

The importance of university facilities for student satisfaction at a Norwegian university

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Abstract

Purpose – This article has a twofold aim: first, to explore the influence of higher education institution (HEI) facilities on overall student satisfaction; and second, to identify the distinct facilities that most strongly influence student overall satisfaction with HEI facilities.

Design/methodology/approach – A tailor-made questionnaire is developed to measure student perception about student life, including their perceptions about the facilities at the HEI they attend. Two econometric models are estimated using OLS regression analysis.

Findings – The factor that most strongly influences student satisfaction with university facilities is the quality of its social areas, auditoriums and libraries. Conversely, it is determined that computer access on campus does not influence student satisfaction.

Research limitations – The sample includes data only from a single university. Moreover, only Norwegian students at the university participated in the survey.

Practical implications – Based on our findings, the most effective strategy to improve student overall satisfaction with the facilities at an HEI is to improve the quality of social areas, auditoriums and libraries. Such a strategy will result in students who are more satisfied with the HEI they are attending and thereby increase the HEI's chances of long-term success.

Originality/value – To the best of our knowledge, this is the first study to identify the facilities that most strongly influence the overall satisfaction of students with the facilities at HEIs.

Keywords: Facilities; University; Norway; Student satisfaction; Higher education institutions; HEI; Education

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1. Introduction

The higher education market is strongly affected by globalization (Hemsley-Brown and Oplatka, 2006). This has produced an international market for educational services and increased competition to attract students. As competition among higher education institutions (HEIs) has increased, these institutions have been forced to adopt market-oriented strategies to differentiate themselves from their competitors and thereby attract as many students as possible (Butt and Rehman, 2010). HEIs have also realized that their sector represents a business-like service industry and have begun to focus more on meeting or exceeding the needs of their students (Gruber et al., 2010). Therefore, numerous studies have been conducted to identify the most important factors influencing student satisfaction.

Student satisfaction is a short-term attitude resulting from an evaluation of a student's educational experience (Elliott and Healy, 2001), and as such, it is important to understand for a number of reasons. Satisfied customers tend to have a higher probability of generating positive word-of-mouth (Kwun et al., 2013). Thus, it is more likely that satisfied students engage in positive word-of-mouth communication than do less satisfied students. Moreover, positive word-of-mouth influences the performance of non-profits through its impact on donor acquisitions, donor loyalty and organizational reputation (Williams and Buttle, 2013). Hence, student satisfaction indirectly influences organizational performance. Furthermore, a satisfied alumnus is more likely to contribute financially to the institution (Stutler and Calvario, 1996). Feedback from students can be used to improve those factors where satisfaction is low (Douglas et al., 2006), and because student satisfaction has been found to be associated with the perceived quality of the institution (Athiyaman, 1997), raising the level of student satisfaction will improve public perception with respect to the quality of the institution.

The formation of student satisfaction is a multi-dimensional process influenced by many factors. Hartman and Schmidt (1995) state that student satisfaction is shaped by both the perceived quality of the performance of the service providers, i.e., the higher education institution, and the perceived outcomes of that performance. Student life is a web of experiences, all of which influence student satisfaction (Elliott and Healy, 2001). University image, i.e., its reputation, has been found to influence student satisfaction at a Spanish university (Palacio et al., 2002). The results of a study by Elliott and Healy (2001) find that “student centeredness,” “campus climate” and “instructional effectiveness” have a strong

impact on student satisfaction with their overall educational experience. Studying the effect of 19 independent variables on overall satisfaction with their HEI, Mai (2005) finds that the “overall impression of the quality of education,” “overall impression of the school,” “lecturers responses towards complaints/suggestions” and “availability of study areas for students” have a positive and statistically significant influence on student overall satisfaction. In a study of student satisfaction at a UK university, Douglas et al. (2006) conclude that the most important aspects are those associated with teaching and learning.

University facilities, and the management of these facilities, play an important role in achieving the goals of the university by providing students and employees an effective infrastructure as a basis for university functions (Kärnä et al., 2013). Moreover, university facilities are important factors that influence students’ decisions when selecting an HEI (Price et al., 2003) as high quality facilities are found to have a major impact on learning (Lewis, 2000, Tanner, 2009). Campus facilities are also a critical factor that affect student perception of the reputation of an HEI (Nguyen and LeBlanc, 2001). Conversely, unsuitable facilities have been found to damage and reduce student motivation (Hassanbeigi and Askari, 2010).

The focus of this article is on university facilities, and the aim is twofold. First, using empirical evidence from students at a Norwegian university, we explore the association between student perception regarding university facilities and overall student satisfaction. Second, we identify the university facilities that are most important and most influential with respect to the student’s level of satisfaction with the HEI facilities. To the best of our knowledge, this is the first study to investigate how overall satisfaction with HEI facilities is influenced by student perception regarding the individual facilities at the institution.

The remainder of the article is organized as follows. Model specifications are presented in Section 2. Section 3 describes the survey instrument used, the demographic characteristics of the respondents and the dataset. Estimation results are presented and discussed in Section 4. Finally, in Section 5, we draw the main conclusions from our work and discuss possible implications for the HEIs.

2. The Models

Two models are estimated. The purpose of the first model (*satisfaction model*) is to estimate how different factors influence student overall satisfaction with a Norwegian HEI. The purpose of the second model (*facility model*) is to estimate the influence of individual university facilities on student overall satisfaction with the facilities at the HEI.

2.1 The satisfaction model

The aim of the *satisfaction model* is to explain student overall satisfaction with the HEI (*SS*). The dependent variable (*SS*) is a measure of how satisfied the students are overall with the HEI. The variable is constructed using questions that measure the degree to which the students agree with four statements related to overall satisfaction, see section 3.1. The following explanatory variables are used to explain variations in *SS*:

- *University facilities (UF)*
- *Host city (HC)*
- *Job prospects (JP)*
- *Costs of studying (CS)*
- *Reputation (RE)*

As noted in Section 1, university facilities, and the management of these facilities, play an important role in achieving the goals of a university by providing students and employees an effective infrastructure as a basis for university functions. Due to its role as a facilitator, the hypothesis is that there is positive association between student satisfaction with university facilities (*UF*) and overall satisfaction (*SS*). Further, as Elliott and Healy (2001) note, it is reasonable to assume that the size and attractiveness of the city where the university is located affects student satisfaction as students spend a great portion of their time off campus. The hypothesis is that high satisfaction with the host city (*HC*) is positively associated with student satisfaction with the university. Furthermore, those who complete studies at an HEI tend to secure higher paying and more interesting jobs than those who do not complete such studies (Hansen and Wiborg, 2010). Hence, economists usually view schooling as a financial investment. That is, students invest money and time to obtain greater lifetime wealth and higher consumption in return (Oreopoulos and Salvanes, 2011). Therefore, we hypothesize that students who are satisfied with their job prospects (*JP*) after completing their studies will

exhibit higher overall satisfaction with the HEI. In contrast to the situation in many other countries, students at HEIs in Norway generally do not pay tuition fees. However, costs related to housing and transportation can vary substantially based on the location of the HEI at which a student is enrolled. Because this money have an alternative, and perhaps a more enjoyable, application, we hypothesize that there is a positive association between student perception regarding the cost of studying (*CS*) and overall satisfaction with the HEI. Reputation refers to the overall quality or character of an organization as judged by people in general. As previously mentioned in Section 1, prior studies have found that HEIs with good reputations tend to have more highly satisfied students. Therefore, we hypothesize that there is a positive association between the degree to which students are satisfied with the reputation (*RE*) of the HEI and their overall satisfaction with the institution.

To estimate the degree to which student satisfaction (*SS*) is influenced by their evaluations of the various aspects of student life, the following model is employed:

$$(1) SS = \alpha + \beta_{UF}UF + \beta_{HC}HC + \beta_{JP}JP + \beta_{CS}CS + \beta_{RE}RE + \varepsilon$$

In Equation (1), α is a fixed term, $\beta_j, j = \{UF, HC, JP, CS, RE\}$, which are the parameters to be estimated and ε is a random error term with constant variance and an expected value of zero. The analysis is conducted at student level.

Equation (1) implies that $\frac{\partial SS}{\partial j} = \beta_j$. This means that a marginal change in j by one unit changes *SS* by β_j units. Hence, the value of β_j has a straightforward interpretation. It follows from the hypotheses presented in Section 2 that we assume $\beta_{UF}, \beta_{HC}, \beta_{JP}, \beta_{CS}, \beta_{RE} > 0$.

2.2 The facility model

The aim of the *facility model* is to identify the facilities at HEIs that are most influential in the formation of student overall satisfaction with the facilities of an HEI. The dependent variable (*UF*) is the degree to which the respondents are satisfied with the facilities at the HEI. Hence, the dependent variable in the *facility model* is one of the explanatory variables in the *satisfaction model*. The following variables are used to explain variations in *UF*:

- *Library (LI)*
- *Computer access (CA)*
- *Study hall (SH)*
- *Rooms for group work (GW)*
- *Auditoriums (AU)*
- *Social areas (SA)*

Libraries stimulate academic and research activities by providing access to world-class information resources (Hossain and Islam, 2012). Thus, libraries provide resources students can use in their studies. It is, as such, reasonable to assume that students who are satisfied with the library (*LI*) also exhibit higher levels of overall satisfaction with university facilities (*UF*). Students use computers to analyse data, search for information, prepare reports and presentations and write theses. Thus, the quality and accessibility of IT facilities is a predictor of student satisfaction (Mai, 2005). The hypothesis is, therefore, that students who are satisfied with the access to computers on campus (*CA*) will have higher levels of overall satisfaction with university facilities. Study halls are quiet rooms with workstations where students can read, study and complete their curriculum-related assignments. The hypothesis is that there is a positive association between student satisfaction with the number of workstations in the study halls (*SH*) and their overall satisfaction with university facilities. Most universities also have private or separate rooms where students can gather and work collaboratively on tasks related to their studies. The hypothesis is that there is a positive association between student satisfaction with access to rooms for group work (*GW*) and overall satisfaction with university facilities. As lectures at a university are primarily conducted in auditoriums, factors such as thermal comfort, indoor air quality and audio and visual comforts have been determined to affect learning (Lee et al., 2012). Hence, it is reasonable to expect that student satisfaction with the school's auditoriums (*AU*) influence overall satisfaction with university facilities. University campuses also have, in addition to libraries, auditoriums, offices etc., social areas where students can relax, study and spend time preparing for their next lecture or class period. Previous research has found that students have higher expectations than what they experienced with regard to areas on campus where they can relax (Awang et al., 2014). Our hypothesis is that there is a positive correlation between satisfaction with the social areas on campus (*SA*) and overall satisfaction with university facilities.

To identify the individual facilities at an HEI that most strongly influence student overall satisfaction with university facilities (UF), the following model is employed:

$$(2) UF = \gamma + \beta_{LI}LI + \beta_{CA}CA + \beta_{SH}SH + \beta_{GW}GW + \beta_{AU}AU + \beta_{SA}SA + \varepsilon$$

As in Equation (1), γ is a fixed term, β_i , $i = \{LI, CA, SH, GW, AU, SA\}$, which are the parameters to be estimated and ε is a random error term with constant variance and an expected value of zero.

Moreover, Equation (2) implies that $\frac{\partial UF}{\partial i} = \beta_i$. As with Equation (1), this means that a marginal change in i by one unit changes UF by β_i units. Further, it follows from our hypotheses that we assume $\beta_{LI}, \beta_{CA}, \beta_{SH}, \beta_{GW}, \beta_{AU}, \beta_{SA} > 0$.

2.3 The relationship between the models

The link between the two models is one variable, namely, university facilities (UF). This particular variable measures the degree to which students are satisfied with the facilities at the HEI, and it is included in the *satisfaction model* as an explanatory variable and in the *facility model* as a dependent variable. That is, in the *satisfaction model*, we estimate, when controlling for RE , CS , JP and HC , the influence of UF on student overall satisfaction with HEIs (SS). In the *facility model*, we estimate the influence of the degree to which students are satisfied with individual university facilities, namely, SH , GW , AU , SA , CA and LI , on student overall satisfaction with the university facilities (UF).

It follows that the importance of facilities on student overall satisfaction, as well as the facilities most strongly influencing satisfaction with university facilities as a whole, is identified. The relationship between the *satisfaction model* and the *facility model* is illustrated in Figure 1.

(Figure 1 about here)

3. The data

3.1 The higher education system in Norway

There are 53 accredited HEIs in Norway. The majority of these are owned and operated by the state. In general, tuition fees are not required at these public institutions, except from professional programmes such as MBA. Since 2002, Norway has adhered to the objectives of the Bologna Process in the European Higher Education Area (Michelsen and Aamodt, 2007). As a result, the degree system involves a three-year bachelor programme followed by a two-year master programme, which then qualifies for researcher training at a PhD programme. The employment rate for Norwegian 25-34 year-olds with education from HEIs is 89%. In EU21 and the United States, the employment rate is 82% for the same demographic (OECD, 2014).

3.2 The case university

The UoN, from which the sample is drawn, has nearly 6,000 enrolled students and a staff of 600. It is located in the city of Bodø in the northern part of Norway, and offers degrees at the undergraduate, postgraduate and doctorate levels in the fields of professional studies, social sciences, business and natural sciences.

The university campus has about 50,000 m² of floor space. Nearly half of this space is used for offices, rooms for group work, classrooms and auditoriums. In addition, the library, study halls and other social areas use nearly 10,000 m². The remaining floor space is used by four canteens, meeting rooms, toilets, storage areas, technical rooms and corridors. Overall, the university has about 500 offices, 63 rooms for group work, 44 classrooms and 17 auditoriums. The oldest buildings on campus were built in 1986 and the newest were built in 2004.

3.3 Survey instrument

The survey instrument used in this study is a tailor-made web-based questionnaire. In addition to questions related to demographic characteristics, a range of questions are included to assess the influence that different factors have on student satisfaction and to identify the university facilities that most strongly influence student overall satisfaction with university facilities. Each question in the survey instrument is categorized into one of three groups.

The first group of questions is designed to reveal student overall satisfaction with the university (SS). This is accomplished by asking students to indicate the degree to which they agree with

the following four statements using a five-point Likert-scale ranging from (1) “I strongly disagree” to (5) “I strongly agree”:

- *Based on my experience with the university, I am very satisfied with my choice of educational institution.*
- *The university has exceeded my expectations.*
- *Thinking about a perfect educational institution, this university comes close to that ideal.*
- *Based on what I now know, I think I was right when I chose to study at this university.*

An average score is calculated for each respondent based on his or her answers on each of these four questions. The construct “*overall satisfaction*” (SS) proved to have high internal reliability (Cronbach’s alpha=0.89).

The second group of questions is designed to reveal students overall satisfaction with various aspects of student life. This is accomplished by asking the respondents to state, using a five-point Likert-scale ranging from (1) “Very unsatisfied” to (5) “Very satisfied,” their overall satisfaction with the facilities at the university, the city in which the university is located, the job prospects upon completing their studies, the costs associated with their studies at the university and the reputation of the university.

The third group of questions is designed to determine student satisfaction with university facilities. Using the same five-point scale as used for the second set of questions, students were asked to state their satisfaction with the university library, computer access, study halls, rooms for group work, auditoriums and on-campus social areas.

Ordinal scales, as those employed in this study, do have their limitations with respect to econometric analysis, as they produce non-metric data (e.g. Hair et al., 1998). It is, however, clear that a score of 3 represents higher satisfaction than a score of 2. In the following analyses, it is assumed that the respondents perceive differences between scores as equal such that average values can be calculated.

3.4 Demographic characteristics of sample and population

The web-based questionnaire was distributed to 5,232 Norwegian students at the University of Nordland (UoN). Of the 5,232 surveys distributed, 1,457 are returned, producing a response rate of 28 percent. Key demographic characteristics of the respondents and the population are summarized in Table 1.

Our sample differs relatively little from the population with regard to gender and age. However, females are somewhat overrepresented and young students are somewhat underrepresented in our sample. The female dominance in the population reflects the fact that Norwegian males tend to choose a vocational education more often than females (Statistisk sentralbyrå, 2013), and as such, males are underrepresented at most Norwegian HEIs.

(Table 1 about here)

3.5 Summary statistics of the data

Table 2 summarizes the variables as determined by the *satisfaction model*.

(Table 2 about here)

As evidenced from Table 2, students are most satisfied with job prospects and university facilities and least satisfied with the costs associated with studying and the reputation of the institution.

Table 3 denotes the pairwise correlation of the explanatory variables applied in the *satisfaction model*. Later tests show that the correlations in Table 3 do not cause any estimation problems with respect to the specifications of the *satisfaction model*.

(Table 3 about here)

Table 4 summarizes the variables as determined by the *facility model*. The table shows that students at the UoN are most satisfied with the institution's library and the computer access it provides, while they are least satisfied with the number of rooms designated for group work and the access they have to study halls.

(Table 4 about here)

Table 5 presents the correlation coefficients among the explanatory variables of the *facility model*. Later tests show that the correlations in Table 5 do not cause any estimation problems with respect to the specifications of the *facility model*.

(Table 5 about here)

4. Results and discussion

4.1 The satisfaction model

The multiple regression estimates of Equation (1) are presented in Table 6.

(Table 6 about here)

To check for multicollinearity, we estimate the variance inflation factors (VIF) and find that they range from 1.74 to 1.35, with an average value of 1.45, which is well below the critical value of 10, the value that indicates the possibility of a multicollinearity problem (Hair, 1998). The F-test indicates good model fit, and an inspection of the error term indicates that it is uncorrelated with the independent variables and has an expected value close to zero. The explanatory power of the model (R^2) is 0.40, suggesting that the model explains 40 percent of the variance in the measure of student satisfaction. All t-statistics of variable coefficients are calculated using White (1980) robust standard errors to correct for heteroscedasticity. Hence, the statistical properties are generally good and indicate that the estimation results are credible.

The signs of the estimated coefficients support the a priori assumptions regarding the impacts of the explanatory variables in Equation (1) on student satisfaction. However, one of the estimated coefficients (β_{JP}) does not have a statistically significant influence on student satisfaction.

The results, as presented in Table 6, warrant several comments. First, the two variables on which the HEIs have the greatest influence, i.e., reputation (*RE*) and facilities (*UF*), have a strong and statistically significant influence on student overall satisfaction. A one unit increase

in *RE* and *UF* is associated with an increase in overall satisfaction of 0.423 and 0.134 units, respectively.

Previous research has found that three factors significantly predict the image of a university: academic factors, athletic factors and the extent of news coverage of the university (Arpan et al., 2003). The academic factors and the extent of news coverage are most relevant in a Norwegian setting as there is no tradition for Norwegian HEIs to have their own athletic departments. According to Arpan et al. (2003), HEIs can improve their image by developing nationally known academic programmes/departments/schools, by recruiting nationally known and/or excellent professors, and by being committed to academic excellence. Moreover, by improving its visibility in the media, the image of the university image will subsequently improve. To increase the visibility in the media, the institutions could encourage and reward (financially or otherwise) those in the faculty and administration who best represent the institution in the media channels that have national coverage.

The estimation results from the *satisfaction model* suggest that by improving the quality of university facilities, overall student satisfaction increase. Subsequently, an analysis is performed to further explore the determinant variables of student satisfaction with university facilities (*UF*). It is noted that our finding, i.e., student perception about university facilities is significantly and positively correlated with student overall satisfaction with the university, contradicts previous studies (e.g. Douglas et al., 2006), which have found that, although physical facilities influence student choice regarding HEI, it is not important with respect to student satisfaction.

It is further evident from Table 6 that factors related to the city in which the HEI is located influence student satisfaction. Thus, the university and its student organizations should inform local politicians about what services students expect from the host city. In such discussions, it could prove effective to present information about revenues generated by students. According to Barstad et al. (2012), the average Norwegian student had yearly expenses of NOK 74,000 (approximately USD 12,300) in 2012. Consequently, making a city more attractive to students could prove profitable for local authorities as an increase in student population will increase revenues for businesses and, in turn, result in higher tax revenues for the city in which the HEI is located.

Although the costs related to studying (*CS*) have a statistically significant influence on student satisfaction, the practical significance is low ($\beta_{CS}=0.08$). Thus, aiming to improve student satisfaction, it is probably not necessary to give high priority to reducing the costs associated with attending an HEI by, for example, reducing transportation and lodging costs.

Job prospects (*JP*) do not have a statistically significant influence on student satisfaction. It is reasonable to assume that this is due to the high employment rate in Norway, i.e., students are relatively confident that they will find a job once they have completed their studies. In 2012, the average unemployment rate was 2.6 percent in Norway, 8 percent in OECD-areas and 10.5 percent in the EU (Arbeidsdepartementet, 2013). Hence, it is reasonable to assume that *JP* will be of greater concern for students, and therefore influence student satisfaction more strongly, in many countries other than Norway.

4.2 The facility model

Table 7 provides OLS-regression estimates of Equation (2).

(Table 7 about here)

The variance inflation factor (VIF) ranges from 1.93 to 1.37, with an average value of 1.59. The F-value indicates that the model is significant at the 1 percent level. The R^2 value of 0.34 suggests that the model explains 34 percent of the variance in student satisfaction with university facilities (*UF*). All t-statistics of variable coefficients are calculated using White (1980) robust standard errors to correct for heteroscedasticity.

The signs of all of the estimated coefficients in Equation (2), except *CA*, support our a priori assumptions with respect to the signs of the estimated parameters. However, the coefficient of *CA* is far from being statistically significant. As with Equation (1), the statistical properties of Equation (2) indicate that the estimation results are credible.

The results in Table 7 give rise to several comments. First, social areas (*SA*) at the university are most strongly associated with overall satisfaction with university facilities. This suggests that for universities aiming to improve student satisfaction with university facilities, it would

be wise to prioritise the social areas, such as hallways and areas where students may choose to relax and interact socially between lectures and classes.

Second, the estimated effect on overall satisfaction with university facilities when increasing student satisfaction with social areas ($\beta_{SA}=0.274$) is more than 50 percent higher than it is when improving satisfaction with the university's auditoriums ($\beta_{AU}=0.177$), i.e., the factor with the second highest association with *UF*. Nevertheless, properly managing the temperature, air quality and audio and visual comfort in the auditoriums is significantly positively linked to student satisfaction with university facilities.

Third, the finding that student perception regarding the library significantly affects student satisfaction with university facilities contradicts previous studies that have concluded that library experiences do not lead to improved student satisfaction (Kuh and Gonyea, 2003). Furthermore, studies from the UK have found that more than half of the university students have never borrowed an item from the library, never visited the library and have never downloaded an item from an electronic resource available through the library (Goodall and Pattern, 2011). However, student satisfaction with university libraries are impacted positively by the availability of resources and the assistance provided by the library staff (Andaleeb and Simmonds, 1998).

Fourth, the only explanatory variable not found to be statistically significantly associated with student overall satisfaction with university facilities is computer access (*CA*). Considering how important computers are for students who must write compulsory reports during their semester courses and write a thesis at the end of their study programme, this finding is somewhat surprising. However, this lack of emphasis on *CA* could be due to the high PC penetration in Norway, given that the proportion of Norwegian households with access to PCs had reached 93 percent by 2013, an increase of 37 percent from 2003 (Statistics Norway, 2014). Because of the high PC penetration, Norwegian students likely do not need computer access on campus to the same extent as they did only a few years ago. This finding suggests that HEIs in countries with lower PC penetration than Norway should carefully monitor student need for computer access on campus to avoid investing in computers that their students ultimately do not need and appreciate.

Fifth, although satisfaction with rooms for group work (*GW*) and study halls (*SH*) have a statistically significant correlation with the degree to which students are satisfied with university facilities, their practical significance are low ($\beta_{GW} = 0.093$, $\beta_{SH} = 0.063$). Thus, improving student access to group rooms and study halls should not be a primary priority for HEIs that aim to increase student satisfaction with respect to facilities.

5. Conclusions and implications

HEIs compete fiercely for the best and the brightest students. Accordingly, knowledge about how student satisfaction is developed can be used by HEIs to develop strategies that make them more attractive for prospective students. In this article, we first explored factors associated with student overall satisfaction with HEIs, and second, we identified the individual facilities that most strongly influence overall satisfaction with HEI facilities. Two econometric models were estimated using data from a survey conducted among students at a relatively small Norwegian university.

The factors identified as the ones that most strongly influence student overall satisfaction with an HEI is the reputation of the institution, the attractiveness of the host city and the quality of the facilities at the HEI. Job prospects do not significantly influence student satisfaction. These findings suggest that the university can improve student satisfaction by implementing measures that improve the university's reputation and by investing in university facilities. Moreover, university management should exert pressure on local politicians to prioritize measures that support the wants and needs of the students, especially because of the positive impact students have on local businesses, a factor that is important in such discussions.

It is the quality of the social areas, auditoriums and libraries that most strongly influence students overall satisfaction with the facilities. Hence, investments in such facilities will have a significant effect on student satisfaction with university facilities and, as such, on overall student satisfaction with the HEI.

However, it is important that investment decisions be based on some predefined principles, e.g., a cost-benefit analysis. This implies that in addition to the expected benefits of investing in university facilities, the cost of the investments should also be considered. Because most

universities have a limited budget to spend on facilities, it is important that they start by investing in those facilities that will contribute the most per monetary unit invested to improving student satisfaction. However, this is a reasonably difficult exercise.

Finally, as consistent with all empirical studies, the results from the analyses have their weaknesses. For example, both the validity and reliability of the survey are debatable. First, the findings are based on answers given by students from only one rather small university, and the questionnaire was distributed only to Norwegian students at the institution. If student preferences vary between small and large universities, between universities with different academic profiles and/or between Norwegian and foreign students, the results from the study will be valid only for smaller institutions with primarily Norwegian students.

It is difficult to say whether institution size (measured by number of students) has an impact on student preferences regarding facilities. Compared to smaller universities, large universities have bigger classes, are more crowded, and are more impersonal. This implies reduced satisfaction. And yet, a university with many students has a larger area, more social events and provides greater opportunities for networking, compared with a smaller university. This implies increased satisfaction. Nevertheless, a study by Wiers-Jenssen et al. (2002) has found that students at smaller institutions are somewhat more satisfied than students at larger institutions are. The relationship is, however, far from unambiguous.

Although there is not a clear relationship between the size of the institution and student preferences regarding facilities, we recognise that the academic profile may have an impact. The profile of the case university is geared towards professional studies, social sciences, business and natural sciences. It cannot be concluded nor is it obvious that students at more equipment-intensive institutions, such as those that specialise in the physical sciences, medicine and technical disciplines, have the same preferences towards university facilities as do the respondents to in the current survey. Hence, the results from this study should be treated with care when applied to institutions with academic profiles that differ significantly from the case university.

An additional weakness with the study is that foreign students are not included in the survey. Approximately 10 percent of the enrolled students at UoN are from countries outside Norway. It is difficult to know if some of these students have different preferences with respect to

university facilities than Norwegian students. If this is the case, the results will not be directly transferable to other Norwegian universities that have a large share of students from countries outside Norway. However, foreign students are far from a homogenous group. Cultural differences may influence how students emphasize the importance of different facilities, but in a study situation, it is reasonable to assume that the role as a student is more important than nationality. We are not familiar with research that focuses on exactly this problem.

Despite the above limitations, this article represents a first attempt to assess the influence of university facilities on student satisfaction and to identify which facilities at an HEI are the most important for student satisfaction. For smaller universities with an academic profile that corresponds to the case university, the survey results have a direct benefit. For larger institutions and institutions with academic profiles different from that in our case study, the results must be treated with greater caution. Nonetheless, the method applied must be relevant for student surveys regardless of the size of the institution, the composition of the student population or the academic profile of the university.

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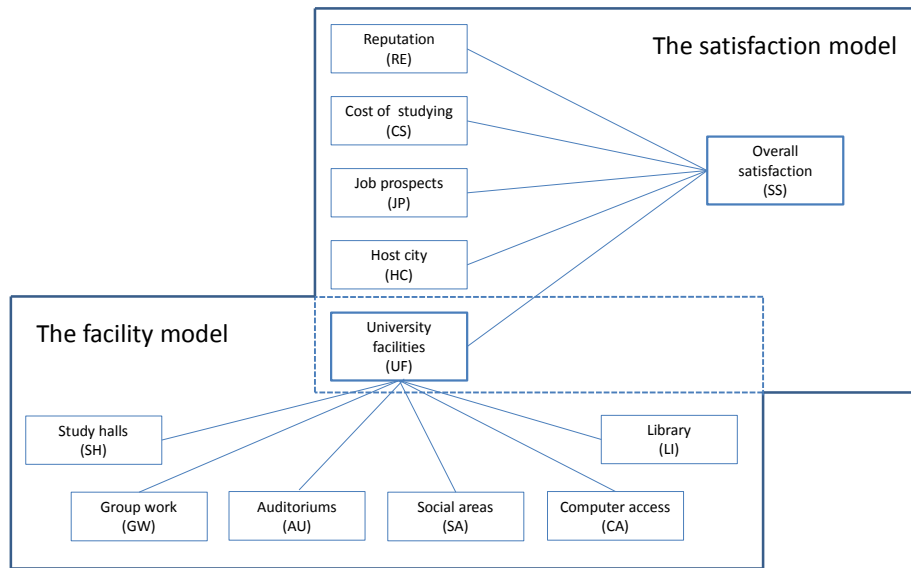


Figure 1: The relationship between the *satisfaction model* and the *facility model*.

Table 1: Demographic profile of sample and population.

		<i>Sample (A)</i>		<i>Population* (B)</i>		<i>Difference (A-B)</i>
		Frequency	Percent	Frequency	Percent	<i>(percentage points)</i>
Gender	Female	955	65.6%	3 319	63.4%	2.2
	Male	500	34.4%	1 913	36.6%	-2.2
Age	24 and under	455	31.2%	1 822	34.8%	-3.6
	25 to 34	433	29.7%	1 582	30.2%	-0.5
	35 to 44	291	20.0%	1 037	19.8%	0.2
	45 to 54	232	15.9%	666	12.7%	3.2
	55 and over	46	3.2%	133	2.5%	0.7

*Norwegian students at the University of Nordland.

Table 2: Summary statistics of dataset used to estimate the *satisfaction model*.

<i>Variable name and code</i>	<i>Definition</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>Overall satisfaction (SS)</i>	Overall satisfaction: university	3.69	0.97	1	5
<i>University facilities (UF)</i>	Satisfaction: university facilities	4.00	0.86	1	5
<i>Host city (HC)</i>	Satisfaction: university host city	3.86	0.99	1	5
<i>Job prospects (JP)</i>	Satisfaction: job prospects	4.06	0.89	1	5
<i>Costs of studying (CS)</i>	Satisfaction: costs of studying	3.72	1.14	1	5
<i>Reputation (RE)</i>	Satisfaction: reputation	3.76	1.14	1	5

Table 3: Pairwise correlation matrix of the explanatory variables used to estimate the *satisfaction model*.

	<i>UF</i>	<i>HC</i>	<i>JP</i>	<i>CS</i>	<i>RE</i>
<i>UF</i>	1.00	0.42*	0.34*	0.37*	0.58*
<i>HC</i>		1.00	0.36*	0.27*	0.44*
<i>JP</i>			1.00	0.34*	0.43*
<i>CS</i>				1.00	0.41*
<i>RE</i>					1.00

*Indicates correlation coefficients statistically significant at the 5 percent level or better.

Table 4: Summary statistics of dataset used to estimate the *facility model*.

<i>Variable name (code)</i>	<i>Definition</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>University facilities (UF)</i>	Overall satisfaction: university facilities	4.00	0.86	1	5
<i>Library (LI)</i>	Satisfaction: library	4.22	0.86	1	5
<i>Computer access (CA)</i>	Satisfaction: computer access	3.96	1.01	1	5
<i>Study halls (SH)</i>	Satisfaction: study halls	3.60	1.22	1	5
<i>Group work (GW)</i>	Satisfaction: rooms for group work	3.24	1.26	1	5
<i>Auditoriums (AU)</i>	Satisfaction: auditoriums	3.77	0.99	1	5
<i>Social areas (SA)</i>	Satisfaction: social areas	3.92	0.91	1	5

Table 5: Pairwise correlation matrix of the explanatory variables used to estimate the *facility model*.

	<i>LI</i>	<i>CA</i>	<i>SH</i>	<i>GW</i>	<i>AU</i>	<i>SA</i>
<i>LI</i>	1.00	0.50*	0.39*	0.28*	0.29*	0.40*
<i>CA</i>		1.00	0.52*	0.41*	0.30*	0.36*
<i>SH</i>			1.00	0.63*	0.33*	0.34*
<i>GW</i>				1.00	0.32*	0.30*
<i>AU</i>					1.00	0.48*
<i>SA</i>						1.00

*Indicates correlation coefficients statistically significant at the 5 percent level or better.

Table 6: Multiple regression estimates of the *satisfaction model*.

Dependent variable: Student satisfaction (SS)

	Coefficient	Robust Std. Err	t-values
Constant	0.661	0.190	3.47 ***
β_{UF}	0.134	0.042	3.14 ***
β_{HC}	0.161	0.036	4.50 ***
β_{JP}	0.003	0.041	0.07
β_{CS}	0.080	0.028	2.85 ***
β_{RE}	0.423	0.043	9.91 ***

Summary statistics: N=824, R²=0.40, F-value=85.07

Level of significance: *** indicates $p < 0.01$ (two-tailed).

Table 7: Multiple regression estimates of the facility model.

	Coefficients	Robust Std. Err	t-values
<i>Constant</i>	1.116	0.163	6.86 ***
β_{LI}	0.143	0.037	3.89 ***
β_{CA}	-0.008	0.034	-0.25
β_{SH}	0.063	0.031	2.04 ***
β_{GW}	0.093	0.029	3.24 ***
β_{AU}	0.177	0.031	5.62 ***
β_{SA}	0.274	0.040	6.90 ***

Summary statistics: N = 891, $R^2 = 0.34$, F-value = 61.66

Level of significance: *** indicates $p < 0.01$ (two-tailed).