participation or role in current traffic management
4. Strong recommendation by any of the user groups

The number of participants from each study group did not represent the percent distribution of the actual number of heads for each group.

Topics approached during interviews:

1. Administration
2. Traffic and transportation at CMU
3. Land-use
4. Physical conditions at campus
5. Pollution

Focus during the interviews:

1. Personal perception (How do you think?)
2. Personal perception of attitude of all users towards topics (How do other people think?)
3. Cultural specifics in connection with topics (How does Thai society think?)
4. Suggestions

Methods used:

Preparation stage: Each chosen participant was first contacted in person and a detailed list of topics in English and Thai was forwarded. Second contact was made via Telephone in order to arrange for an appointment not before at least 7 days since the first contact.

The SSI: Time allocated for the interviews with each participant was between 60 and 90 minutes. Before the start of the interview, participants were informed that they could discuss

⁷⁸ For more details see appendixes, chapters A3 and A4

any traffic related topic besides those on the list. Research- and analysis-focus would, however, primarily concern the topics introduced.

Other than SSI:

Between October 1998 and June 2000 the researcher had many conversations and interviews while conducting other traffic related research. Resulting knowledge and experience was integrated in the study implementation and analysis.

5.5 The Second (Feedback) Questionnaire

Topics addressed in the 2nd questionnaire:

1. Physical traffic environment
2. Organizational traffic environment
3. Traffic PR (attitudinal traffic environment)

Methods used and data treatment:

The number of questionnaires was based on a 95% confidence level with a statistical accuracy of ± 0.5 for a population of 10.000⁷⁹ heads at the study site. Participants were chosen according to user-groups and, here, individuals and/or groups of people of at least four were approached at random.

- All data was collected by the researcher or a research assistant.
- The data was analyzed for mean percent distribution.
- The software program SPSS was used for data analysis.

The number of questionnaires for a statistical accuracy of 95 % for this population is 369⁸⁰. Due to calculation in two-digit percent points, the actual total number calculated was 374. The number per user group is given as follows:

No. of questionnaire per sub-group:	BA students	MA students/ doctoral students	Teachers	Research Assistants	Adminis- tration	Full-time employees
No per group:						
Faculty of Humanities: 94	74	8	7	1	2	2
Faculty of Science: 114	75	17 + 3 for doctoral students	10	1	4	4
Faculty of Social Sciences: 70	50	15	3	-	1	1
Faculty of Economics: 28	18	9	1	-	-	-
Computer Center: 1	-	-	-	-	1	-

⁷⁹ See chapter 6.1: Assessment of study area, population.

⁸⁰ Source: AREA mini presentation, Darwin Mendel, April 1977

Library: 7	-	-	-	2	3	2
Student registration: 3	-	-	-	1	1	1
Sum:	217	52	21	5	12	10
Sub-Total:	317					
Estimated (daily) Commuters and others: 57	57	Table 1a: Number of questionnaires for the feedback phase according to user groups				
Total	374					

The following worded questions were asked in the questionnaire:

Regarding Space:

Question 1:

Would you consider the existence of a silent zone around the main library as an improvement to your daily activities at university campus?

Question 2:

Would you consider less concrete and more greenery as an improvement to university campus?

Regarding Traffic:

Question 3:

Would you consider a convenient weather protected system of walkways connecting faculty buildings as an improvement of traffic infrastructure at campus?

Question 4:

Would you consider an increase in traffic guards to ensure a more strict traffic law enforcement as an improvement to traffic management at campus?

Question 5:

Would you consider an increase in tramcars and lines in combination with a higher frequency of runs as an improvement to traffic management at campus?

Question 6:

Would you consider such a tramline system as an alternative to your current, main form of transportation at campus?

Question 7:

If the university initiates PR activities and campus-user tutoring regarding the guards and their role in traffic management at campus, do you think that would be an improvement to the current traffic management?

Regarding the Polluter Pays Principle:

(The following text was included in the questionnaire:) The Polluter Pays Principle uses fees for traffic management. Those collected fees can only be used for traffic measures and

management and must result in the creation of traffic alternatives for users. It requires that those users at campus that create more pollution than others to pay a higher fee.

Question 8:

Would you agree to the following objectives to university traffic management?

- Provide an increase in human space over traffic space.
- Provide a traffic environment that has less air-, noise-, and visual pollution.
- Decrease the number of vehicles at campus.
- Promote walking as the general form of short distance commuting.
- Implement PPP/UPP.

Question 9:

Would you agree to the following guiding principles for traffic management at campus?

- Unless it creates direct contradiction to or conflicts with the underlying objectives, always put the user convenience within the traffic environment first.
- Traffic measures should consider all user groups equally.
- Traffic measures should give all user groups sufficient time to prepare for their impact.
- Utilize people participation as much as possible.
- Traffic measures should always have an educational effect.
- Always promote the environmentally more efficient form of transportation.

Question 10:

What do you think of the following statement? University should create a traffic management unit that has an equal number of representatives from all user groups, which are students, teachers, faculties, university personnel, administrators.

Question 11:

(Please answer, even if you did not agree with question 10)

What do you think of the following statement? This traffic management unit should be the only body that can decide on the rate of user fees.

Question 12:

(Please answer, even if you did not agree with question 10)

What do you think of the following statement? This traffic management unit should be the only body that decides on how traffic user fees are employed at campus and what traffic measures are taken.

Regarding People Participation:

Question 13:

Do you think that the role of user groups in traffic organization should increase?

Question 14:

Do you think that university should call a public forum on transportation to discuss its policy regarding traffic management?

Question 15:

(Please answer, even if you did not agree with question 14)

Do you think that such a public forum should have the opportunity to propose a traffic management plan worked out by all participants to the university?

Approach towards formulating the questions:

Especially regarding questions 8 and 9, the research tried to simulate a situation similar to one any administrative or management unit experiences: decisions very often concern a group of

objectives and guidelines that form part of a whole. It is therefore not possible to eliminate a less popular part of such a set without compromising the whole. Accordingly, the questionnaire did not ask for an evaluation of the individual objectives and guidelines introduced in the questionnaire. Instead, participants were only given a choice to either accept or reject them as a whole.

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