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A Web-Based Survey Study of Possible Parking Allocations at the Ås Campus NMBU When Faulty and Students From Adamstuen Are Going to Move to Ås in 2019

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Declaration

I, Nawaraj Bhujel, declare that this thesis is result of my research investigations and findings. Sources of information other than my own have been acknowledged and references have been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature:

Date:

Dedication

Dedicated to my respected mother Mrs. Dil Maya Bhujel and my loving wife Mrs. Yamuna Khawas Bhujel.

Acknowledgement

Abstract

The parking congestion and its side effects: excessive search drive, higher carbon emission and higher cost of driving are expected to be bigger at the Ås campus when the faculty and students are going to move from Adamstuen to Ås in 2019. In order to manage the congestion and its side effects, this study has investigated the possibility of three principles of parking allocations: guaranteed parking to staff member, prohibited parking to those who reside closer than three kilometer from the Ås campus, and parking allocation based on individual willingness to pay (WTP). For that, the survey links (English and Norwegian versions) were emailed to all staff (1700) and students (3500) of NMBU. A low response rate of 0.25 % among students made me exclude student responses from the analyzed material. For the staff members who use the on-campus parking under the staff registration (effective demand), the response rate remained 37 % in the most restrictive scenario.

The four combinations of demand and supply were assumed as follows due to the uncertainties: I=(supply= 500, demand ≥1200), II=(supply=500, 900≤demand<1200), III=(supply= 700, demand ≥1200), IV=(supply=700, 900≤demand<1200). My findings show that neither the guaranteed nor prohibited allocations can reduce the demand adequately (or demand ≤ supply) to manage the congestion. However, a parking fee from NOK 50 to 810 per month would reduce demand to create an equilibrium in the market for staff parking at NMBU and It could therefore be an effective option for the congestion management at the Ås campus in future.

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1 Chapter I: Introduction

This chapter includes three sections: Motivation, Problem of Statement and Research Questions, and Thesis Outline.

1.1 Motivation

Staff and students from the Ås campus of the Norwegian University of Life Sciences (NMBU) experience difficulties to find the parking space in the desired parking lot during peak parking hours. These difficulties are expected to increase when faculty and students from the Adamtuen campus of NMBU are going to move to Ås in 2019. Due to the national and county regulations, NMBU is not allowed to increase the number of parking spaces, which will further increase the discrepancy between demand and supply of on-campus parking at NMBU. As a consequence of the externally set rules and changes in parking demand, the students and staff are expected to spend additional time (travel time loss) to search for the available parking space at the Ås campus. In some cases, one may even be unable to find a vacant parking spot in the university premises.

1.2 Problem of Statement and Research Questions

The general documentation of search drive in relation to the congestion in the parking remained massive (Malić, Brčić, & Krasić, 2000; Jeihani, Ardeshiri, Du, & Rakha, 2015; Weinberger, Millard-Ball, & Hampshire, 2016; Dowling, Fiez, Ratliff, & Zhang, 2017). According to Weinberger et al .(2016), it may take few to several minutes of search drive in order to find the free space in the crowded parking lots. With regard to the Ås campus of NMBU, this problem

may be further accentuated due to the size of the campus and dispersed location of parking lots (see Figure 1.1), and the traffic pattern (see Figure 1.2)

Figure 1.1: Distribution and Allocation of Parking Spaces at NMBU in Ås
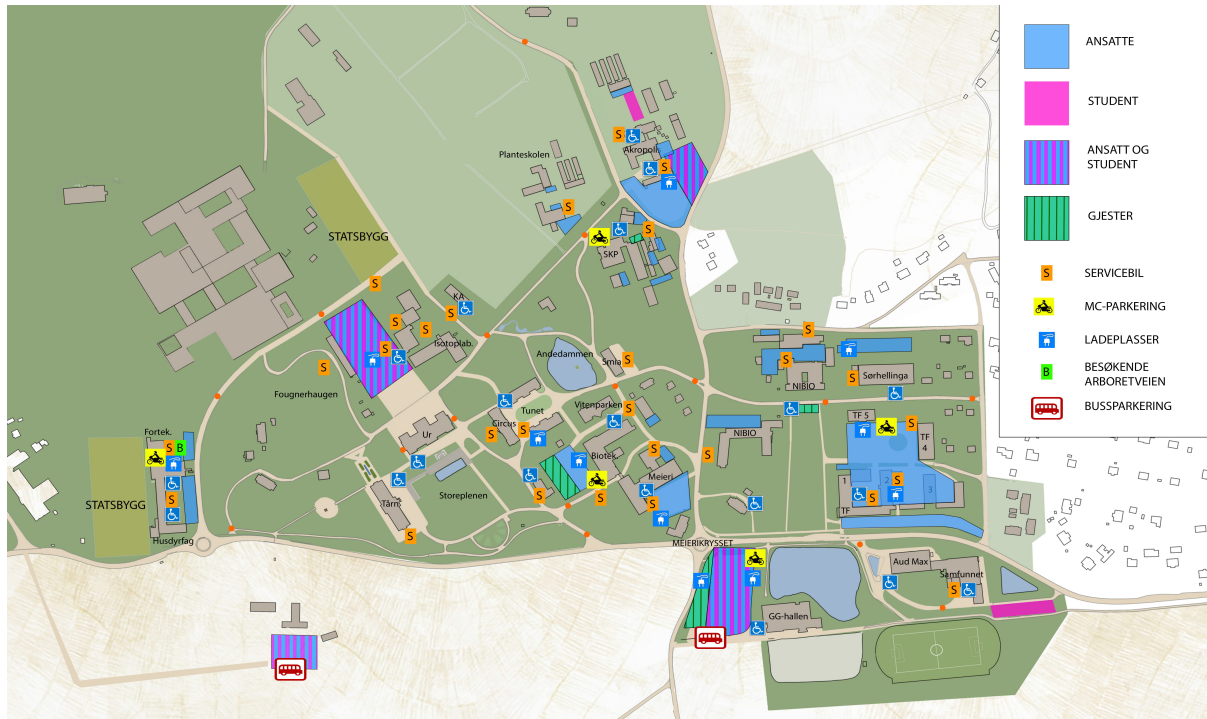
Figure 1.2: Traffic and Driving Route at NMBU in Ås

In addition, Figure 1.2 shows that routes joining the parking lots do not follow the shortest distances, which further aggravates the search time problem. Failing to find a vacant parking space on the first lot could lead to substantial time going to another parking lot.

Moreover, NMBU does not have communication mechanism that keeps potential parkers up to date about the parking status in real time. Therefore, there always exist uncertainties on whether the parking lots have the free space or not. This further raises the uncertainties in the search drive process as well, because of which the parker may end up cruising their car in any parking point. However, the trouble does not end here. When the search drive takes the drivers far away from their regular work building, there could be additional time loss due to two ways walking from the parking lot to the work point and the work point to the parking lot. Finally, the frustration of long search drive might lead them to the illegal parking spaces reserved for guests, disabled, or service cars.

Anticipating that the dispersed parking lots and the long drives between the lots can increase the search drive significantly; the parker may prefer to wait for the parking space until somebody else leaves. However, there always exists the large general uncertainties in the waiting time (Shoup, 2006). The same uncertainties pertain regarding NMBU parking. Moreover, this option will not be time feasible during the office hours for the majority of staff and class hours for several students. Considering these all situations, it is reasonable to expect that the search drive will become sensitive issue at the Ås campus. In turn, air pollution, climate gas emission, and costs of driving also increase (Shoup, 2006).

With this regard, this research seeks to provide a knowledge base for more informed decisions on how to allocate the scarce parking space at the Ås campus in future. For that, the parking

allocation principles and practices were first reviewed to identify some allocations, which is relevant and applicable to the future-parking situation of NMBU.

1.2.1 General Principles of Parking Allocation

Well-functioning parking principles should according to the University of Bristol guidelines (2014) adhere to the following principles:

1. Support the operational requirements of the university, and the vehicles required to carry out the university operations. These include (in no particular order) departmental vehicles, travel between university sites, users who need vehicles to carry out their work, visitors, contractors, deliveries and collections.

2. Prioritize disabled staff and students for parking service in the university; and facilitate the university's ability to meet any legal obligations.

3. As far as possible prioritize the spaces for those who access the higher opportunity travel costs to get to and from work. These alternatives also include those persons who take care responsibility (like drop children to school) and share their travel.

4. Aim to minimize the call on parking resource by providing the space for the alternative travel options and provide the technologies that will facilitate such alternative options.

    (University of Bristol, 2014)

1.2.2 University Specific Parking Allocation

For the university specific allocations, I reviewed the parking principles of six universities. First, Manchester Metropolitan University used priced-based and need-based criteria to allocate the university-parking permit among the staff and students. The university varied charges based on their level of income. For the need based-criteria, the university assessed their residential distance from the work place, the link of public transport from their resident, and other socio-

economic factors. The purpose of using these criteria was to ensure the fair and efficient allocation of parking resource among staff and students (Manchester Metropolitant University, 2009).

Second, Chapman University in California approached an auction mechanism to allocate the parking resources. For that, the parking spots scattered over the university arena were put in the categories premium and non-premium spots- based on their relative distance from the center of the university. The university charged the base-rate for the non-premium spots (farthest and more inconvenient) while the allocation of parking service in the premium spots followed the decreasing price auction. The students and staff who showed the higher WTP would be eligible for the parking place in the premium category. When the number of bids matches the number of parking spots, the market clears, and those whose bids lie above or equal to the market-clearing price would reserve their parking spot for the given time. Those students and staff who were not willing the to pay higher fees could approach the non-premium category or wait until the price in the premium category would drop down (Ghosh, 2012).

Third, University of Bradford in the United Kingdom used fee based-parking permit to allocate the university parking among the staff, students and visitors. However, the parking permits were free to the disabled. Those students who live closer than two kilometer to the campus were allocated very few and the conditional permits (for example, to the temporary or the permanent disabled student) compared to those who live further away than two kilometer. The staff and students who applied earlier for the permits were given priority, but permits were restricted to the number that could cover the operational and improvement cost of parking. In case, the demand for permits exceeds the available parking capacity, then the need-based approach was used to manage the excessive demand (University of Bradford, n.d.).

Fourth, the Austrian Catholic University applied paid and unpaid approaches to allocate the university parking scattered over the different colleges. The university used the paid and reserved parking approaches in the urban colleges while parking lots around the regional and the non-urban colleges were set unreserved and free of charge for the students and staff. The disabled staff, visitors, and students were freely allocated the parking space over all colleges (ACU, 2017).

Fifth, Oxford Brookes University in the United Kingdom truncated the staff and students from the parking right in the university based on their geographical distribution from the center of university. The objectives of this was to get the parking allocation that supports and ensures the parking place for the most needed person, the reduction on dependency of private car use and the use of the sustainable alternative options. The students and staff residing inside the circle of (two-three) kilometer radius from the center of university were not assigned parking spaces. Those who reside outside this circle were entitled the parking permit with the annual fee. The permit holders paid a daily parking fee in the peak hours, and the daily fee was set based on their level of salary. However, the permit holders were not guaranteed for the parking places (OBU, 2016).

Sixth, the University of Glasgow, considering ineffective old parking polices and ongoing high demand of parking; is approaching a new police based on the following eight principles.

1. Fairness

   Possible Criteria

   - Disability

   - Business Need

   - Alternative Travel Options

- Exceptional Circumstances

- Caring Responsibility

2. Annual Renewal of Permit

3. Realistic Charge

   Use of permit fee to incentivize the use of public transport

4. Eligibility of Student

   The student with exceptional circumstances like temporary mobility or disabled

5. Facilitating Irregular Car Usage

   More use of public mode and occasional use of private mode

6. Encouraging Alternative Means of Transport

7. Enforcement

8. Courtesy and Ease of Use

   (University of Glasgow, 2017)

It is worth noting that all these six universities are located in urban areas. That makes them a bit different from the Ås campus of NMBU, which is located some distance outside the city center, possibly with less frequent public transportation possibilities and longer travel distances for a larger share of the potential users of parking.

1.2.3 Selection of Parking Allocation and Research Questions

Based on the above reviews and the discussions with the thesis advisor, the following three possible allocation principles for the parking were selected:

1. Guaranteed parking to staff members

2. Prohibited parking to those who reside closer than three kilometer (3km) to campus

3. Parking allocation based on WTP for parking

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With regard to the first allocation, the guaranteed staff parking is fairly acceptable to the majority of the staff. This allocation mechanism is consistent the university trying to hold and attract important staff members. Since the staff and students share some parking spots at the Ås campus, it can also reduce the congestion and its side effects. However, parking only for staff may be unacceptable to several students and the effect may appear as the lower students' enrollment rate at NMBU.

With regard to the second allocation, the prohibited parking to those residing closer than three kilometer from the Ås campus (group I) is fairly acceptable to those who reside further way from three kilometer (group II). In term of the residential distance and the feasibility of other modes of transport (walking and cycling), it is reasonable to reserve the parking to the group II and prohibit the parking to the group I. In turn, it also reduces the congestion and its side effects. However, the feasibility of walking and cycling in Norway is seasonal. Especially in the winter season, it is risky and difficult to approach these modes even for shorter distance.

With regard to the third allocation, the parking fee can induce several desirable effects as follows:

1. Those who reside closer to the Ås campus may find alternative mode of transport (walk or cycle) more feasible and economical than to drive and park at the Ås campus. Therefore, it is more likely that they prefer alternative transports to the private drive to visit the Ås campus NMBU. In turn, this will reduce the congestion and its side effects.

2. Those who enjoy the better possibilities of public transport from their residence to the Ås campus may find the public transport journey more economical than to drive and park at the Ås campus. Therefore, it is more likely that they prefer the public transport to the private drive to visit the Ås campus. This, in turn, will reduce the congestion and side

effects. However, this allocation principle may be unacceptable to several staff members and students, as they have been using the on-campus parking free of charge.

Despite these attractive features of each allocation, it does not mean that all allocation principles will help to limit the congestion adequately in future so that its side effects become virtually non-issue at the Ås campus. Therefore, this study has used the following research questions to investigate the effectiveness of these principles for the congestion management.

- *Which of the three allocation principles: guaranteed parking to staff members, prohibited parking to those who reside closer than three kilometer from the Ås campus, and the parking allocation based on WTP, will limit the parking congestion so that its side effects: excessive search drive, more carbon emission and higher cost of driving, is virtually a non-issue at the Ås campus?*

- *Which parking fee structure is relevant to limit the parking congestion so that its side effects: excessive search drive, more carbon emission and higher cost of driving, is virtually a non-issue at the Ås campus?*

1.3 Thesis Outline

The rest of the paper includes the following chapters: Research Methodology, Results, Findings and Discussion, and Conclusion and Final Remark.

2   Chapter II: Research Methodology

This chapter includes four sections: Research Design, Data Collection Method, Relevant Response Rate and Data Analysis Tool.

2.1   Research Design

The state preference (SP)-based survey design was approached as research design for this study. I chose this design to frame the following needs of this study.

- Hypothetical questions and scenarios

- Attitudinal questions related to the issue raised in this research

- Questions related to the individual travel and parking choice behavior

- Questions related to the individual socio-economical characteristics

- Questions related to the individual WTP to pay and WTP to accept the fee

Under the above framework, separate sections were used in the survey questionnaire to address the following issues.

1. Objective of Survey

2. Location of Campus relative to residence

3. Travel Mode

4. Travel Time

5. Travel and Parking Attributes

6. Your View on Search Time for Parking

7. Your Preferences for Solving the Parking Issues at the Ås Campus

8. Some follow-up questions about you

The survey questionnaire presented in the appendix section provides the further details about the titles and questions used in each of the above sections.

2.2   Data Collection Method

Data were collected through a web based survey questionnaire that was sent to all NMBU staff and students. NMBU does not allow mass email campaigns unless this is relevant for the university, its students or staff. My advisor therefore contacted the university administration to administer the emails, which they did. Two separate links for English and Norwegian versions of questionnaire were prepared using Google web-based form (Also known as Google form). Google provides this form free of charge.

The survey instrument was designed and updated based on suggestions and discussions with the thesis advisor. The guidelines provided by Pearce, Özdemiroğlu, Great Britain, & Department for Transport (2002) for contingent valuation method was also referred for the structural validation of instrument. In addition, the questionnaires were also sent to some selected professors at NMBU for further validation of instrument. Finally, the thesis advisor reviewed, refined and translated it to Norwegian. The central administration emailed the links of both forms in 16th May 2018. A reminder mail was sent one week later.

2.3   Relevant Response Rate

A study on parking is more relevant for those who drive to the campuses than those who use other modes of transport. I therefore expected quite different response rates among those who drive to campus and those who do not. Still, I chose to have the survey sent to all students and staff as some may have chosen not to register their car and use guest parking which was free at the time of the survey. It turned out that the fraction of guest parking staff who responded was less than two percent (see Table 3.2).

The overall response rate for the students was 0.25 % (9 out of 3500 students). There are several possible explanations for this low response rate. First, the survey was sent out on May 16, just

before the start of the exam period due to some delays. Hence, I expect the students not to participate on the survey, but to focus on their exams. Second, with three years for a bachelor degree, and two years for a master degree, many students may have perceived the parking problem in 2019 as an issue of little relevance to them. Third, a large fraction of the students lives so close to the Ås campus that they do not drive, which again renders parking irrelevant to them.

The basic staff response rate was 37 % (629 of 1700). This is quite high. Still I argue that this is not the relevant response rate as many who do not drive to the Ås campus may perceive the parking problem as an irrelevant issue to them. To estimate the relevant response rate, it is therefore necessary to identify the population who drive to the Ås campus.

One relevant population for this purpose can be the population of those staff members who use the staff reserved parking under the staff registration (reference population). However, it is also possible that not all registered members (required population) prefer to use their registration (or do not drive to the campuses or do not use the staff parking). The problem to work with the required population in compared to the reference population is: it is more difficult to find the reference data for the required one. Therefore, I decided to use the reference population as the relevant population for the response rate. I also expected that the response rate from this population would not differ much from the required population as the survey shows that the required population covers the 95% of the relevant population.

However, NMBU has only the record of how many vehicles are registered, but not the record of how many staff members has registration. Also, note that it is not possible to make one to one correspondence (one vehicle = one staff registration) between the number of vehicle registration and the number of registered staff members as some staff members have registered more than

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one vehicle. Moreover, there are some other possibilities to make some reasonable guess to the staff registration. First, the survey shows that there is the fraction of members (around 15%) who do not have staff registration. This implies that this fraction must exist in the total staff population (1700) also. Therefore, the registered staff members should be less than 1700. Next, the current record of NMBU shows that there are around 1725 parking spaces at NMBU ((1380 at Ås + 345 at Adamstuen), which includes the parking space for staff, students, guest, disabled, free space and service car. Excluding the approximated space for the students (around 105), the rest shares around 1620 spaces and it goes even further down with the exclusion of spaces for disabled, guest and service cars. In this process, the space available for the staff remains around 1500. If we assume that NMBU might not accept more registration than its parking capacity, then it is reasonable to argue that the number of registered staff members (the relevant population) should lie below 1500.

There is however also another possibility. Note, that the current parking regulation at NMBU allocates 0.45 parking spaces per staff members at the Ås campus only. This means there are around 765 (0.45 times 1700) spaces for all types of staff members at NMBU. Excluding the spaces for disabled, guest and service car, the spaces available for the registered member becomes lower than 765. Therefore, if we assume that the registration stays below the available spaces, then number of registered members should lie below 765. However, the survey shows that there are 559 registered members and with this assumption, it is more likely that the size of registered sample is greater than the size of registered population. Also, note that around 1828 vehicles are registered at the Ås campus only. To have registration below 765, each registered staff should have registered two or more than two vehicles, which is also unlikely. Therefore, under these settings, it is reasonable to assume that the registered staff population can be greater

than 765 as well. Therefore, instead of assigning the single number to the population, I have set the following range. The response rates were estimated accordingly.

Case I: Lower Scenario

Staff Registration Range (the reference population) = (1200-1500)

Sample = 559

Expected Response rate = (37%-47%)

Case II: Upper Scenario

Staff Registration Range (the reference population) = (900 -1200)

Sample =559

Expected Response rate = (47% - 63%)

These cases show that if the reference population goes further down (<900), the response rate goes even further up. Also, recall that the required population is the subset of the reference population. Therefore, one can expect that the response rate with the required population can be as good as the response rate with the reference population.

2.4   Data Analysis Tool

The large section of the data analysis in this research uses the quantitative data. For that, the quantitative analysis was broadly categorized into the analysis of three types of variables: single variable analysis, bi-variable analysis and multi-variable analysis. For that, the following statistical tools were used.

Single –variable: One-way proportional table

Bi-variable: Two-way proportional table, two-way graph (line)

Multi-variable: Regression table

The Stata version 14 was used for all of the above analyses.

3 Chapter III: Results, Findings and Discussion

To identify the allocation, which will manage the parking congestion (parking demand less than or equal parking supply) and its side effects: excessive search drive, higher carbon emission and higher cost of driving, this study has purposed three principles of parking allocation:

1. Guaranteed parking to staff members

2. Prohibited parking for those residing closer than three kilometers from Ås campus, and

3. Parking allocation based on WTP.

This chapter analyses these principles of curtailing demand using the key results and findings from the survey. Clearance of the parking market at NMBU also hinges on the supply side. Before going into the detail on the demand side, I therefore present the current situation of parking supply and the description of relevant demand at the Ås campus.

3.1 Current Situation of Parking Supply at the Ås Campus

NMBU's parking map shows that there are around 1380 parking spaces in 2018 at the Ås campus, which includes 470 reserved parking spaces for staff, 24 spaces for disabled, 58 spaces for guest, and 804 free spaces. NMBUs' current regulation for parking arrangement at the Ås campus estimates that there are around 0.45 parking spaces per staff at the Ås campus. With this estimation, the required supply of parking spaces for 1700 staff should be around 765. However, the actual supply should be less than this figure as 1700 includes the staff members at Adamstuen as well. Excluding the supply to guest and disabled parkers, the supply to the rest of the staff goes even further down. Therefore, it is reasonable to assume that the current supply to staff can lie between the ranges of 500 to 700. For the rest of the analysis, these numbers are used as upper and lower thresholds of supply at the Ås campus.

3.2   Description of Relevant Demand

Recall that the parking demand situation at the Ås campus will be different when the faculty of Veterinary Medicine is going to move to the Ås campus in 2019[1]. The number of staff registrations could be one reference point to approximate the demand situation. The section 2.3 has already discussed some problems with this approach. Therefore, I have also used survey sample to approximate the demand scenario. For that, the staff population was classified into the following subpopulations:

1. Do not drive to the Ås campus

2. Drive to the Ås campus, but do not use the on-campus parking

3. Have staff registration, but do not use the on-campus parking

4. Have staff registration and use the on-campus parking (the relevant demand)

5. Guest parking users (relevant demand, but due to low response rate and the uncertainty it was dropped from analysis)

Table 3.1 presents the proportion of these subpopulations from both campuses with 95% confident interval. The confident interval and the standard error in the table were produced by bootstrapping the original sample (628) with 439 replications. The bootstrapping resamples the original sample with replacement, and uses same sample size to estimate bootstrap standard error and confident interval (Efron & Tibshirani, 1993).

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[1] *Several information regarding to NMBU were collected by either inquiring the concerned departments of NMBU or visiting the different sites of NMBU. For the web-based information, I recommend readers the following link: <https://www.nmbu.no/en>*

Table 3.1: Proportion of Staff Type by Parking Behavior in Two Campuses

Proportion estimation
Number of observations = 628
Replications   = 439

Type of Parking Behavior	Observed Proportion	Bootstrap Std.Err.	Normal - Based [95%Conf.	Interval]
Admastuen				
Do not drive to the Ås campus	.0079618	.0063893	.0016413	.0377019
Drive to the Ås campus, but do not use the on-campus parking	.0175159	.0053996	.009547	.0319223
Have staff registration, but do not use the on-campus parking	.0079618	.0044409	.0026591	.0235891
Have staff registration and use on-campus parking	.2117834	.016746	.1808165	.2464582
Guest parking users	.0031847	.0046204	.0001843	.0524713
Ås				
Do not drive to the Ås campus	.0573248	.0089279	.0421362	.0775453
Drive to the Ås campus, but do not use the on-campus parking	.0063694	.0032315	.0023509	.0171389
Have staff registration, but do not use the on-campus parking	.044586	.008698	.0303268	.0650995
Have staff registration and use the on-campus parking	.6257962	.0196945	.5864691	.6635289
Guest parking users	.0143312	.0044494	.0077811	.0262492

Note: One or more parameters could not be estimated in 61 bootstrap replicates; standard error estimates include only complete replications.

It is obvious that the parking demand depends on the number of on-campus parkers. In the classification list, either the subpopulation (4) or subpopulation (5) uses the on-campus parking. Table 3.1 shows that the proportion of this subpopulation (5) ranges from 59% to 66% of the total staff population at the Ås campus while it ranges from 18% to 24% at the Adamstuen campus. In aggregate, it ranges from 77% to 90% at NMBU. However, this range is slightly

different when the parking demands were aggregated to NMBU rather than to the individual campuses. Table 3.2 below provides the further details about it.

Table 3.2: Proportion of Staff Type by Parking Behavior at NMBU

Proportion estimation
Number of observation   = 628
Replications   = 446

Type of Parking Behavior	Observed Proportion	Bootstrap Std.Err.	Normal-based [95%Conf	Interval]
1.Do not drive to the Ås campus	.0652866	.0099349	.0483129	.0876744
2.Drive to the Ås campus, but do not use the on campus- parking	.0238854	.006328	.0141711	.0399885
3.Have staff registration, but do not use the on-campus parking	.0525478	.009246	.0371103	.0739141
4.Have staff registration and use the on-campus parking	.8375796	.015109	.8057533	.8650646
5.Guest parking users	.0175159	.0049817	.0100077	.0304837

Note: One or more parameters could not be estimated in 54 bootstrap replicates; standard-error estimates include only complete replications.

Table 3.2 shows that the proportion of this subpopulation ranges from 80% to 86% while it was from 77% to 90% in the previous table. With these ranges, one can say with 95% confidence level that the three or more than three out of four staff use the on-campus parking (or parking demand $\geq$ 1200), which is also consistent with the range assumed in the section 2.3. Therefore, I used this range as upper demand scenario for the rest of the analysis.

Here is also possibility of sample selection bias in the survey. I expect this bias due to following reasons:

- The survey is related to the parking issue at the Ås campus.

- Since the fraction of staff members (which is also visible in the tables) uses other modes transport, some of them may find the survey non-relevant.

- Since the fraction of staff members uses off-campus parking, most of them may find the survey non-relevant

This bias can weaken the reliability of the bootstrapped confident interval as the bootstrapping often seeks representative sample (original) for the consistent estimation (Efron & Tibshirani, 1993). Therefore, there is still uncertainty regarding the upper demand scenario, and it may be unwise to rely on the upper demand scenario only for the demand analysis.

Therefore, as discussed in the section 2.3, I also approached the following demand scenario.

Lower demand scenario = $900 \leq$ parking demand <1200

Based on these demand and supply thresholds, the benchmark demand reductions (that are necessary to manage the congestion and its side effects) were estimated. The each cell containing the percentage in Table 3.3 shows these benchmark reductions.

Table 3.3: Demand and Supply Scenario

		Demand	
		Low (900-1200)	High (>1200)
Supply	**Low (500)**	$\geq 45\%$	$\geq 59\%$
	High (700)	$\geq 23\%$	$\geq 42\%$

Table 3.3 shows that it requires 45% or more than 45% benchmark reduction when the supply stays at the low while it requires 23% or more than 23% of reduction when the supply stays at high.

Also, note that, for rest of my analysis, I only used sample from the subpopulation (4). Therefore, this sample should fairly represent the subpopulation (4).

3.3   Guaranteed Parking to Staff Members

The allocation of guaranteed parking to staff under current provision of parking allocation in NMBU demands the guaranteed parking for maximum 1700 staff at NMBU. However, only a fraction of this population uses the on-campus parking. Table 3.3 shows that the parking demand from this population either exceeds 1200 (upper demand scenario) or stays between 900 and 1200 (lower demand scenario). That means NMBU should provide 900 or more than 900 parking spaces to guarantee the parking spaces to these members. However, NMBU, as far as our supply threshold is true, can supply maximum 700 parking spaces to the staff members. This situation clearly indicates that the guaranteed parking to the staff members alone is not enough to manage the congestion and its side effects.

However, the members may arrive at different times in the working days and use the on-campus parking for the different durations. In this situation, the parking demand may fluctuate over the different parts of the day, and congestion may be non-issue during some parts of the day. To identify this fluctuation, I first examined the relation between the members' arrival time and their duration of parking. For that, their arrival time and duration of parking were decomposed as follows (see Table 3.4).

Table 3.4: Dummy for Arrival Time and Duration of Parking

Variable	Level	Dummy
Arrival Time	Arrive between 7:00 to 10:00	1
	Arrive at other hour than 7:00-10:00	0
Duration of parking	More than 4 hours per day	1
	Less than 4 hours per day	0

The logistic regression was used to identify the relation between these two variables. Table 3.5 presents the logistic regression's coefficients.

Table 3.5: Coefficients of Logistic Regression

Time of Arrival	Coef.	Bootstrap St.Err	t-value	p-value	Normal-based [95% Conf. Interval]	
Duration of parking per week	0.338	0.156	2.16	0.030	.0317787	.6434171
Constant	2.167	0.500	4.33	0.000	1.186299	3.146835

Table 3.5 shows that there is the association between their arrival time and duration of parking (p-value<0.005). The table also shows that the parking demand is more likely to remain uniform or increasing from 7:00 to the next four hours (at least). This implies that if the parking gets congested at 7:00, it is more likely that either the congestion remains same or increases gradually afterward.

However, these findings are still not enough to assess the effectiveness of guaranteed allocation during the different parts of day, as we still do not know the proportion of demand between 7:00-10:00. Therefore, I also examined the proportion of parking demand during this hour. Table 3.6 presents the observed proportion with the bootstrapped confident interval.

Table 3.6: Distribution of Parking Demand over Arrival Time and Duration of Parking

Proportion estimation
Number of Observations = 526
Replications   = 500

Arrival Time	Duration of Parking	Observed Proportion	Bootstrap Std.Err.	Normal-based [95%Conf. Interval]	
7:00-10:00	**>4hr**	.648289	.0213485	.6053998	.6889119
7:00-10:00	**≤ 4hr**	.256654	.0190829	.221064	.2957979
Different time		.095057	.0128179	.0727331	.1233217

Table 3.6 divides the aggregate demand into two time frames: 7:00-10:00 and different times than 7:00-10:00. The demand in the first time frame is around 90%. Therefore, the guaranteed

allocation cannot ensure the congestion free staff parking space during this time frame. However, there is only 10% of parking demand in the second time frame. This implies that it is possible to ensure the congestion free parking spaces during other parts of day. Since the parking congestion before and after the office hours is irrelevant to my investigation, it is reasonable to examine the parking demand after 10:00. For that, as discussed above, the duration of parking may be helpful. Table 3.6 also shows that around 64% of staff members arrive between 7:00 to 10:00 and continue to use the on-campus parking for equal or more than four hours. This implies that the guaranteed allocation could remain ineffective even after 10:00 for minimum one additional hour (except in low demand and high supply scenario as presented in Table 3.3).

3.4 Prohibited Parking to Those Who Reside Closer than Three Kilometer from the Ås Campus

Concerning to the second principle, I expected that several staff members reside closer than three kilometer from the Ås campus and the prohibited parking to them could be effective to reduce the parking congestion. However, the survey identifies that the majority of members (around 87% to 93%) reside further away than three kilometer. Table 3.7 provides the more details about the parking demand situation under the prohibition.

Table 3.7: Distribution of Parking Demand over Residential Distance Separated by Three Kilometer

Proportion estimation
Number of Observation = 526
Replications   = 426

Parking Demand	Observed Proportion	Bootstrap Std.Err.	[95% Conf.	Normal Based Interval]
Staff Registration (Residential distance ≤3km)	.0893536	.0128354	.0671872	.1179087
Staff Registration (Residential distance >3km)	.9068441	.0131347	.8777141	.9295916

Note that it requires 23% or more than 23% of demand reduction to manage the congestion under the low demand and high supply scenario (see Table 3.3). However, Table 3.7 shows that prohibiting those residing closer than three kilometer from campus can reduce 12% or less than 12% of the demand. This implies that prohibition is also not enough to manage the congestion and its side effects.

3.5   Parking Allocation Based on WTP

Concerning the third principle, one would expect that staff members could find it rational to pay a reasonable parking fee to secure parking in the desired parking lots rather than to suffer from congestion related problems: excessive search drive, more carbon emission, and higher cost of driving. Also, keep in mind that those who reside closer to the Ås campus or access better alternatives would rather prefer "not to drive". Since individual WTP has been the dominant choice for fee based parking allocation (Hasan-Basri, Abd Karim, & Bakar, 2015; Huang, Chiang, & Chen, 2014; SARGISSON, 2018), my study has also approached this method to identify the monthly parking fee structure that would cut the demand below the supply thresholds. For that, I decided to estimate the parking demand curve-based on the individual WTP for the monthly parking fee. For that, I adopted the idea of Deltas & Kordas (2004).

In my survey, I used ten different monthly fees in Norwegian Kroner (NOK): 50, 100, 150, 200, 250, 300, 350, 400, 450, and 500. Each respondent would randomly face one fee with binary choice: "yes" or "no". If the respondent's WTP were higher than the faced fee, they would normally say yes to this fee and want to use the on-campus parking at this fee. However, if their WTP were lower than this fee, they would respond "no" to this fee, and would not want to use

the on-campus parking at this fee. Therefore, I divided their binary decision (to the faced fee) as follows.

Parking Decision = 1 if the member decided to use the on-campus parking (or WTP ≥ the faced fee or say yes to the faced fee in the survey question)

Parking Decision = 0 If the member decided not use the on-campus parking (or WTP <the faced fee or say no to the faced fee in the survey question)[2]

There are several models (linear regression model, binary logistic (or probit) model, multinomial logistic (probit) model, order probit model, random utility model) to estimate the demand curve(Boardman, 2011; Pyddoke & Swärdh, 2017; Haab & McConnell, 2002). Each of these model demands different type of dependent variables for the demand estimation. For example, the linear regression often requires the continuous variable while the binary logistic regression requires the binary variable. Since the parking decision is binary, I selected the binary logistic function for the demand analysis as follows.

Equation 3.1: Logistic Function

$$P(\textbf{Parking Decision} = \textbf{1/X}) = \frac{e^{X\beta}}{1+e^{X\beta}} \text{------------I}$$

where X = matrix of covariates, β = vector of parameter and P = probability

Note that this function allows users to estimate the proportional demand after the estimation of parameter(Wooldridge, 2015; Haab & McConnell, 2002; Ben-Akiva & Bierlaire, 1999). Several studies have used the maximum likelihood method to estimate the parameter (Cameron & Huppert, 1989; Alberini, 1993; Wooldridge, 2015; Haab & McConnell, 2002). In this case, I

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[2] *Haab & McConnell (2002) includes the details description about the use of binary model for dichotomous choice question. Only the relevant sections were presented here.*

expected that this function would allow me to estimate the proportion of those staff members who are more likely to use the on-campus parking.

Regarding to the choice of covariates (or independent variables), I decided to work on single important covariate to keep the analysis fairly simple and straight. Since several cited papers used either price or fee for the demand analysis (Bruner, Kessy, Mnaya, Wakibara, & Maldonado, 2015; Huang et al., 2014; Bruner et al., 2015), I selected the monthly parking fee (or the faced fee) for this purpose. However, I also observed later that more than 50% of respondents faced NOK150 to respond. I expected this situation (skew distribution of respondents over fees) due to following situations. As discussed above, the survey used ten different fees. To ensure randomness in the fee selection, each fee was randomly assigned to a number as follows:

Table 3.8: Bid Assignment

Fee (in NOK)	Assigned Number
50	9
100	10
150	1
200	6
250	8
300	2
350	3
400	4
450	5
500	7

The fee is visible to the respondent after they select a number from the assigned number in Table 3.8. Since this table also includes "one" and they did not know what comes up after this selection, the majority of them might have anchored "one" for precaution. Therefore, to reduce the effect of this anchoring bias, I also defined the correction dummy as follows.

Correction dummy = 0 If the respondent faced 150 to respond

Correction dummy = 1 if the respondent faced fee different from 150.

Table 3.9 presents the results from the logistic regression. The regression used the original sample to estimate the coefficients in the first column (the observed coefficients) while the 95% confidence intervals for the each observed coefficient were produced by bootstrapping the original sample with 500 replications.

Table 3.9: Coefficients of Logistic Regression

Parking Decision	Observed Coef.	Bootstrap St.Err	Z	P>|Z|	Normal-based [95% Conf. Interval]	
Monthly Parking Fee (NOK)	-0.003	0.001	-3.51	0.000	-.004844	-.0013754
Correction Dummy	0.948	0.234	4.05	0.000	.489144	1.407462
Constant	-0.075	0.191	-0.39	0.696	-.4497361	.3003861

Mean dependent var.	0.435	**SD dependent var.**	0.496
Pseudo r-squared	0.028	**Number of Obs.**	524.000
Chi-square	18.088	**Prob > chi2**	0.000
Akaike crit. (AIC)	703.451	**Bayesian crit. (BIC)**	716.236

*** p<0.01, ** p<0.05, * p<0.1

Table 3.9 shows that the fee and the correction dummy are significant while the constant term is insignificant. Moreover, the negative and significant coefficient of the fee implies that the relation of fee with the parking demand is correctly identified. Therefore, I only selected the significant variables for the following demand equations.

Equation 3.2: The demand and inverse demand equations– using the coefficients from the lower bound column of 95% confident interval

$$\mathbf{P(Parking\ Decision = 1/x)} = \frac{e^{0.24 - 0.005 \times monthlyfee}}{1 + e^{0.24 - 0.005 \times monthlyfee}} \text{------------1.a}$$

$$\mathbf{monthlyfee} = \frac{1}{0.005} \times \left(0.24 - \log\frac{P}{1-P}\right) \text{---------------1.b}$$

Equation 3.3: The demand and inverse demand equations –using the coefficients from the observed coefficient column

$$\mathbf{P(Parking\ Decision = 1/x)} = \frac{e^{0.47 - 0.003 \times monthlyfee}}{1 + e^{0.47 - 0.003 \times monthlyfee}} \text{--------------2.a}$$

$$\textbf{monthlyfee} = \frac{1}{0.003} \times \left(0.47 - \log\frac{P}{1-P}\right) \ldots\ldots\ldots\ldots 2.b$$

Equation 3.4: The demand and inverse demand equations – using the coefficients from the upper bound column of 95% confidence interval

$$\textbf{P(Parking Decision} = 1/x) = \frac{e^{0.7-0.0013\times monthlyfee}}{1+e^{0.7-0.0013\times monthlyfee}} \text{----------------}3.a$$

$$\textbf{monthlyfee} = \frac{1}{0.0013} \times \left(0.7 - \log\frac{P}{1-P}\right)\text{--------------}3.b$$

Three demand curves (blue, red, and green curves in Figure3.1, 3.2, and 3.3) presented in the next three Sections (3.5.1, 3.5.2 and 3.5.3) were derived from the equations 1.b, 2.b and 3.b respectively. For that, each of these equations has used the real values between 0 and 1 as the values of P to produce the demand curves.

For notational simplicity, I renamed them lower, observed [3] and upper demand curves respectively. Also, note the bootstrapped confident interval allows the decision maker (here: the parking authority at NMBU) to make consistent and valid inferences from the sample to the population when the sample is representative. Therefore, I also expected that all the findings and discussion presented in the next section are 95% valid to the population (refer to Section 3.2 for the more details about the population).

3.5.1 Fee Based Parking Allocation: Scenario I (High Supply, High Demand)

This scenario requires 42% or more than 42% of demand reduction to manage the congestion (see Table 3.3). For this, the parking demand should stay to the right side of the red vertical dash line (supply cap=58%) in Figure 3.1.

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[3] *Note that a word "Observed" is used here to refer the demand curve estimated by using the original sample.*

Figure 3.1: Parking Demand: Scenario I (High Supply, High Demand)

Parking Demand in the Ås Campus
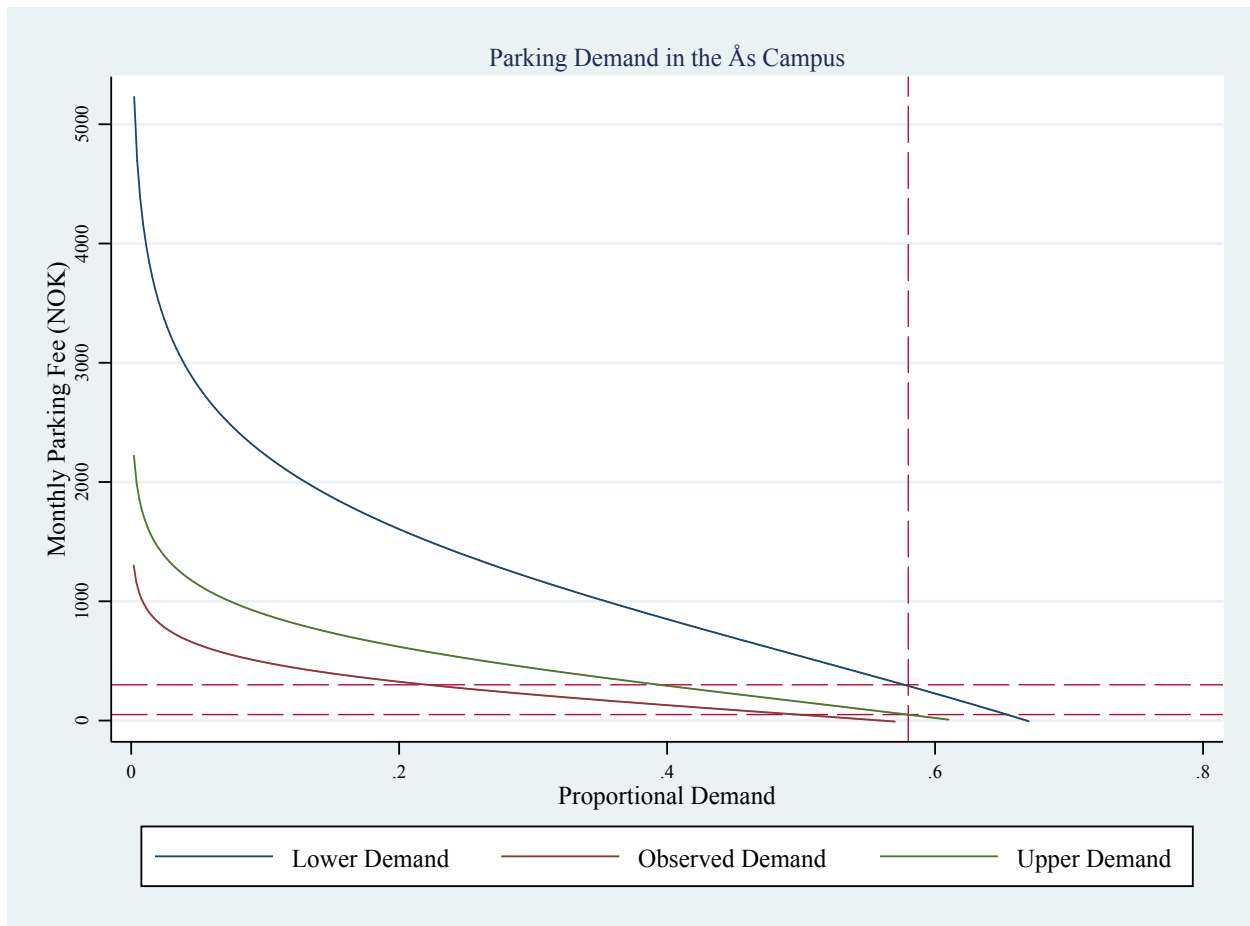
Since the true demand curve can be blue, red or any curve between them (see Figure 3.1), the effectiveness of a fee-based allocation has been discussed in the each case.

Case I: If the blue line represents the true demand, then the idea of fee-based allocation becomes irrelevant, but the congestion management is still possible with the positive fee.

Case II: If the red line represents the true demand, then the monthly parking fee should be NOK300 or more than NOK 300 to manage the congestion.

Case III: There could be infinitely many demand curves between the blue and the green demand curves. Therefore, I just used the observed demand (red line) in the third case. In the next two Sections (3.2 and 3.3) as well, I referred the same red line in the third case. If this red line

represents the true demand, then the parking fee should be at around NOK 50 to manage the congestion.

In this scenario, I assumed that 1200 or more than 1200 staff members demand the on-campus parking. Therefore, if the maximum demand stays at 1200, we can say with 95% confident that the fee range between NOK1-NOK300 can be applicable to reduce the parking demand.

3.5.2   Fee Based Parking Allocation: Scenario II (Low Supply, High Demand)

This scenario requires 59% or more than 59% of demand reduction to manage the congestion (see Table 3.3). For this, the parking demand should stay to the right side of red vertical dash line (supply cap = 41%).

Figure 3.2: Parking Demand: Scenario II (Low Supply, High Demand)
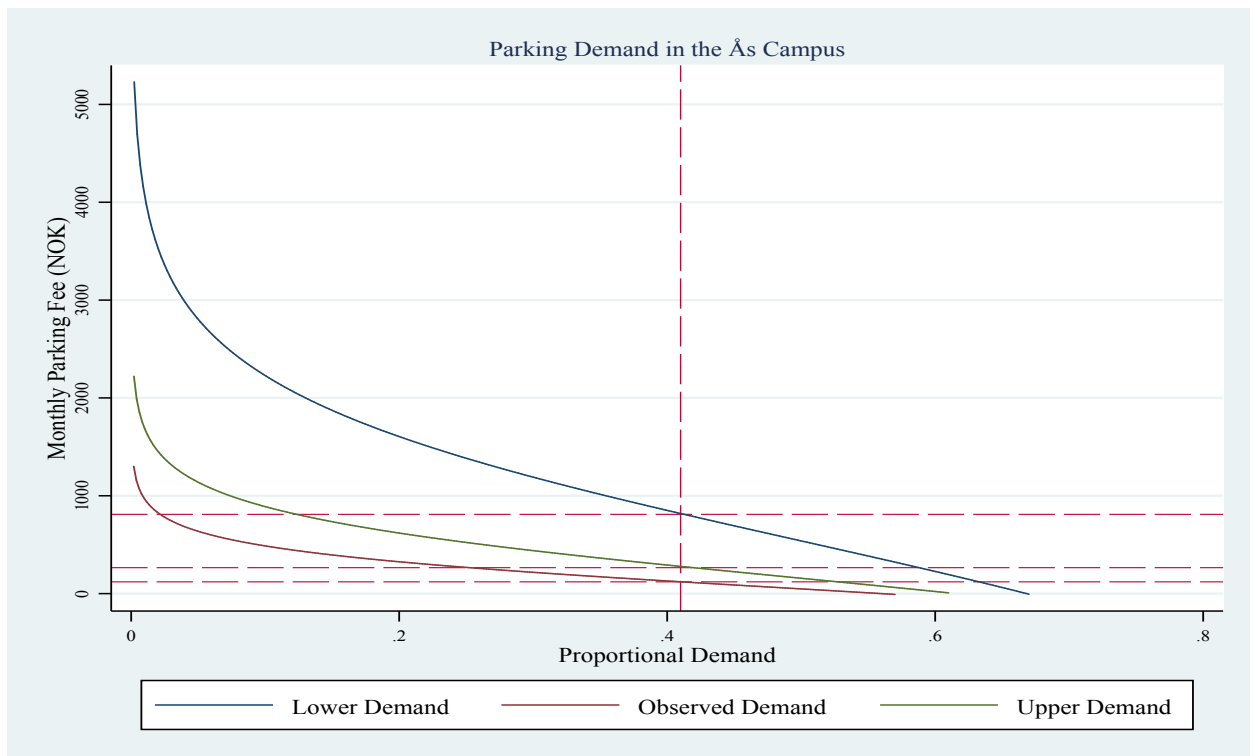
Case I: The required monthly fee to manage the congestion should be NOK120 or more than NOK 120.

Case II: The required monthly fee to manage the congestion should be NOK810 or more than NOK 810.

Case III: The required monthly fee to manage the congestion should be around NOK 265.

In this scenario, I assumed that 1200 or more than 1200 staff members use the on-campus the parking. If the maximum demand stays at 1200, then the monthly fee range between NOK120-NOK810 can be applicable to manage the congestion and its side effects.

3.5.3   Fee Based Parking Allocation: Scenario III (Low Supply, Low Demand)

This scenario requires 45% or more than 45% of demand reduction to manage the congestion (see Table 3.3). For that, the parking demand should stay to the right side of the first red vertical dash line (supply cap = 55%).

Figure 3.3: Parking Demand: Scenario III (Low Supply, Low Demand)

Case I: The required parking fee to manage congestion should be positive.

Case II: The required parking fee to manage the congestion should be NOK395 or more than NOK 395.

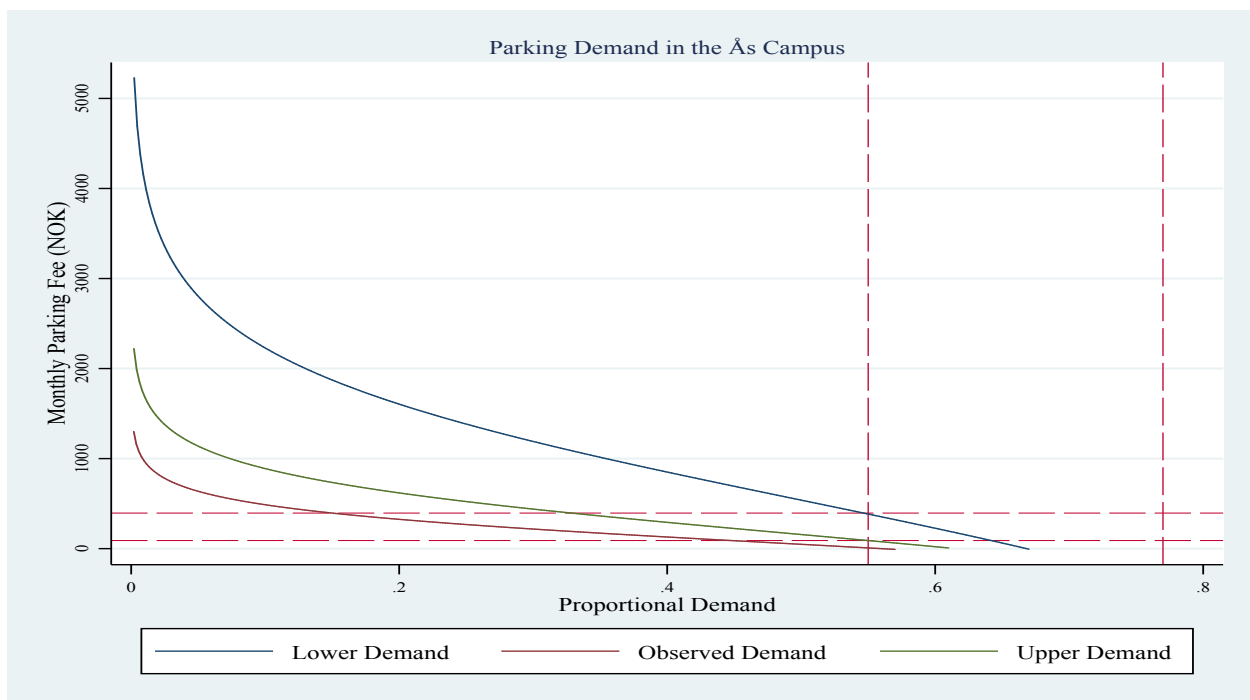**Case II:** The required parking fee to manage the congestion should be around NOK 90.

In this scenario, I assumed that 900 or more than 900 staff members use the on-campus the parking. If this number stays at 900, then the monthly fee range between NOK1-NOK395 can be applicable to manage the congestion and its side effects.

Figure 3.3 also presents the possibility of fee-based allocation in the low demand and high supply scenario (see Table 3.3). In this case, the demand should stay to the right of the second red vertical dash line (supply cap = 77%). However, Figure 3.3 shows that the all demand curves are already to the right side of this line. As there are sufficient staff parking spaces without fee, the fee is irrelevant in this scenario.

In overall, these findings from Sections 3.3.1, 3.5.2, and 3.5.3 shows that the fee based allocation can be a relevant and effective option to manage the congestion and its side effects. For this purpose, the required fee structure can be either NOK50 or NOK 810 or any fees between NOK50 and NOK810 when the maximum demand does not exceed 1200. Note that these fee ranges only regulate the congestion when the demand is effective (or a fee is relevant).

4 Chapter IV: Conclusion and Closing Remarks

The parking congestion (and its side effects: excessive search drive, more carbon emission, and higher cost of driving) is expected to become bigger issue at the Ås campus when the Veterinary Medicine is going to move to the Ås campus in 2019. Therefore, to provide a knowledge base for more informed decisions on how to allocate the scarce parking space at the Ås campus in future, this research investigated follows:

- *Which of the three principles: guaranteed parking to staff members, prohibited parking to those who reside closer than three kilometer from the Ås campus, and the parking allocation based on WTP, will limit the parking congestion so that its side effects: excessive search drive, more carbon emission and higher cost of driving, is virtually a non-issue at the Ås campus?*

- *Which parking fee structure is relevant to limit the parking congestion so that its side effects: excessive search drive, more carbon emission and higher cost of driving, is virtually a non-issue at the Ås campus?*

My findings show that the congestion reduction from guaranteed parking to staff is not enough to limit the congestion and its side effects to the desired level (virtually zero side effects). Though the prohibited parking to those who reside closer than three kilometer from the Ås campus can reduce some fraction of the congestion, the reduction is also not large enough to limit the congestion and its side effects to the desired level. However, the fee based allocation shows the possibility of adequate reductions in the effective demand that can ensure the parking spaces to the fee payers (or limit the congestion to the desired level). For this purpose, the relevant fee structure can range from NOK50 to NOK 810 per month.

Therefore, as far as NMBU are concerned about the allocation of scare parking resource and the parking congestion management in future, the fee based allocation can be one relevant and effective option. Given that NMBU is also approaching the tighter parking allocation in 2018 and afterward (0.45 parking spaces /staff in 2018 and 0.3 parking spaces/staff in 2025), this allocation can be one complementary option to achieve these targets in future.

In addition to these three principles, there could be other allocations principles that could be relevant to the parking situation of the Ås campus in future. However, I would also like to include the following allocations for the further investigation if I will have opportunity to re-investigate this issue again.

1. The reserved parking to the car pool drive

2. The reserved parking to those who has child care responsibility

3. The prohibited parking to those who access the better public transport facility from their resident to the Ås campus

Note that after the completion of Follo train tunnel joining Oslo to Ås, the two way train travel time between Oslo and Ås will become shorter than today. Therefore, I expect that the third allocation will be more relevant for the parking allocation in future. For that, I would like to use the discrete choice based experimental design (discrete choices of the above principles) to identify the acceptable and effective allocations.

Finally, I mention some issues that I have relaxed in this research, but would like to suggest for the further investigation.

1. How does the congestion in the parking spaces reserved for the staff impact on the number of staff registration in future?

2. Does the congestion in the parking spaces reserved for the staff increase the illegal parking practices?

The lower registration and higher illegal parking practices are also possible when the parking allocations (for example fee based allocation) are applied. Therefore, it is also interesting to investigate these issues (1 and 2) under the different parking allocations as well.

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6 Appendix

Survey regarding NMBU on-campus parking
* Required

Objective of Survey

Students and staff are experiencing difficulties finding parking space at the Ås campus of the Norwegian University of Life Science (NMBU) during peak parking times. These difficulties are expected to increase when faculty and students from the Adamstua campus of NMBU move to Ås. NMBU are not allowed to increase the number of parking spots due to national and county regulations which will limit parking space further.

As a consequence of the externally set rules and changes in parking demand, students and staff are expected to spend additional time (travel time loss) to search for available parking space at the Ås campus. In some cases, one may even be unable to find a vacant parking spot on the university premises.

The future search times for vacant parking are uncertain, but they are expected to increase. This will lead to more time wasted, higher fuel costs for car drivers, and increased climate gas emissions. At this stage the university administration is uncertain how to deal with these issues.

This study seeks to provide insights on how to deal with these issues in ways that are the least disagreeable for staff and students by investigating staff and student travel patterns and preferences for traveling and campus parking.

This study is part of a masters thesis project at the School of Economics and Business at NMBU. The main research questions of this survey have been approved by the university management, while the detailed questions in the survey and the survey design have been formulated by the master student with assistance of the thesis advisor, Eirik Romstad. If you have any questions regarding this survey, please do not hesitate to contact the thesis advisor Eirik Romstad (eirik.romstad@nmbu.no).

The expected time to complete the survey is about 5 minutes. Individual responses to the survey are anonymous, and it is not possible for the student or the advisor to identify individual respondents.

Your participation will improve the basis for which future decisions on parking congestion at the Ås campus will be dealt with, and will be most helpful for a successful completion of the student's masters thesis. In advance, thanks for your cooperation.

1. Location of Campus

1. **Where do you currently study or work?** *
   Mark only one oval.

   ( ) Ås   **Skip to question 2.**

   ( ) Adamstuen   **Skip to question 3.**

2. Travel Mode

2. **How do you travel to Ås campus? (Multiple choices are possible)**
   Check all that apply.

   ☐ Car

   ☐ Public Transport

   ☐ Bicycle

   ☐ Foot

Skip to question 4.

2.Travel Mode

3. **How do you expect to travel to Ås campus of NMBU in/after 2019? (Multiple choices are possible)**
   Check all that apply.

   ☐ Car

   ☐ Public Transport

   ☐ Bicycle

   ☐ Foot

Skip to question 37.

3.Travel Time
3.1 Specify the one way travel time in minutes for each of the choices below (if highly uncertain or irrelevant, round to closest 100 minutes)

4. **Car**

   _____

5. **Public Transport**

   _____

6. **Cycle**

   _____

7. **Foot**

   _____

Skip to question 8.

4. Travel and Parking Attributes

8. **4.1 What kind of parking arrangement do you currently have for parking at the Ås campus?**
Mark only one oval.

( ) I have registered my car, and are allowed to park in staff/student parking spaces.

( ) I park in the guest parking spaces.

( ) I do not park in campus parking lots.

9. **4.2 Which option is valid in your case?**
Mark only one oval.

( ) The distance from my residence to the Ås campus is greater than 3 km.

( ) The distance from my residence to the Ås campus is less than or equal to 3 km.

10. **4.3 When do you normally arrive at the Ås campus?**

_____

11. **4.4 How many hours do you park at the Ås campus in an ordinary work/study week?**
Mark only one oval.

( ) 0-5

( ) 5-10

( ) 10-15

( ) 15-20

( ) more than 20

12. **4.5 Which of the following options best describe your driving situation?**
Mark only one oval.

( ) I drive alone from my residence to the Ås campus

( ) I drive with my family (example children) and drop them off on my way to the Ås campus

( ) I drive with colleagues or fellow students to the Ås campus

( ) None of the above alternatives

13. **4.6 How do you rate the quality of public transport from your residence to the Ås campus?**
Mark only one oval.

	1	2	3	4	5	6	
Extremely Bad	( )	( )	( )	( )	( )	( )	Extremely Good

Skip to question 20.

4.Travel and Parking Attributes

14. **4.1 What kind of parking arrangement do you currently have for parking at the Adamstuen campus?**

Mark only one oval.

- ( ) I have registered my car, and are allowed to park in staff/student parking spaces.
- ( ) I park in the guest parking spaces.
- ( ) I do not park in campus parking lots.

15. **4.2 Which option is valid in your case?**

Mark only one oval.

- ( ) The distance from my residence to the Ås campus is greater than 3 km.
- ( ) The distance from my residence to the Ås campus is less than or equal to 3 km.

16. **4.3 When would you normally expect to arrive to the Ås campus after the move from Adamstua?**

_____

17. **4.4 How many hours do you expect to park at the Ås campus in an ordinary work or study week?**

Mark only one oval.

- ( ) 0-5
- ( ) 5-10
- ( ) 10-15
- ( ) 15-20
- ( ) more than 20

18. **4.5 Which of the following options will best describe your future driving situation?**

Mark only one oval.

- ( ) I expect to drive alone from my residence to the Ås campus
- ( ) I expect to drive with my family (example children) and drop them off on my way to the Ås campus
- ( ) I expect to drive with colleagues or fellow students to the Ås campus
- ( ) None of the above alternatives

19. **4.6 How do you rate the quality of public transport from your residence to the Ås campus?**

Mark only one oval.

	1	2	3	4	5	6	
Extremely Bad	( )	( )	( )	( )	( )	( )	Extremely Good

5. Your view on search time for parking

20. **5.1 What is the maximum time acceptable to you to spend looking for a parking space? (in minutes)**

_____

21. **5.2 Suppose a driver spends 10 minutes extra looking for a vacant parking spot. What do you see as the main problems with this? (Choose one option for each row)**
    Mark only one oval per row.

	Increased Carbon Emission	Increased Fuel Use and Cost to Driver	10 Minutes of Time Loss	Other
First Important Problem	◯	◯	◯	◯
Second Important Problem	◯	◯	◯	◯
Third Important Problem	◯	◯	◯	◯

6. Your preferences for solving the parking issues at the Ås campus

6.1 Scenario description

The parking situation at the Ås campus is likely to become more difficult, resulting in more time than today spent searching for a vacant parking spot. In some cases one may not even find a vacant spot. All of the following questions on your preferences for measures to reduce the time spent searching for a vacant parking spot does not include persons with disabilities, who still are guaranteed reserved parking

22. **6.1.2 Which of the following alternatives do you prefer?**
    Mark only one oval.

    ◯ Prohibited parking for those living closer to campus than 3 km

    ◯ Parking priority for faculty and staff members at the university

23. **6.1.3 For you to prefer fee parking over the two alternatives listed above, what is an acceptable daily parking fee?**

_____

6.2 Willingness-to-pay for on campus parking

The random number you pick below is used to differentiate some options in a few of the following questions

24. **6.2.1 Choose one number randomly**

   Mark only one oval.

   - ( ) 9   **Skip to question 34.**
   - ( ) 3   **Skip to question 28.**
   - ( ) 6   **Skip to question 31.**
   - ( ) 1   **Skip to question 26.**
   - ( ) 4   **Skip to question 29.**
   - ( ) 5   **Skip to question 30.**
   - ( ) 2   **Skip to question 27.**
   - ( ) 8   **Skip to question 33.**
   - ( ) 10   **Skip to question 25.**
   - ( ) 7   **Skip to question 32.**

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

25. **6.2.2 Would you be willing to pay NOK 100/Month to guarantee a parking spot at the Ås campus with less search time than 2 minutes ?**

   Mark only one oval.

   - ( ) Yes
   - ( ) No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

26. **6.2.2 Would you be willing to pay NOK 150/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

   Mark only one oval.

   - ( ) Yes
   - ( ) No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

27. **6.2.2 Would you be willing to pay NOK 300/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

   Mark only one oval.

   ◯ Yes

   ◯ No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

28. **6.2.2 Would you be willingness to pay NOK 350/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

   Mark only one oval.

   ◯ Yes

   ◯ No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

29. **6.2.2 Would you be willingness to pay NOK 400/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

   Mark only one oval.

   ◯ Yes

   ◯ No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

30. **6.2.2 Would you be willingness to pay NOK 450/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

   Mark only one oval.

   ◯ Yes

   ◯ No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

31. **6.2.2 Would you be willingness to pay NOK 200/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

Mark only one oval.

◯ Yes

◯ No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

32. **6.2.2 Would you be willingness to pay NOK 500/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

Mark only one oval.

◯ Yes

◯ No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

33. **6.2.2 Would you be willingness to pay NOK 250/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

Mark only one oval.

◯ Yes

◯ No

Skip to question 35.

6.2 Willingness-to-pay for on campus parking

Introducing fee parking implies that there also is a fee for guest parking. Invited visitors get a "free parking" voucher they can put in their car so they do not need to buy a daily parking ticket. Suppose that the daily parking fee is sufficiently high that it is cheaper to buy a monthly permit for anyone using faculty/staff/student parking spaces more than five days per month.

34. **6.2.2 Would you be willingness to pay NOK 50/Month to guarantee parking spot at the Ås campus with less search time than 2 minutes ?**

Mark only one oval.

◯ Yes

◯ No

6.3 Willingness-to-pay for campus parking (2)

N+1 price auctions are used to determine who will get one of N equal goods, for example parking spots. Suppose there are 5 parking spots for sale, and more than 5 persons wanting these parking spots. Those interested in the parking spots hand in their written bid in a sealed envelope. At the time the auction ends, the envelopes are opened, and the 5 persons with the highest bids each gets one of the five parking spots. To steer clear of envy and unequal treatment of these 5 persons, the all pay the same price which is the size of the highest non-winning bid, in this case the 6th (N+1) ranked bid. Those with non-winning bids pay nothing and get no parking spot.

Suppose Anna, Bill, Cecilia and David all bid for one of the 5 parking spots. Anna bids US $ 22, and Bill US $ 20. Both these bids are among the 5 highest bids. Cecilia bids US $ 18, which is the highest non-winning bid (the 6th highest bid), and David bids US $ 15. In this case Anna and Bill both get one of the parking spots, for which they both pay US $ 18, the size of the highest non-winning bid. Cecilia and David have bids ranked 6 or lower. They pay nothing, and do not have a parking space.

35. **6.3. Suppose an N+1 price auction was held to decide who got parking spaces at the Ås Campus with a search time less than 2 minutes. What would be your bid in NOK/month?**

_____

7. Some follow-up questions about you

36. **7.1 Staff or Student** *

   Mark only one oval.

   ◯ Staff   **Skip to question 51.**

   ◯ Student   **Skip to question 55.**

3.Expected Travel Time

3.1 Specify one way in minutes for each of the choices below (if highly uncertain or irrelevant, round to closest 100 minutes)

37. **Car**

_____

38. **Public Transport**

_____

39. **Cycle**

_____

40. **Foot**

_____

41. **3.2 How will your travel time change from your current travel time?**
Mark only one oval.

- ( ) Less
- ( ) About Same
- ( ) More

Skip to question 14.

4.Travel and Parking Attributes

42. **4.1 What kind of parking arrangement do you currently have for parking at the Ås campus**
Mark only one oval.

- ( ) I have registered my car, and I am allowed to park on staff/student parking spaces.
- ( ) I park on the guest parking spaces.
- ( ) I do not park on campus parking lots.

43. **4.2 Which option is valid in your case?**
Mark only one oval.

- ( ) The distance from my residence to the Ås campus is greater than 3 km.
- ( ) The distance from my residence to the Ås campus NMBU is less than or equal to 3 km.

44. **4.3 At what time of the day would you expect to
arrive at the Ås campus?**

_____

45. **4.4 How many hours would you expect to park at the Ås campus in an ordinary work or study
week?**
Mark only one oval.

- ( ) 0-5
- ( ) 5-10
- ( ) 10-15
- ( ) 15-20
- ( ) more than 20

46. **4.5 Which of the following option best describes your driving situation?**
Mark only one oval.

- ( ) I drive alone from my residence to the Ås campus
- ( ) I drive with my family (example children) and drop them on my way before I arrive to the Ås campus
- ( ) I drive with colleagues or fellow students to the Ås campus
- ( ) None of the above alternatives

47. **4.5 How do you rate the quality of public transport from your residence to the Ås campus?**
Mark only one oval.

	1	2	3	4	5	6	
Extremely Bad	◯	◯	◯	◯	◯	◯	Extremely Good

5. Your view on search time for parking

48. **5.1 What is the maximum time acceptable to you to spend looking for a parking space? (in minutes)**

_____

49. **5.2 Suppose a driver spends 10 minutes extra looking for a vacant parking spot. What do you see as the main problems with this?**
Mark only one oval per row.

	Increased Carbon Emission	Increased Fuel Use and Cost to Driver	10 Minutes of Time Loss	Other
First Important Problem	◯	◯	◯	◯
Second Important Problem	◯	◯	◯	◯
Third Important Problem	◯	◯	◯	◯

50. **5.3 Rate the following statement " Finding the parking space is easier in paid parking lot than in a free parking lot"**
Mark only one oval.

	1	2	3	4	5	6	
Strongly disagree	◯	◯	◯	◯	◯	◯	Strongly agree

Skip to question 22.

7. Some follow-up questions about you

51. **7.2 Faculty**
Mark only one oval.

◯ Biosciences

◯ Environmental Sciences and Natural Resources Management

◯ Land Scape and Society

◯ School of Economics and Business

◯ Science and Technology

◯ Veterinary Medicine

◯ Faculty of Chemistry, Biotechnology and Food Science

52. **7.3 Job Type**
Mark only one oval.

◯ Administrative

◯ Technical

◯ Teaching and Research

◯ Other

53. **7.4 Are you expecting to retire from your current job before 2019?**
Mark only one oval.

◯ Yes

◯ No

54. **7.5 Age**

_____

Skip to question 59.

7. Some follow-up questions about you

55. **7.2 Faculty**
Mark only one oval.

◯ Biosciences

◯ Environmental Sciences and Natural Resources Management

◯ Land Scape and Society

◯ School of Economics and Business

◯ Science and Technology

◯ Veterinary Medicine

◯ Faculty of Chemistry, Biotechnology and Food Science

56. **7.3 Education**
Mark only one oval.

◯ Bachelor

◯ Master

◯ PHD

57. **7.4 Are you expecting to finish your study before 2019?**
Mark only one oval.

◯ Yes

◯ No

58. **7.5 Age**

_____

7. Some follow-up questions about you

59. **7.6 What is your annual gross income in NOK**
    (if you prefer not to answer this question, leave
    open)

_____

Skip to question 60.

60. **Thank you for your cooperation. If you have any comments on this survey, please enter those**
    in the space below (max 300 characters)

_____

_____

_____

_____

_____

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Spørreundersøkelse NMBU parkering
* Required

Formål med undersøkelsen

Studenter og ansatte har allerede problemer med å finne parkeringsplasser på Ås campus ved Norges Miljø-og Biovitenskaplige Universitet (NMBU) i perioder hvor mange parkerer. Disse problemene er forventa å bli større når ansatte og studenter fra Adamstua flytter til Ås. NMBU kan ikke øke antallet parkeringsplasser pga. nasjonale og fylkesvise regler som vil begrense antallet parkeringsplasser ytterligere.

Et resultat av disse reglene og endringer i etterspørselen etter parkeringsplasser, forventer man at ansatte og studenter kommer til å bruke mer tid på å finne tilgjengelig parkering på Ås-campusen. I noen tilfelle kan det også være at det er ingen tilgjengelige parkeringsplasser på universitetsområdet.

Framtidig forventa tid for å lete etter ledig parkering er usikker, men den forventes å stige. Dette vil føre til mer tap av tid, høgere drivstofforbruk og dermed høgere drivstoffkostnader, og økte utslipp av klimagasser. På det nåværende stadiet er universitetsadministrasjonen usikker på de skal forholde seg til at parkeringsplasser blir et knappere gode.

Formålet med denne studien er å framskaffe økt innsikt om hvordan parkeringsproblemene skal løses på måter som reduserer ulempene mest mulig for ansatte og studenter ved å se på reisemønsteret og preferansene for reiser til ansatte og studenter.

Denne studien er del av en masteroppgave ved Handelshøyskolen NMBU. Hovedproblemstillingene i denne studien har blitt godkjent av NMBU sentral, mens den detaljerte utformingen av spørsmål og undersøkelsen er utført av masterstudenten med støtte fra vegleder, Eirik Romstad. Viss du har noen spørsmål om undersøkelsen, vennligst kontakt Eirik Romstad (eirik.romstad@nmbu.no).

Den forventa tida for å svare på undersøkelsen er ca. fem minutter. Svarene hver enkelt gir er anonyme, og det er ikke mulig for studenten eller vegleder å identifisere individuelle respondenter.

Ved å delta i undersøkelsen blir beslutningsgrunnlaget bedre for å redusere ulemper som følge av parkeringssituasjonen ved Ås campus.   Det vil også hjelpe studenten med å fullføre masteroppgaven på en bra måte. På forhand takk for at du er villig til å delta.

1. Campus Plassering

1. **Hvor jobber eller studerer du? ***
   Mark only one oval.

   ◯ Ås   **Skip to question 2.**

   ◯ Adamstuen   **Skip to question 3.**

2. Reisemåte

2. **Hvordan reiser du til Ås campus? (flere valg mulig)**
   Check all that apply.

   ☐ Bil

   ☐ Kollektivtransport

   ☐ Sykkel

   ☐ Går

Skip to question 4.

2.Reisemåte

3. **Hvordan forventer du å reise til Ås campus/NMBU fom. 2019? (flere valg mulig)**
   Check all that apply.

   ☐ Bil

   ☐ Kollektivtransport

   ☐ Sykkel

   ☐ Til fots

Skip to question 37.

3.Reisetid
3.1 Angi reisetid i minutter for hvert av valgene nedenfor (hvis det er svært usikkert eller uaktuelt, rund av til nærmeste 100 minutter)

4. **Bil**

   _____

5. **Kollektivtransport**

   _____

6. **Sykkel**

   _____

7. **Går**

   _____

Skip to question 8.

4. Reise og parkering

8. **.1 Hvilken parkeringsordning har du for øyeblikket ved parkering på Ås campus?**
   Mark only one oval.

   ◯ Jeg har registrert bilen min, og har lov til å parkere på ansatt- eller studentparkeringsplasser

   ◯ Jeg parkerer på gjesteplassene.

   ◯ Jeg parkerer ikke på campus parkeringsplasser.

9. **4.2 Hvilket alternativ er gyldig i ditt tilfelle?**
   Mark only one oval.

   ( ) Avstanden fra mitt bosted og til Ås campus NMBU er større enn 3km.

   ( ) Avstanden fra mitt bosted og til Ås campus NMBU er mindre enn eller lik 3km.

10. **4.3 Når kommer du vanligvis til Ås campus?**

   _____

11. **4.4 Hvor lenge (i timer) parkerer du på Ås campus hver uke i en vanlig arbeidsuke?**
   Mark only one oval.

   ( ) 0-5

   ( ) 5-10

   ( ) 10-15

   ( ) 15-20

   ( ) mer enn 20

12. **4.5 Hvilket av følgende alternativ best beskriver din reise til og fra Ås campus?**
   Mark only one oval.

   ( ) Jeg kjører alene fra mitt bosted til Ås campus

   ( ) Jeg kjører med familien min (eksempelvis barn) og slipper dem av på veien før jeg kommer
   inn på Ås campus

   ( ) Jeg kjører sammen med kolleger eller medstudenter til Ås campus

   ( ) Ingen av de oppgitte alternativene dekker mitt reisemønster

13. **4.6 Hvordan vurderer du kollektivtilbudet fra bostedet ditt til Ås campus?**
   Mark only one oval.

	1	2	3	4	5	6	
Veldig dårlig	( )	( )	( )	( )	( )	( )	Veldig godt

   Skip to question 20.

4.Reise og parkering

14. **4.1 Hvilken parkeringsordning har du for øyeblikket for parkering på Adamstua campus?**
   Mark only one oval.

   ( ) Jeg har registrert bilen min, og har lov til å parkere på ansatt- eller studentparkeringsplasser.

   ( ) Jeg parkerer på gjesteplassene.

   ( ) Jeg parkerer ikke på campus parkeringsplasser.

15. **4.2 Hvilket alternativ er gyldig i ditt tilfelle?**
    Mark only one oval.

    ⬭ Avstanden fra mitt bosted og til Ås campus er større enn 3km.

    ⬭ Avstanden fra mitt bosted og til Ås campus er mindre enn eller lik 3km.

16. **4.3 Når forventer du vanligvis å ankomme Ås campus?**

    _____

17. **4.4 Hvor mange timer forventer du å parkere på Ås campus i en vanlig arbeidsuke?**
    Mark only one oval.

    ⬭ 0-5

    ⬭ 5-10

    ⬭ 10-15

    ⬭ 15-20

    ⬭ Mer enn 20

18. **4.5 Hvilket av følgende kommer til best å beskrive din reise til og fra Ås campus?**
    Mark only one oval.

    ⬭ Jeg forventer å kjøre alene fra mitt bosted til Ås campus

    ⬭ Jeg kjører med familien min (eksempelvis barn) og slipper dem av på veien til Ås campus

    ⬭ Jeg forventer å samkjøre med kolleger eller medstudenter

    ⬭ Ingen av de oppgitte alternativene dekker mitt reisemønster

19. **4.6 Hvordan vurderer du kolletivtilbudet fra bostedet ditt bosted og til Ås campus?**
    Mark only one oval.

	1	2	3	4	5	6	
Veldig dårlig	⬭	⬭	⬭	⬭	⬭	⬭	Veldig godt

5. Ditt syn på letetid etter parkeringsplass

20. **5.1 Hva er den maksimale tiden som er akseptabel for deg som sjåfør å bruke på å lete etter parkeringsplass på Ås campus? (i minutter)**

    _____

21. **5.2 Anta at en sjåfør bruker 10 minutter ekstra på jakt etter en ledig parkeringsplass. Hva ser du som de viktigste problemene med dette? (velg ett alternativ for hver rad)**
Mark only one oval per row.

	Økt karbonutslipp	Økt bruk av drivstoff og kostnad for fører	10 minutter av tidsforsinkelse	Annen
Første viktig problem	◯	◯	◯	◯
Andre viktige problem	◯	◯	◯	◯
Tredje viktige problem	◯	◯	◯	◯

6. Dine preferanser for å løse parkeringssituasjonen ved Ås campus

6.1 Beskrivelse av scenarioet

Parkeringssituasjonen på Ås campus vil sannsynligvis bli vanskeligere, noe som resulterer i mer tid enn i dag brukt på å søke etter ledig parkeringsplass. Alle følgende spørsmål er om dine preferanser for tiltak for å redusere tiden som du bruker for å lete etter ledig parkeringsplass (inkluderer ikke personer med funksjonshemninger, som fortsatt er garantert reservert parkering)

22. **6.1.2 Hvilket av følgende to alternativer vil du foretrekke?**
Mark only one oval.

◯ Forbudt å parkere for de som bor nærmere campus enn 3 km

◯ Prioritert parkering for ansatte

23. **6.1.3 For at du skal foretrekke gebyrparkering over de to alternativene som er oppført ovenfor, hva er en akseptabel daglig parkeringsavgift?**

_____

6.2 Betalingsvilje for parkering på campus

24. **6.2.1 Velg ett tall tilfeldig.**

   Mark only one oval.

   ( ) 9   **Skip to question 34.**

   ( ) 3   **Skip to question 28.**

   ( ) 6   **Skip to question 31.**

   ( ) 1   **Skip to question 26.**

   ( ) 4   **Skip to question 29.**

   ( ) 5   **Skip to question 30.**

   ( ) 2   **Skip to question 27.**

   ( ) 8   **Skip to question 33.**

   ( ) 10   **Skip to question 25.**

   ( ) 7   **Skip to question 32.**

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

25. **6.2.2 Vil du være villig til å betale 100 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

   Mark only one oval.

   ( ) Ja

   ( ) Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

26. **6.2.3 Vil du være villig til å betale 150 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

   Mark only one oval.

   ( ) Ja

   ( ) Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

27. **6.2.3 Vil du være villig til å betale 300 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

    Mark only one oval.

    ◯ Ja

    ◯ Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

28. **6.2.3 Vil du være villig til å betale 350 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

    Mark only one oval.

    ◯ Ja

    ◯ Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

29. **6.2.3 Vil du være villig til å betale 400 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

    Mark only one oval.

    ◯ Ja

    ◯ Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

30. **6.2.3 Vil du være villig til å betale 450 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

    Mark only one oval.

    ◯ Ja

    ◯ Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

31. **6.2.3 Vil du være villig til å betale 200 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

    Mark only one oval.

    ◯ Ja

    ◯ Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

32. **6.2.3 Vil du være villig til å betale 500 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

    Mark only one oval.

    ◯ Ja

    ◯ Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden.

33. **6.2.3 Vil du være villig til å betale 250 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

    Mark only one oval.

    ◯ Ja

    ◯ Nei

Skip to question 35.

6.2 Betalingsvilje for parkering på campus

Innføring av gebyrparkering innebærer at det også er gebyr for gjesteparkeringen. Inviterte besøkende får en "gratis parkering" kupong som de kan legge i bilen, slik at de trenger ikke å kjøpe en 1-dags parkeringsbillett. Anta at den daglige parkeringsavgiften er tilstrekkelig høy at det er billigere å kjøpe en månedlig tillatelse for alle som bruker ansatt- eller studentparkering mer enn fem dager i måneden..

34. **6.2.3 Vil du være villig til å betale 50 kr/måned for garantert parkeringsplass på Ås campus med mindre letetid enn 2 minutter?**

    Mark only one oval.

    ◯ Ja

    ◯ Nei

Skip to question 35.

6.3 Betalingsvilje for parkering på campus (2)

N+1 pris auksjoner er brukt for å bestemme hvem som får et av N like goder, f.eks. parkeringsplass. Anta at det er 5 parkeringsplasser for salg, og at det er fler enn 5 personer som ønsker disse parkeringsplassene. De som er interesserte i å ha rett til å parkere leverer anbud i en lukket konvolutt. Når budrunden er over, åpnes konvoluttene og de 5 personene med de høyeste anbudene får hver en av de 5 parkeringsplassene. For å unngå misunnelse og forskjellsbehandling for disse 5 personene, betaler de alle den samme prisen som er satt lik størrelsen på det første anbudet som ikke gir parkeringsplass. I dette tilfellet er dette det 6. (N+1) anbudet. De som ikke har et anbud som gir parkeringsplass betaler ingenting og mottar ikke parkeringsplass.

Anta at Anna, Bjørn, Cecilie og David alle byr for en av de 5 parkeringsplassene. Anna byr 22 $ og Bjørn byr 20 $. Begge disse anbudene er blant de 5 høyeste budene. Cecilie byr 18 $, som er det høgeste anbudet (N+1 anbudet) som ikke gir parkeringsplass, og David byr 15 $. I dette tilfellet får Anna og Bjørn begge en av parkeringsplassene, og de betaler begge 18 $. Cecilie og David har anbud som er rangert som nr. 6 eller lavere. De betaler ingenting, men for heller ingen parkeringsplass.

35. **6.3.1 Anta at en N+1 pris auksjon ble avholdt for å bestemme hvem som fikk parkeringsplass ved Ås campus med en letetid mindre enn 2 minutter. Hvor stort ville anbudet ditt bli (kr/måned)?**

_____

7. Noen oppfølgingsspørsmål om deg

36. **7.1 Ansatt eller student** *
    Mark only one oval.

    ◯ Ansatt   **Skip to question 50.**

    ◯ Student   **Skip to question 54.**

3.Forventet Reisetid

3.1 Angi reisetid i minutter for hvert av valgene nedenfor (hvis det er svært usikkert eller irrelevant, runde til nærmeste 100 minutter)

37. **Bil**

_____

38. **Kollektivtransport**

_____

39. **Sykkel**

_____

40. **Til fots**

_____

41. **3.2 Hvordan vil reisetiden din til Ås sammenlignet med din nåværende reisetid?**
    Mark only one oval.

    ◯ Mindre

    ◯ Omtrent det samme

    ◯ Mer

Skip to question 14.

4.Reise og parkering

42. **4.1 Hvilken parkeringsordning har du for øyeblikket til parkering på Ås campus**
    Mark only one oval.

    ◯ Jeg har registrert bilen min, og har lov til å parkere på ansatt- eller studentparkeringsplasser.

    ◯ Jeg parkerer på parkeringsplassene for gjester.

    ◯ Jeg parkerer ikke på campus parkeringsplasser

43. **4.2 Hvilket alternativ er gyldig i ditt tilfelle?**
    Mark only one oval.

    ◯ Avstanden fra mitt bosted og til Ås campus NMBU er større enn 3km.

    ◯ Avstanden fra mitt bosted og til Ås campus er mindre enn eller lik 3km.

44. **4.3 Når forventer du vanligvis å ankomme Ås campus?**

    _____

45. **4.4 Hvor mange timer forventer du å parkere på Ås campus i en vanlig arbeidsuke?**
    Mark only one oval.

    ◯ 0-5

    ◯ 5-10

    ◯ 10-15

    ◯ 15-20

    ◯ Mer enn 20

46. **4.5 Hvilket av følgende alternativ beskriver din kjøresituasjon?**
    Mark only one oval.

    ◯ Jeg kjører alene fra mitt bested til Ås campus

    ◯ Jeg kjører med familien min (eksempelvis barn) og slipper dem av på veien til Ås campus

    ◯ Jeg kjører sammen med kolleger eller medstudenter til Ås campus

    ◯ Ingen av disse alternativene passer

47. **4.5 Hvordan vurderer du kollektivtilbudet fra bostedet ditt til Ås campus?**
    Mark only one oval.

	1	2	3	4	5	6	
Veldig dårlig	◯	◯	◯	◯	◯	◯	Veldig godt

5. Ditt syn på letetid etter parkeringsplass

48. **5.1 Hva er den maksimale tiden som er akseptabel for deg som sjåfør å bruke på å lete etter parkeringsplass på Ås campus? (i minutter)**

    _____

49. **5.2 Anta at en sjåfør bruker 10 minutter ekstra på jakt etter en ledig parkeringsplass. Hva ser du som de viktigste problemene med dette?**
    Mark only one oval per row.

	Økt karbonutslipp	Økt bruk av drivstoff og kostnad for fører	10 minutter av tidsforsinkelse	Annen
Første viktig problem	◯	◯	◯	◯
Andre viktige problemet	◯	◯	◯	◯
Tredje viktige problem	◯	◯	◯	◯

Skip to question 22.

7. Oppfølgingsspørsmål om deg

50. **7.2 Fakultet**
    Mark only one oval.

    ◯ Biovitenskap

    ◯ Miljøvitenskap og naturressursforvaltning

    ◯ Landskap og samfunn

    ◯ Handelshøyskolen

    ◯ Vitenskap og teknologi

    ◯ Veterinærhøgskolen

    ◯ Fakultet for kjemi, bioteknologi og matvitenskap

51. **3. Jobb**
    Mark only one oval.

    ◯ Administrativ

    ◯ Teknisk

    ◯ Undervisning og forskning

    ◯ Annen

52. **7.4 Forventer du å pensjonere fra din nåværende jobb før 2019?**
   Mark only one oval.

   ◯ Ja

   ◯ Nei

53. **7.5 Alder**

   _____

   Skip to question 58.

7. Oppfølgingsspørsmål om deg

54. **7.2 Fakultet**
   Mark only one oval.

   ◯ Biovitenskap

   ◯ Miljøvitenskap og naturressursforvaltning

   ◯ Landskap og samfunn

   ◯ Handelshøyskolen

   ◯ Realfag og teknologi

   ◯ Veterinærhøgskolen

   ◯ Fakultet for kjemi, bioteknologi og matvitenskap

55. **7.3 Utdanning**
   Mark only one oval.

   ◯ Bachelor

   ◯ Master

   ◯ PHD

56. **7.4 Forventer du å fullføre studiene dine før 2019?**
   Mark only one oval.

   ◯ Ja

   ◯ Nei

57. **7.5 Alder**

   _____

Oppfølgingsspørsmål om deg

58. **7.6 Hva er din årlige bruttoinntekt i NOK (viss du ikke ønsker å svare på dette spørsmålet, la det stå åpent)**

   _____

   Skip to question 59.

59. **Takk for samarbeidet. Hvis du har kommentarer til denne undersøkelsen, vennligst skriv kommentarene dine inn de i ruten nedenfor (maks 300 tegn)**

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