Saint Petersburg State University
Graduate School of Management
Master of Business Analytics and Big Data

ANALYSIS OF NON-ACADEMIC ASPECTS INFLUENCING STUDENT SATISFACTION

Consulting project

Master's Thesis by the 2nd year student
BM.5783.2021 - Master's in Business Analytics and Big Data
Golubeva Polina, Klemeshova Ekaterina
Research Advisor:
Sofia. V. Zhukova
PhD in Computer Science, IT in Management Department

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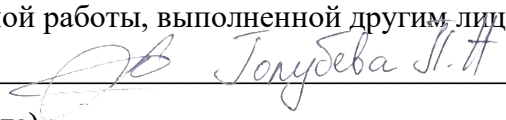
ЗАЯВЛЕНИЕ О САМОСТОЯТЕЛЬНОМ ХАРАКТЕРЕ ВЫПОЛНЕНИЯ ВЫПУСКНОЙ КВАЛИФИКАЦИОННОЙ РАБОТЫ

Я, Голубева Полина Андреевна, студент второго курса магистратуры направления « Бизнес аналитика и большие данные», заявляю, что в моей магистерской диссертации на тему «Анализ неакадемических факторов влияния на

удовлетворенность студентов», представленной в службу обеспечения программ магистратуры для последующей передачи в государственную аттестационную комиссию для публичной защиты, не содержится элементов плагиата.

Все прямые заимствования из печатных и электронных источников, а также из защищенных ранее выпускных квалификационных работ, кандидатских и докторских диссертаций имеют соответствующие ссылки.

Мне известно содержание п. 9.7.1 Правил обучения по основным образовательным программам высшего и среднего профессионального образования в СПбГУ о том, что «ВКР выполняется индивидуально каждым студентом под руководством назначенного ему научного руководителя», и п. 51 Устава федерального государственного бюджетного образовательного учреждения высшего образования «Санкт-Петербургский государственный университет» о том, что «студент подлежит отчислению из Санкт-Петербургского университета за представление курсовой или выпускной квалификационной работы, выполненной другим лицом (лицами)».



_____ (Подпись студента)

01.06.2023(Дата)

STATEMENT ABOUT THE INDEPENDENT CHARACTER OF THE MASTER THESIS

I, Golubeva Polina Andreevna, (second) year master student, program «Master in Business Analytics and Big Data», state that my master thesis on the topic «Analysis of non-academic aspects influencing student satisfaction», which is presented to the Master Office to be submitted to the Official Defense Committee for the public defense, does not contain any elements of plagiarism.

All direct borrowings from printed and electronic sources, as well as from master theses, PhD and doctorate theses which were defended earlier, have appropriate references.

I am aware that according to paragraph 9.7.1. of Guidelines for instruction in major curriculum programs of higher and secondary professional education at St. Petersburg University «A master thesis must be completed by each of the degree candidates individually under the supervision of his or her advisor», and according to paragraph 51 of Charter of the Federal State Institution of Higher Education Saint-Petersburg State University «a student can be expelled from St. Petersburg University for submitting of the course or graduation qualification work developed by other person (persons)».

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01.06.2023 (Date)

ЗАЯВЛЕНИЕ О САМОСТОЯТЕЛЬНОМ ХАРАКТЕРЕ ВЫПОЛНЕНИЯ ВЫПУСКНОЙ КВАЛИФИКАЦИОННОЙ РАБОТЫ

Я, Клемешова Екатерина Андреевна, студент второго курса магистратуры направления « Бизнес аналитика и большие данные», заявляю, что в моей магистерской диссертации на тему «Анализ неакадемических факторов влияния на

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Клемешова Екатерина Андреевна (Подпись студента)

01.06.2024(Дата)

STATEMENT ABOUT THE INDEPENDENT CHARACTER OF THE MASTER THESIS

I, Klemeshova Ekaterina Andreevna, (second) year master student, program «Master in Business Analytics and Big Data», state that my master thesis on the topic «Analysis of non-academic aspects influencing student satisfaction», which is presented to the Master Office to be submitted to the Official Defense Committee for the public defense, does not contain any elements of plagiarism.

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Клемешова Екатерина Андреевна (Student’s signature)

01.06.2023 (Date)

INTRODUCTION

The number of higher education institutions is increasing every year. Every year, new educational programmes appear, and there is therefore increasing competition not only between applicants, but also between universities. Universities have a constant need to improve their campuses and research centers because applicants are becoming more finicky in their choices. Universities spend millions each year to advertise and attract the most talented students. However, the best advertising is likely to be only feedback from university students.

For this reason, in order to maintain their competitiveness, universities need to monitor student satisfaction, for which many aspects of the learning process are important. With the increasing complexity of the education system comes the need for more sophisticated models that allow for non-obvious conclusions and detailed analysis of the findings.

Universities want to retain their students, and assessing their satisfaction can help identify areas that need improvement and address them accordingly. This can help prevent students from dropping out or transferring to other institutions. Along with this student satisfaction is closely linked to a university's reputation. If students are happy with their experience, they are more likely to recommend the institution to others, which can lead to increased enrollment and a positive reputation. Assessing student satisfaction can help universities identify areas where they need to improve the quality of education they offer. This can include things like curriculum, teaching methods, and resources.

Also, universities want their students to succeed, and assessing their satisfaction can help identify factors that contribute to their success. This can include things like access to support services, opportunities for internships and networking, and overall satisfaction with their academic experience. Assessing student satisfaction is a way for universities to hold themselves accountable for providing a high-quality educational experience. It shows that they are committed to meeting the needs of their students and are willing to make changes to improve their experience.

The main goal of this study is to identify factors that could influence non-academic student satisfaction. This direction was chosen based on the fact that the fastest changes that a university can make are often not related to the academic process. The curriculum is approved for several years ahead, but the university has the opportunity to quickly influence other aspects of student life.

The first chapter examines the main shortcomings of the current approach, including the time it takes to complete the survey and its complexity in identifying influencing factors. As a result of the literature analysis, factors were identified that were later used as a basis for the survey in chapter 3. The factors considered in other researchers' studies often include factors directly related to the learning process, such as lecture quality and teacher qualifications, and are not related

to, for example, convenience of classrooms, sports sections, or laboratories. The study showed that Structural equation modeling is most commonly used for assessing student satisfaction, and sometimes this method is used to search for factors that later become the basis for building neural networks.

The second chapter discusses the methodology of using structural equation modeling. Structural equation modeling is a statistical technique used to analyze complex relationships between multiple variables. It is a method of constructing and testing models that explain the relationships among different variables. SEM can be used to analyze both observed and latent variables, and it allows researchers to test hypotheses about causal relationships between variables. SEM can also be used to estimate the strength and direction of these relationships, as well as to identify potential sources of measurement error or bias in the data. Overall, SEM is a powerful tool for understanding complex systems and relationships between different factors.

In the third chapter, based on interviews conducted with several undergraduate students and literature from chapter 1, the main factors that could influence student satisfaction with their non-academic life were identified. After data collection, one factor related to dormitories had to be excluded due to insufficient data. The remaining model included factors such as University's atmosphere, Professional development opportunities, University's support, Extracurricular activities, Canteen, vending machines, Career Center, Study office, International office, IT resources, Classrooms / places of individual studies, Appearance of buildings/territory. It was hypothesized that these factors affect non-academic student satisfaction, which in turn affects overall satisfaction, which in turn affects loyalty. In the result of the research, it was found that only 5 out of 11 factors were significant. These factors were University's atmosphere, Professional development opportunities, Career Center, Study office, and International office. It was also revealed that these factors indirectly influence loyalty through non-academic and overall student satisfaction.

Chapter 1. Student satisfaction overview

1.1 Problem statement

1.1.1 Company description

The Graduate School of Management of St. Petersburg State University (GSOM SPBU) is a business school located in St. Petersburg, Russia. It was originated in 1993, the school has quickly become one of the top institutions for management education in the country and beyond. The school is focused on innovation and research, it gives a number of programs for people who are looking to link the careers in management. It provides MBA (in 2023: Executive MBA, MBA-challenges in digital world program, double degree executive MBA GSOM and ALMAU), Master's degree (Master in management, corporate financ, Business analytics and big data, Smart city management), bachelor degrees (management, international management, public administration) and PhD in Management programs. The school's curriculum is designed to provide students with a comprehensive understanding of management principles and practices, skills and knowledge requires to reach a success in current business environment.

One of the main advantages of GSOM SPBU is its faculty, which consists from the most talented and experienced professionals in the sphere of management. The school's stuff is highly engaged in researches, conferences. As a result, they are able to give students the latest knowledge about the most recent practices in management.

Moreover, the school managed to create a big number of business partnerships in our country and abroad, it gives students access to a huge list of opportunities for internships, networking, and career prospects.

Another notable advantage of GSOM SPBU is the fact that it attracts students from wide range of locations. It welcomes students from over 30 countries, by creating a dynamic and multicultural learning environment. This diversity enriches the educational experience for students but also prepares them for success in today's global business world.

Along with the giving bachelor and master programs, GSOM SPBU also provides executive education and consultancy services to different businesses in our country and beyond. The aim of the program is to help the managers and executives of current business conditions advance the knowledge required to go through business challenges.

Overall, GSOM SPBU is one of the leading institutions for studying management. With its innovative approach to teaching and research, strong ties to the business network, and big pool of talented students, the school is well-prepared to create a new successful generation of top-managers and executives that are able to work on global market.

GSOM SPBU has achieved numerous accomplishments in management, marketing, business administration fields. Here the list of the main achievements, which are valued the most:

1. International Accreditation: GSOM SPBU is one of the few business schools in Russia to receive international accreditation from prestigious organizations such as AACSB, EQUIS, and AMBA. In addition, it became the first Russian business school to be rewarded with all three aforementioned accreditations (also known as the triple crown accreditation)

2. Research Excellence: GSOM SPBU is known for its research excellence in various area of management and related areas. The faculty stuff has published their research in top-tier academic journals, as a result, the school is ranked in the top business schools in our country for research output every year.

3. Global Rankings: the university is regularly ranked among the top business schools in Russia and Eastern Europe by various global rankings such as Financial Times, QS World University Rankings, and Eduniversal.

4. Alumni Success: GSOM SPBU has a large network of successful alumni who are leaders in various industries and sectors. Many of them have top positions in prestigious multinational corporations, government agencies, and non-profit organizations.

5. Innovative Programs: the school offers innovative programs that suits for varying needs of business sphere. The university has created new programs such as the Executive MBA, Master of Digital Transformation, and Master of Supply Chain Management to address emerging trends in the industry. Overall, the school is recognized as a leading business school in Russia and Eastern Europe, with orientation on academic excellence, research, and innovation.

1.1.2 Current student satisfaction assessment methods and their shortcomings

Universities monitor the quality of education every year. This indicator is very important for accreditation and university development. Every semester GSOM SPbU assesses student satisfaction with the courses taken. To collect data, students take a survey, which is directly related to the teacher's work. A more comprehensive survey is also conducted by the SPbU Centre for Monitoring Educational Quality. The purpose of this survey is to find out the students' opinion on the conditions of education programs in the academic year 2022-2023. This survey collects many questions ranging from the ease of navigation in the university to the quality of knowledge received.

The disadvantage of this approach to evaluation is that such surveys most often do not assess satisfaction, but rather try to find its causes. As a result of such surveys, we have a set of questions and response statistics, but it is not possible to identify the impact of individual components on overall satisfaction. The key objective of such surveys is to find problem areas.

Often, a full-fledged study of the causes of student satisfaction requires asking a large number of questions. The SPbU Education Quality Monitoring Centre survey is adaptive and

changes in case a student notes low satisfaction with some parameter. A negative response is followed by a set of questions which help to better identify the source of the problem. Such a survey takes about 30 minutes to complete, making students less willing to agree to complete it. This careful selection of questions is both a plus and a minus. The advantage is that the exact cause of dissatisfaction can be found, and the disadvantage is that such detail increases the time taken to complete and reduces the response rate.

It is only possible to collect a significant number of responses to such a questionnaire at university level, if such a questionnaire is applied at faculty level, the number of responses will be small. Although the questionnaire includes a choice of campus and department, the questions are generic enough that they can be applied to the whole university and not to a particular department.

As mentioned earlier, such surveys are aimed at finding problem areas and collecting statistics without investigating the factors affecting satisfaction. However, such factors may differ from faculty to faculty. If we look at the psychological profile of the humanities and the technology, we notice that for people whose profession is directly related to communication, attending meetings where there is an opportunity to express themselves and gain useful acquaintances is much more important than for people whose activities are related to technical developments. For this reason, questions arise: "Is it possible to collect statistics to investigate the satisfaction of totally different students?"

Given that in order to build a long-term development strategy one needs to understand which satisfaction factors to focus on to a greater or lesser extent, collecting information on current issues is not well suited to such a task.

1.2 Theoretical background and literature overview

1.2.1 Customer satisfaction overview

Customer satisfaction is how satisfied customers are with the products or services they have purchased from a company. Various research methods are used to predict customer satisfaction, such as the use of customer surveys, focus groups, social media monitoring, and data analysis. Keeping track of customer satisfaction is necessary for several simple reasons:

- Satisfied customers are more likely to return and recommend products or services to their friends and acquaintances, resulting in more customers.
- Studying customer satisfaction helps to understand which aspects of their products or services need improvement, which can lead to increased product competitiveness.
- Customer satisfaction surveys help companies better understand their target audience and develop more effective marketing strategies.

- If customers are not satisfied, it can lead to a company's poor reputation, lower sales and loss of customers.

The factors that affect customer satisfaction depend on the type of business and may include product or service quality, service level, delivery, pricing, information support, reputation, company culture, etc. These factors will vary depending on what the company is producing. Let's look at a few different areas of business to better understand customer satisfaction.

Case 1: Cloud service

Industry: cloud computing

Data collection: Survey of 419 experts/cloud service users was conducted using a Likert scale.

Methods: Structural equation model (PLS-SEM)

Factors: The study identified flexibility, service assurance, reliability, scalability, security, responsiveness of service and usability as positive influences. The study found a partial effect of mediating customer satisfaction among service quality and customer loyalty. Service quality has a positive and significant relationship with customer loyalty and customer satisfaction.

Case 2: Water utility company

Industry: The Maynilad Water Services Inc is responsible for supplying water to the west zone of Metro Manila.

Data collection: An online questionnaire was disseminated to 725 MWSI customers using the snowball sampling method to obtain accurate data.

Methods: Structural Equation Modeling (SEM) and Deep Learning Neural Network (DNN).

Factors: The study identified Assurance, Tangibles, Empathy, Expectations, Confirmation, Performance, and Water consumption as factors affecting MWSI customers' satisfaction. Results showed that affordable water service, providing accurate water bills, on-time completion of repairs and installations, intermittent water interruptions and professional employees contribute to the general satisfaction.

Case 3: Government's disaster response

Industry: Public services.

Data collection: 860 responses acquired through non-probability sampling.

Methods: Structural equation model (PLS-SEM).

Factors: The results show that quality of services, expectations and perceived fairness have a positive impact on people's satisfaction. Service delivery, equitable resource allocation and continuous improvement through feedback of government response become critical factors for the population. The situation of disaster is not significantly related to the expectations and satisfaction of the population. Public satisfaction is significantly related to public trust and the image of government, and public trust has a positive effect on the image of government.

Case 4: E-learning

Industry: Education

Data collection: Survey of 321 participants who studied E-learning.

Methods: Artificial Neural Networks (ANN)

Factors: Instructor attitude and response, Interaction in virtual classroom, Diversity in assessment, Workshop and explanations introduced, Internet speed, Type of learning course.

1.2.2 Student satisfaction overview

As competition between universities intensifies, the competitiveness of a university is directly related to the number and quality of students attracted, as well as their willingness to enrol or continue their studies at a particular university. University choice is directly linked to academic satisfaction of students, so it is important for universities to be aware of these building blocks of student 'happiness'.

Although the topic is relevant, there is still no unified evaluation system, and especially no unified criteria and factors by which student satisfaction could be measured. This lack can be explained by the fact that student satisfaction is influenced not only by the specific learning environment created by the university, but also by emotional and cognitive components.

In the book "The art of student retention" by Dr. Watson Scott Swail, the reasons why students may leave educational institutions are described. The author identifies 5 main reasons in total:

Academic Preparedness. Between 30 and 40 per cent of all incoming freshmen have problems with reading and writing, and about 44 per cent of all college students have taken additional courses in mathematics or writing at least once.

Campus Climate. Students who are minorities may have trouble adjusting and solving non-academic problems. The lack of diversity of students and even faculty often creates problems with academic performance and social experience for minority students.

Commitment to Educational Goals and the institution. According to the author: "The stronger the goal and commitment to the institution, the more likely a student will graduate from college. Active participation in academic and social communities positively influences students' attachment to the institution.

Social and Academic Integration. Establishing peer relationships and developing role models are also important factors in integration.

Financial Aid. For many low-income students, the decision to attend college and continue their education is determined by the availability of financial aid.

The author of the book offers his model of student sustainability and achievement. He focuses on (a) the cognitive and social attributes and (b) the institutional role in the student experience. The geometric model differs from the others in that the student is at the center of the model.

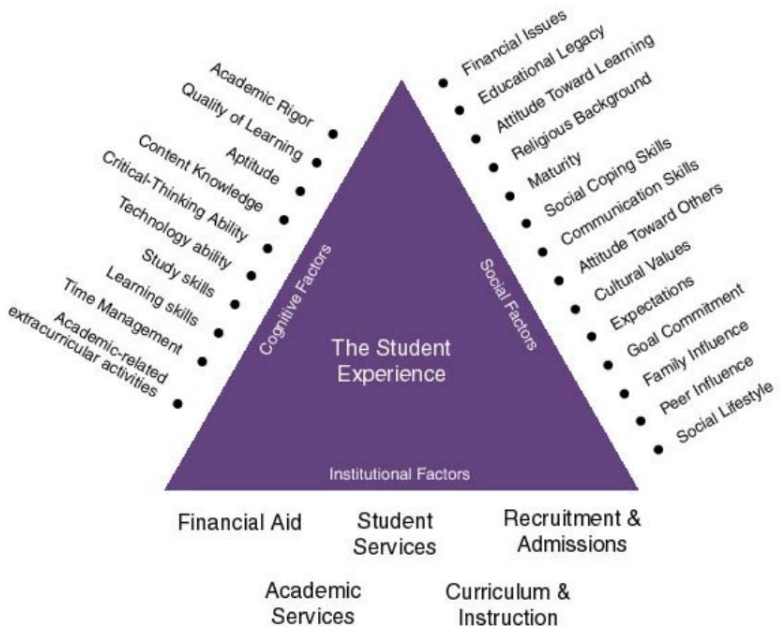


Figure 1. Geometric Model of Student Persistence and Achievement

Source: [Swail's, 2004]

Cognitive factors

Cognitive factors refer to a student's intelligence and academic ability. An important element of cognitive factors is students' ability to make decisions and solve problems.

Social factors

These factors include parental and peer support, development or career goals, educational background and ability to deal with social situations.

Institutional factors

Factors relating to course availability and content, quality of teaching, influence the student and his/her desire to enroll or remain in an institution. Mentoring and career counselling are particularly important. Alongside this, a flexible set of programs and the ability of the institution to be flexible to the needs of the students can be considered. In this model, the set of such factors is at the base of the triangle.

As mentioned earlier, there is no clear definition of student satisfaction, for example, the authors of the article "A hybrid SEM-neural network method for modeling the academic satisfaction factors of architecture students"(2023) distinguish in their study 4 different approaches to defining this notion.

First one of them assesses satisfaction as a proportion of students' mental evaluation and academic experiences. Students come to university with a set of aspirations and experiences that form the basis of their expectations of the university. The extent to which the university meets their expectations and needs determines their attitudes and degree of satisfaction.

Second assesses satisfaction as a mental evaluation of educational outcomes and experiences. In this approach, students assess their satisfaction through the experiences they have had during the learning process. The authors suggest that such satisfaction may include attitudes and feelings that may not be related to the quality of the learning process.

Third evaluates satisfaction as loyalty to the university. The higher the level of people's satisfaction, the more likely people are to reuse the services of their previous institution. Therefore, students' academic satisfaction can predict the level of students' loyalty to their educational centers. If students' level of loyalty to the university is high, their level of satisfaction is also high.

Fourth assesses satisfaction as a person's enjoyment and satisfaction with his/her role as a student. Satisfaction with education is considered as an emotional state which results from satisfaction with the current situation in the environment and the position of the student. The first part refers to individual factors and takes into account the personal characteristics of the student in achieving satisfaction, while the second part refers to institutional factors and includes all that universities can create for student satisfaction, and the third part is the factors that result from the interaction of the first two factors on each other. According to the authors of the article the definition of Academic Satisfaction of students is divided into three sections related to student, university and graduation.

1.2.3 Ways of measuring students KPI

The success of a university is measured not only by its academic achievements but also by the satisfaction, loyalty, engagement, and overall experience of its students. To evaluate these factors, various metrics have been developed, including the Net Promoter Score (NPS), Student Satisfaction Score (SSS), Student Loyalty Index (SLI), Student Engagement Score (SES), Student Experience Index (SEI), Student Retention Rate (SRR), Student Success Rate (SSR), Student Career Preparedness Index (SCPI), and Student Diversity Index (SDI). These metrics provide meaningful insights into the effectiveness of a university's services, programs, and policies in meeting the requirements and expectations of students. By monitoring it, universities can identify rooms for improvement and strengthen their overall reputation as a top institution for higher education.

Net Promoter Score (NPS) is a measure applied for evaluation of customer's trust, loyalty and goodwill in different areas. It is calculated by subtracting the share of respondents, who give a score from 0-6), from the number of respondents (those who give an NPS of 9-10) among the respondents in a survey. The resulting score ranges from -100 to +100, the bigger value indicates bigger loyalty and satisfaction. In education, this measure can be used to assess student satisfaction, alumni engagement etc. This measure has several advantages:

1. Simplicity of calculation: It is a simple and easy-to-understand metric that can be easily communicated to stakeholders.

2. Provide with actionable insights: the measure gives actionable insights that can help institutions identify areas for improvement and make necessary changes.

3. Can be used in benchmarking: this measure allows institutions to benchmark their performance against other institutions in the same industry. For example, recently consulting & research company Changellenge evaluated top 30 Russian Universities using this measure, as a result, NES takes 1st place in the rating of satisfaction with the quality of education while GSOM is on the second place.

Disadvantages of using Net Promoter Score:

1. Limited scope: NPS only measures customer loyalty and satisfaction, which may not provide a complete view of the institution's performance.

2. Lack of context: NPS does not provide context for why customers give a particular score, which may make it difficult to identify specific areas for improvement.

Student Satisfaction Score (SSS): This metric measures the student's general satisfaction with university experience. Among other things, it takes into account factors such as the quality of teaching and campus facilities, student support services, and social life. The SSS is usually calculated through surveys or feedback forms that are administered to students.

The student loyalty index (SLI) is the indicator that measures the level of loyalty that students have towards their university. The study assesses the percentage of students who are likely to recommend the university to others, how likely they are to continue studying at the university, and how committed student is in support for University's mission and values.

Student Engagement Score (SES): This metric measures the level of engagement that students have with their university. It is looking at the involvement of students in extracurricular activities, how frequently and regularly they attend events and workshops, as well as how much they interact with faculty and staff.

Student Experience Index (SEI): The SEI measures the overall experience of students at the university. It takes into account factors such as academic experience, career opportunities, campus culture etc.

This the student retention rate (SRR): It calculates percentage of students who continue to study at university after first year. It is an important indicator of student satisfaction and engagement.

Student Success Rate (SSR): The SSR measures the percentage of students who graduate from the university within a certain timeframe.

Student Career Preparedness Index (SCPI): The SCPI measures how well-prepared students are for their future careers. It analyzes factors such as career counseling, job placement and alumni network.

1.2.4 Approaches to measuring student satisfaction.

Customer satisfaction and loyalty scores are often used in marketing to predict customer departure. For example, a study by Chris Baumann, Greg Elliott and Suzan Burton found a non-linear relationship between customer satisfaction and customer loyalty. The authors used principal component analysis techniques for data reduction to develop a model that would help determine the profiles of customers who are likely to stay with the bank. They used bivariate and multivariate analyses to estimate the resulting variables. The result turned out to be switching costs, a unique predictor of long-term customer intentions to stay, and therefore a significant contributor to customer loyalty.

Such surveys of loyalty and satisfaction can also be applied to education. Buyers will be replaced by students, and instead of satisfaction with the quality of the product, satisfaction with the educational process can be investigated. In the case of students, the educational process includes not only academic aspects, but also factors that may not affect the amount of knowledge, but mostly affect the comfort of learning.

Satisfaction surveys most often use data from surveys of groups of interest. Since it is difficult to evaluate the detailed answers and it is unlikely that quantitative methods can be used on them, Likert-scale surveys are most often used during surveys.

For example, in a study by Anita Kéri and Erzsébet Hetesi (2021) the authors tried to find differences between university and non-university factors that might influence international students' satisfaction with their studies. They used structural equation modeling (SEM) and with the method of partial least squares (PLS) to estimate the coefficients of influence factors, as well as cluster analysis, to determine which groups the students might belong to. The result of the study revealed that the factors that are associated with the university are much more influential than those there not. However, it is difficult to call this conclusion obvious, because for international students, the comfort of living is very important.

Another study, Selim Ahmed and Muhammad Mehedi Masud (2014) conducted a student survey where the main factors of student satisfaction were: administrative service, tangibles, academic programmes, academic staff, delivery of teaching, assurance, and empathy. The study was conducted using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). As a result of the study 5 factors (responsiveness of academic staffs, tangibles, empathy, assurance, and academic programmes) were identified as direct influence factors and academic feedback and administrative service as indirect influence factors.

The topic of student satisfaction is not new, but it is difficult to say that it has been well researched. A study by Ceyhan Aldemir and Yaprak Gülcan at Dokuz Eylül University, Turkey (2004), found that students with high academic performance were satisfied not only with their teachers but also with the university. At the same time, even if the university administration is not working efficiently, students are still satisfied as long as they have good teachers. However, administrative problems may lead to the dismissal of teachers, after which a sharp drop in student satisfaction can be predicted.

Maria de Lourdes Machado, Rui Brites, António Magalhães and Maria José Sá (2011) conducted a study on the factors that could influence the choice of university and student satisfaction. The survey found that the most common answers were: "It was the best one for the subject I wanted", "It was near my home", "It has a good academic reputation".

When the authors moved on to a more detailed survey that looked at specific aspects of the university, they found that students were more concerned with the quality of teaching and the knowledge they could gain from the core courses, but that the relevance of these courses was only ranked 4th.

During the evaluation of academic support, the most important factor for students was the quality of library and computing resources, which ranked above “Quality of Laboratory facilities”.

When asked about the institution's processes and services, the most important factors were 'study spaces and lounges' and the 'support for students with special needs'. Sporting opportunities and extra-curricular activities were the least important to students, with the lowest level of satisfaction.

The use of Structural Equations Modeling is most common in the social sciences because of its ability to impute relationships between unobserved constructs (latent variables) from observed variables. The SEM method was also used in a study by Soolmaz Aghaei, Yaser Shahbazi, Mohammadtaghi Pirbabaei, Hamed Beyti (2023). The authors tried to create a multi-analytical approach by combining Structural Equations Modeling and Artificial Neural Networks. According to the authors, SEM is problematic to use in non-linear models (despite the good modelling in the complex interrelationships between multivariate data), in this case, this method can simplify the problem, together with its poor applicability to large data. To address the shortcomings, ANN will be used, which is effective for studying non-linear relationships in exploratory models and cases where the components are large.

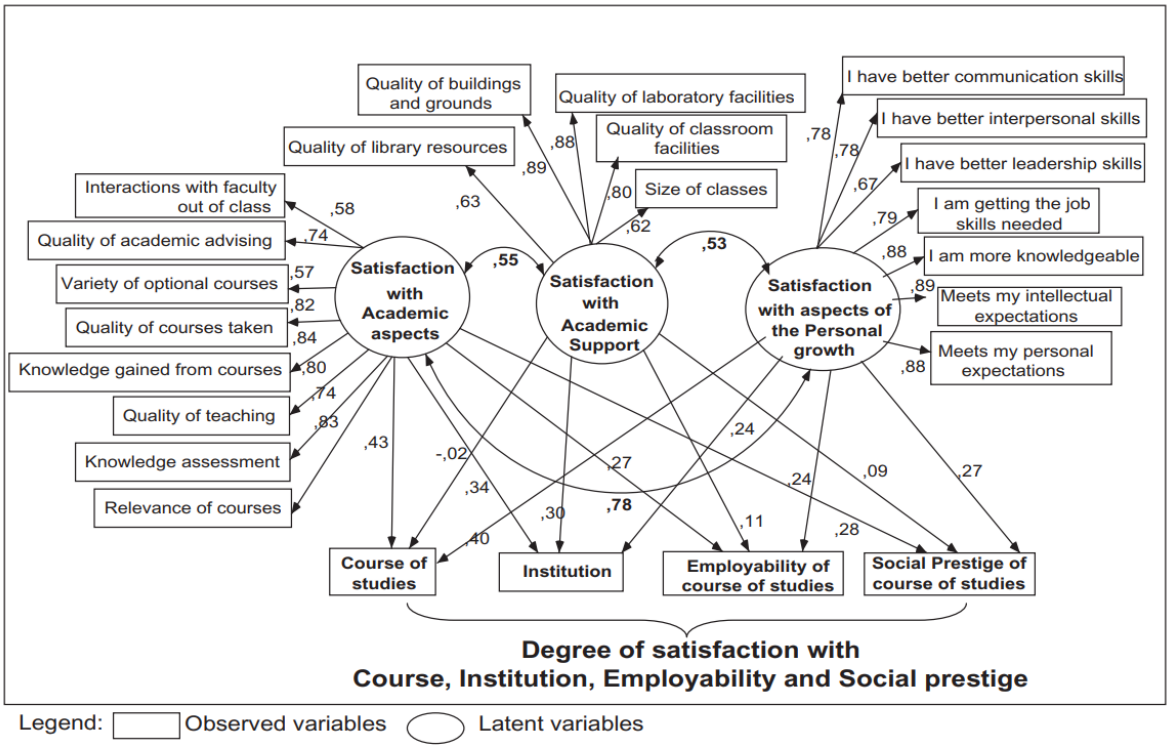


Figure 2. The result of SEM

Source: [Soolmaz, 2023]

In this study, the authors studied the academic satisfaction of architecture students using a balanced approach. After determining the degree of correlation and impact on the central concept, the components became inputs for the ANN. As a result, a model for measuring and predicting students' academic satisfaction was presented. Such a model should help the university to increase the level of academic satisfaction of the students.

Student satisfaction is a broad topic that is discussed on international conferences devoted to quality assurance of higher education at different perspectives. This theme is highly important because good quality of education as a service attracts top talents, drive competitiveness, increases academic level and productivity. To identify the determinants of satisfaction, it is required to use appropriate methods of data collection and data analysis. Then, the results should be integrated well into strategy of the university.

However, some studies consider students' feedback to be insignificant at evaluation of courses and education, for instance, Annamaria KAZAI ÓNODI. The author analyzed more than two thousand students' feedbacks during several semesters at the Corvinus University of Budapest. The researcher concludes good relations between teachers and student, seminars' content to be significant, while satisfaction score – not significant. The author stated that, despite of following the concept of 'students as a customer' introduced by Eagle, L. and Brennan, R. (2007). In the aforementioned article, researchers state that if student is considered as customer, the relationship between students and academic stuff can be harmed, as students can behave inappropriately and

state that ‘they are always right’ as they have a sense of that they actually desire. As a consequence, it damages the level of education and its standards. After analysis, they figured out that even if the majority of the students got positive intentions to improve universities, they do not cover all the costs (reputation losses, opportunity losses etc.) or take all risks, the universities must take trends, satisfy the needs of business and government. As a result, many universities do not place students’ happiness at the first place.

In contrast, the study made by Gibbs, Paul and Dean, Aftab (2015), state that education sphere is the same as any other business sphere as result customer should be prioritized. They used data from two universities in UK, applied seven-point category ranking and used it in regression models in order to test their hypothesis. Also, they chosen interview survey, focus groups, questionnaire for their research. As a result, they have identified more than 40 variables to be analyzed and separated into factors for cluster analysis. They recognized significant difference between males and females’ evaluation of education, for example, they identified that women were happier with learning process, studied more, were more confident about their future prospects after getting degree. Moreover, they listed ten most and least important factors. They identified social factor to be the most important for students’ happiness and satisfaction (it included: friends, safety while getting education, have support from family, consideration education as lifetime investment). In comparison to the Annamaria KAZAI ÓNODI research, this one considers relationship between teachers (establishing contact with them, enjoy the way of how they conduct studies, have or not to have interest in content) to be least significant factor. Taking into account several similar studies with the same contradicting results, we should dig deeper into the topic and add more factors into research to discovers factors are important for our exact university for our specific conditions.

One more study created by Javier Paricio Royo consider education as a product placed at competitive market and student as a customer because they choose university based on its reputation. Students invest in their future, ‘buy a chance for success’, increase probability to get prestigious job. Also, they are attracted to network of graduates and partners of it, which in turn makes them more satisfied with study process and more confident about their future.

Another study was conducted in Finnish university in 2005 by Mangeloja, Esa & Hirvonen, Tatu and compared to similar one from Australia. The studies measured students’ satisfaction with Likert Scale (from strongly agree to strongly disagree), surprisingly, Finnish scored significantly higher in ‘strongly agree’ plus ‘agree’, 86,6% against 68,5%. Also, the authors found negative correlation between satisfaction score and age of a student, however, they did not identify statistical difference between genders on the score, in comparison to Gibbs, Paul and Dean, Aftab (2015). In addition, the respondents noted that educational environment, facilities, level of

recourses make positive impact on their well-being while university reputation make no influence. Finally, they sufficient social relations to be the most influential factor at satisfaction score.

The study made by Bertaccini, B., Bacci, S., & Petrucci, A. (2020) evaluates overall satisfaction with education process based on data gathered from two thousand graduates within 2014-2017 at Florence university using AlmaLaurea surveys (special statistical questionnaire for graduates from 75 Italian universities on the profile, motivation, individual characteristics and employment status, conducted early). They identified latent variables that contribute to the quality of education and assessed by applying Structural Equation Models (Figure 3.). The authors created Customer Satisfaction Indices based on European Customer Satisfaction Indices, that gives holistic evaluation of education process.

The final model (Figure 4.) included eight factors based on 39 different variables (initially they have chosen 41, but 2 of them were statistically insignificant):

- MOTIV: intention to attend university, professional interest in chosen program
- EXPE: expectations about their status at labor market after graduation, earning and career perspectives;
- QUAHW: quality of using experience of internal facilities of the institute, for example, their attitude to libraries, laboratories, and classrooms;
- QUAUW: satisfaction of interacting with of teachers and other university staff members, their perceived level of professionalism;
- VALU: perceived satisfaction of the university experience, the relation between given efforts and overall result;
- LOYA: desire to advice the program to the others, or continue education in the university, loyalty to the institute;
- EFFIC: relation between degree program and job. How acquired skills correspond to real business needs, utility of the degree;
- TRAIN: the need of additional courses/ trainings after getting a degree to get a desired work;

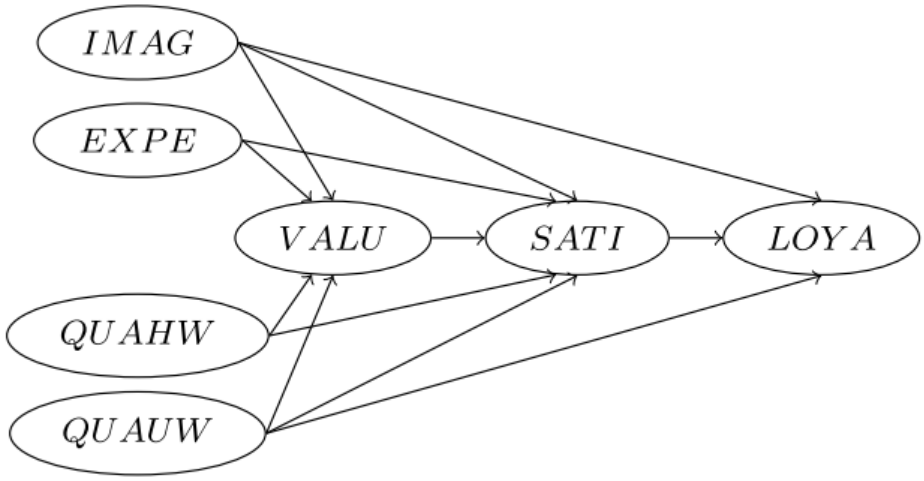


Figure 3. Structural part of the theoretical ECSI SEM

Source: [Bertaccini, B., 2020]

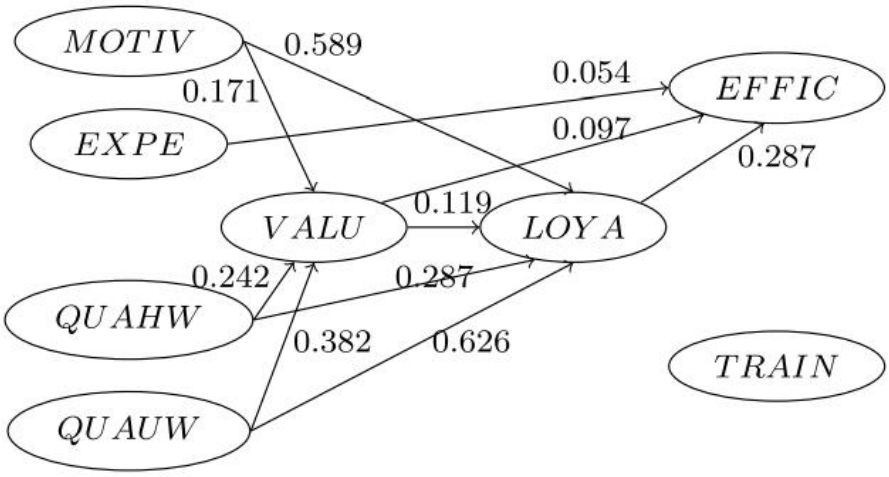


Figure 2. Structural part of the final modified ECSI SEM, relations among latent variables: standardized path coefficient (significance level: 5%)

Source: [Bertaccini, B., 2020]

Then they evaluated how these factors influence fourteen types of degree program (from science to sport). As a result, they identified that QUAUW (teachers, stuff members) has the highest positive impact on evaluation of programs related to health, engineering, and education. Whereas the quality of university's facilities influences loyalty to the institute. Also, they detected that satisfaction is highly influenced by VALU (efforts taken and the final result) while LOYA is impacted by satisfaction.

Another article written by Nehme Azoury, Lindos Daou, Charbel EL Khoury (2014) studies how different components of brand image of university make impact on student's satisfaction rate. They analyzed students' data who studies at private business schools at middle

east and figured out that universities' partnerships\relationships is the only factor that actually make impact on satisfaction.

Some studies are related to student's lifestyle, consumption patterns, social life and its influence on life satisfaction. For example, the article created by Solbjørg Makalani Myrtveit Sæther, Marit Knapstad, Kristin Gärtner Askeland, Jens Christoffer Skogen (2019) analyzed data on more than thirteen thousand students from ten welfare Norwegian organization. The authors checked the influence of socio-demographic (age, number of semesters in university etc.) variables and level of alcohol consumption on life satisfaction, mental health, loneliness. They conducted regression analysis to test their hypothesizes and figured out that students with high level of alcohol consumption have lower life satisfaction score, tend to have more mental health problems, feel lonelier, have a smaller number of friends in comparison to students with low consumption.

1.3 Research goal and objectives

1.3.1 Managerial problem

At the moment GSOM SPbU conducts surveys mainly for academic courses. However, overall student satisfaction is also influenced by satisfaction with services and extracurricular activities. The current surveys are not quite suitable for evaluating other aspects of student life, through them it is impossible to determine the most important factors affecting satisfaction. This improved understanding of the factors influencing student satisfaction is essential for choosing the best school development strategy.

1.3.2 Research goal

The aim of this research is to identify the main factors (determinants) and their influence on the satisfaction of students of the Graduate School of Management at St. Petersburg State University with extracurricular activities and the school's services provided. Practical applications of the research on student satisfaction with university and non-academic activities could include improving existing services, developing new services, and enhancing extracurricular activities to better meet the needs and expectations of students. The results of the study could also be used to inform policies and decision-making processes related to student life and campus culture.

1.3.3 Research tasks

- Analyze existing methods of satisfaction assessment conducted by the university.
- Review relevant research in the field of service quality and/or university assessment.

- Conduct interviews with students, gathering information on what services they use and what criteria they use to evaluate them.
- Create a survey that includes the main services and extracurricular activities in which students are involved.
- Collect data from the survey and conduct an analysis using SEM modeling methods to evaluate the key factors that influence the level of student satisfaction.
- Identify key factors that influence student satisfaction that are not related to academic activities.

1.3.4 Expected results

- Creating a general student satisfaction assessment model that is not directly related to the courses taught.
- Identification of key factors of student satisfaction with non-academic activities and services
- Creation of recommendations based on the findings.
- Recommendations for further development of the model

1.3.5 Practical application

- The result can be used by the university / its services to improve the level of services provided.
- The result can be applied to develop an effective strategy for service development and non-academic activities.

1.3.6 Limitations on research

The study does not include an assessment of academic influences (e.g. quality of lectures, level of teaching, etc.). Therefore, overall student satisfaction will be assessed through student satisfaction with services and non-academic activities. The assessment is based only on the key criteria that were identified during the survey of students on what they consider important while using the services and participating in non-academic activities.

Summary

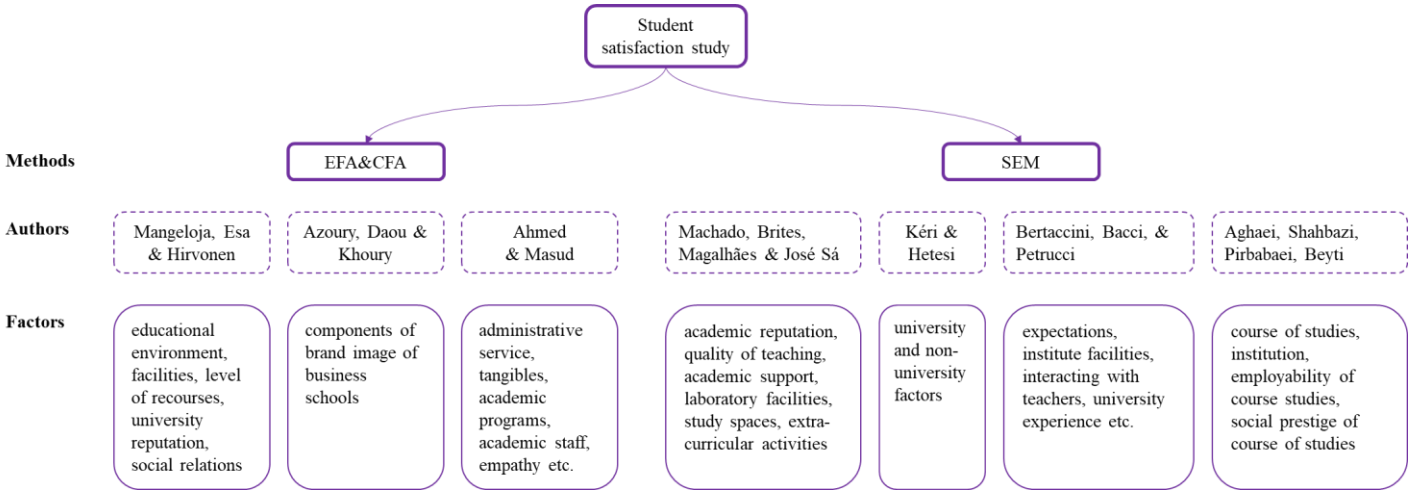
At present, the main issue is that there is no unified approach to assessing student satisfaction that is not related to academic activities. All surveys are aimed more at identifying problem areas and collecting statistics than at researching the factors that influence student satisfaction. However, to develop an effective strategy in conditions of limited resources, it is necessary to understand which factors can have the strongest impact on student satisfaction.

The analysis showed that the study of factors influencing student satisfaction is a hot topic, many of the studies conducted were written no more than 10 years ago. This is evidenced by the large amount of diverse literature, which uses completely different approaches to assessing satisfaction. The most common approach is Structural Equations Modeling.

Almost every study examined different groups of factors, which included not only academic satisfaction, but also students' psycho-emotional well-being, mental health, as well as the social environment around, teachers' interaction with students, social life, and future career opportunities. Some studies also conducted cluster analysis, which allowed students to be divided into groups and to make predictions for each individual cluster, predicting the behaviour of the individual group.

As a result of this analysis, it can be concluded that modelling using SEM method is popular. (Table 1). The trend towards using neural networks is gaining popularity, so newer studies use SEM in combination with ANN.

Table 1. Literature summary



Source: [author research]

Based on the problem, the following tasks were identified: conducting a literature review and communicating with students to identify key factors for evaluation, creating and conducting a

survey to gather data, analyzing and identifying key factors influencing non-academic student satisfaction using the Structural Equation Modeling method.

This study does not evaluate the impact of academic factors such as the standard of teaching and quality of lectures. As a result, the evaluation of student satisfaction will be based solely on their satisfaction with non-academic activities and services. The evaluation will focus on the primary criteria that students identified as significant during the survey, regarding their use of services and participation in non-academic activities.

Chapter 2. Methodology

According to the analysis, the investigation of factors that affect student satisfaction is currently a popular subject, and many of the studies conducted on this topic are relatively recent, within the last decade. This is supported by a vast and varied body of literature that employs various methods for evaluating satisfaction. Structural Equation Modeling allows researchers to test complex relationships between variables, which is particularly useful when studying customer satisfaction, as it is influenced by multiple factors. Also, Structural Equation Modeling can be used to identify causal relationships between variables, which can help researchers to understand the underlying mechanisms that drive customer satisfaction. For these reasons, this method was chosen for further research.

2.1 Procedure of Structural equation modeling

To investigate the factors that have the greatest impact on non-academic student satisfaction, we will use the most common method of analysis. Structural equation modeling is a set of methods. The SEM family of methods takes as its base the regression analysis of observed variables and the factor analysis of latent variables. SEM was developed in the early 20th century but was initially close to exploratory factor analysis. The biogeneticist Sewell Wright then developed the basics of path analysis. The idea was how observed covariances could be related to direct and indirect effect parameters among a set of observed variables. Wright was the first to use path diagrams - graphical representations of causal hypotheses. Factor analysis and path analysis were combined in the early 1970s in the work of three authors, K. G. Jöreskog, J. W. Keesling, and D. Wiley.

The main purpose of SEM is to model the relationships between measured and latent variables. Most often this method is used to confirm and test various hypotheses. Therefore, it is necessary to have a preconceived concept before starting modelling. The first step is to identify hypotheses about relationships between variables in the model, so SEM is not a pure research tool. SEM will not be able to find relationships between variables other than those specified. For the case where it is difficult to work out any concept and assume dependencies, it is better to use EFA.

The main components of the SEM model:

1. measurable variables
2. latent variables
3. hypothetical relationships between variables

The main steps of the SEM model

The process of designing a model begins with the creation of indicator variables and a conceptual model, which are established beforehand in order to organize an appropriate SEM

framework. In the case of conducting a survey, indicator variables are naturally linked to questionnaire responses. (Fig. 1) The initial step in SEM modeling design is typically an EFA, which is necessary to analyze the nature of latent constructs and provide a preliminary understanding of the relationships between measured variables and their corresponding factors. This is followed by a CFA, which confirms factor structures based on EFA investigation and theoretical knowledge. The CFA result pertains to the measurement aspect of the SEM model, which outlines the loadings of indicator variables on corresponding latent factors. The next step involves deriving both the measurement and structural parts of the SEM model, which reveals estimated interrelations and causal relationships between treated variables. Lastly, model-fit indices are calculated to assess the quality of the model's fit to actual data. If these indices indicate poor performance, additional modifications to the model must be made.

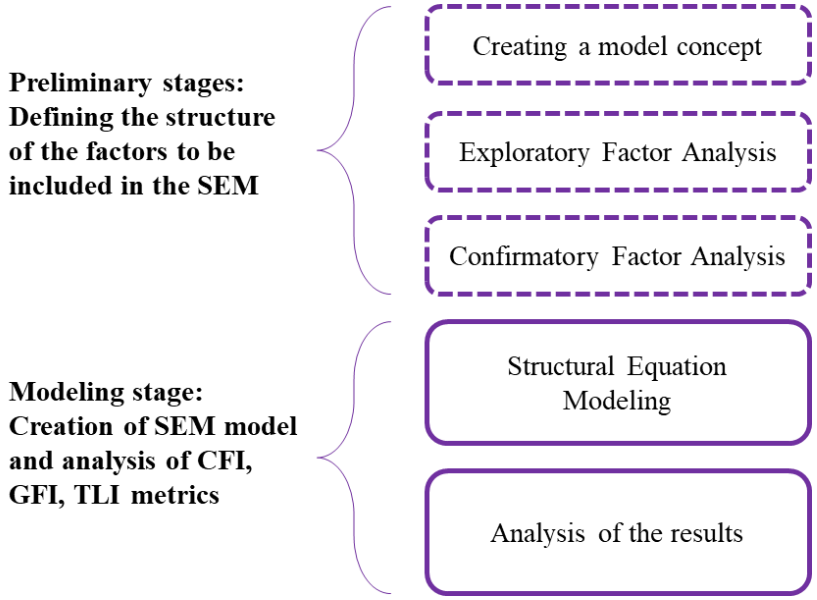


Figure 5. Process of SEM modeling

Source: [author research]

Factor analysis is a statistical technique that aims to explain the variability among observed variables by identifying a smaller number of unobserved "factors". This involves modeling measured variables as linear combinations of these factors, which can help to identify the nature and number of underlying latent factors responsible for variability in the data. Additionally, factor analysis can determine the extent to which each observed variable can be explained by each factor. There are two main types of factor analyses: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA is useful when searching for a structure among variables or employing data reduction, while CFA is useful when there are preconceived ideas about the structure based on theoretical support or prior research. CFA can assess the degree to which the data fits the expected structure.

2.1.1 Preliminary stage: Confirmatory and Exploratory Factor Analysis

There are two categories of factor analysis: exploratory (EFA) and confirmatory (CFA). EFA does not require a priori specification of the number of factors. EFA computer procedure could theoretically generate all possible solutions, from a one - factor model up to a model with as many factors as indicators, but CFA, the researcher must always specify the exact number of factors. There are two big differences between this methods:

- EFA indicators are allowed to depend on all factors - it is unrestricted measurement models.

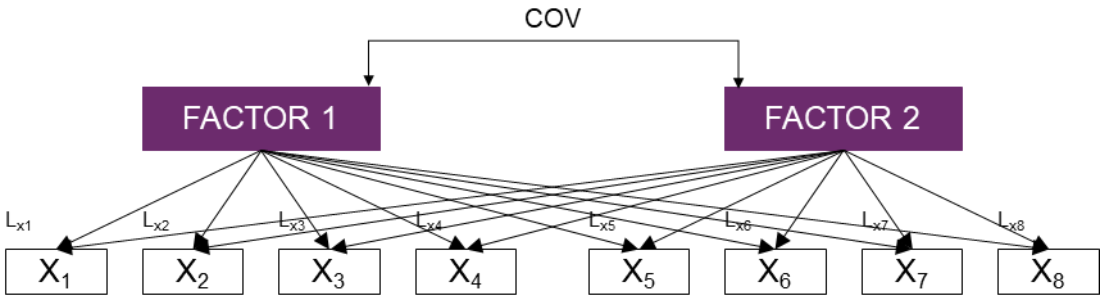


Figure 6. Unrestricted model

Source: [author research]

- CFA indicator is allowed to depend on only the factor(s) specified by the researcher – it is restricted measurement models.

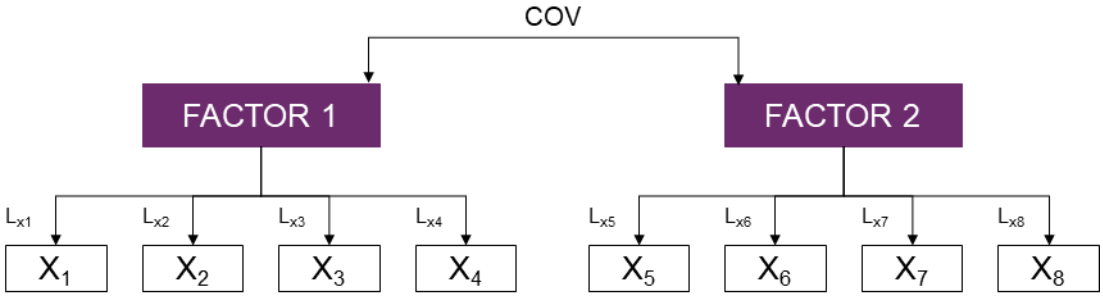


Figure 7. Restricted model

Source: [author research]

Models with multiple factors in EFA are not actually identified because such models have more free parameters than observations. Thus, there is no unique set of statistical estimates for a particular multifactor EFA model. This property concerns the rotation phase in EFA. In contrast, CFA models must be identified before they can be analyzed, so there is only one exclusive set of parameter estimates. Accordingly, CFA has no rotation phase.

It is generally assumed in EFA that the specific variance of each indicator is not shared with that of any other indicator. But CFA permits, depending on the model, estimation of whether specific variance is shared between certain pairs of indicators (i.e., error correlations).

Confirmatory factor analysis is used to test hypotheses of commonality between variables. With CFA it is possible to test several hypotheses simultaneously, which eventually form a measurement model. The model has at least 4 components: a minimum of two variables and indicators. Variability in indicator scores is due to latent variables and measurement error. Latent variables are not observable. Measurement error is indicator variability not attributable to latent variables. The extent to which the variability of indicator estimates can be attributed to latent variables is determined by the loadings - coefficients - estimated in the measurement equations, in which the indicators regress on the latent variable(s) hypothesized to affect them.

2.1.2 Modeling stage: Structural Equation Modeling

Structural equation modeling is a statistical technique that aims to explain the relationships among multiple variables by examining a set of equations that reveal all of the relationships among the constructs involved in the analysis. The constructs are unobservable latent factors that can be represented by multiple variables. SEM combines the confirmatory factor analysis and regression analysis to depict a variety of different relationships between these factors. The technique involves estimating the relations between the measured and latent variables (the measurement model) and the relations among the latent variables themselves (the structural model). In SEM, variables can be either exogenous or endogenous, and the whole set of interrelations like direct, indirect, multiple and reversed can be applied. SEM is gaining popularity because it combines multiple techniques to provide a comprehensive understanding of the relationships among variables.

To illustrate the process of conversion from the CFA measurement model to the SEM model, consider an example with four latent factors and 16 observed indicator variables. (Figure. 8) Each factor is investigated via four indicators, and the covariances for each pair of factors are given in the CFA model. After conversion to the SEM model, some factors and their indicators have an exogenous (independent) character, while others have an endogenous (dependent) character. The SEM model structure reveals causal paths with certain directions, such as the direct impact of covariated Factor 1 and 2 on Factor 3, which has a direct influence on Factor 4.

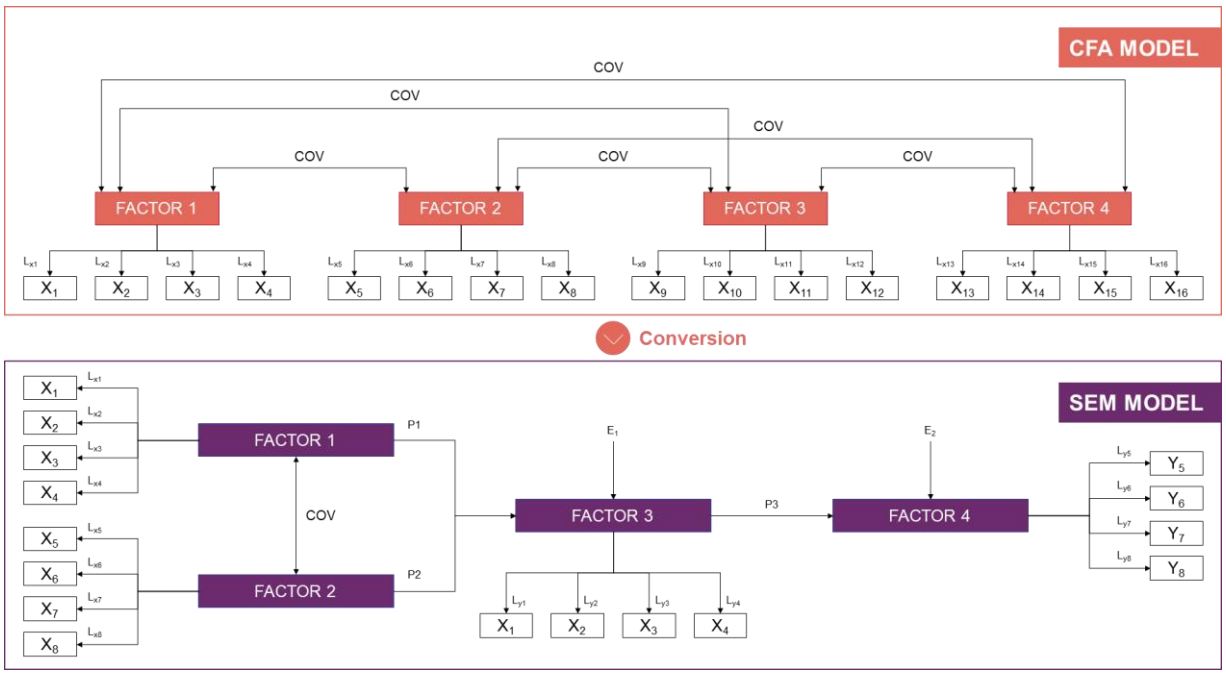


Figure 8. The process of conversion from the CFA to the SEM

Source: [author research]

2.2 Metrics for measuring model quality

2.2.1 Chi2 (2X) indices

In general, Chi-squared (2) indices are statistical measures that are used to detect the relationship of two or more categorical variable. The test is used in order to test the null hypothesis about no connection with the two items. If the received value is bigger than the critical value, then the null hypothesis is denied, consequently we can assume that there is strong bonding and coexistence. This test is often used to study survey data, in which investigators want to find out if there is a link between the chosen variables.

This index has high sensitivity to sample size and can be influenced by model complexity, that in turn can lead the rejection of an ideal model even if it has a good fit. As a result, other indices such as RMSEA or CFI are also used to assess the model. These indices provide a deeper comprehension of the model fit by considering both the complexity of the model and the sample size.

2.2.2 Adaptive fitness index (CFI)

The CFI is a statistical measure that is used in structure equations to assess the validity of proposed models in explaining observed phenomena. It compares fit from the proposed model to an initial one, as it assumes no relationship with data and produces value from 0 to 1. If its value is near to 1, then it suggests good fit for the model and data, but if this value is less than 0.9 then

it indicates poor fit. At the same time; as any other statistical measure it has several disadvantages. As it is noted, it has a high sensitivity to sample size, it can overestimate model fit if the sample is large and finally, it relies on the assumption of normality.

2.2.3 GFI fitness index

GFI is a statistical measurement used in the field of structural equations model to assess the general fit of the model to the observed data. It is a statistical measure used in the field of structural equation model to assess the general fit of the model to the observed data. It is a range of 0 to 1, with the highest values indicating better fit. The value of 0.90 or more is generally considered acceptable.

Further, the main differences between GFI and CFI are how they assess model fit. According to GFI, it is possible to estimate the proportion of variance in observation data that is accounted for by hypothesized model, and CFI calculates an improved model fit compared to one who has no relationship with variable.

2.2.4 Root Mean Square Error of Approximation index (RMSEA)

In structure equations, it is possible to use the critical root mean square error of Approximation for accessing the fit of an experimental model to its hypothetical model, and for evaluating data that is observed. The technique consists of calculating the discrepancy in the proposed model and the observed data, the value ranges from 0 to 1. The value of 0 stands for perfectly good fit, but values lower than 0.05 are regarded as good and values higher than 0.10 are regarded as poor. An application of this method is commonly used in research for evaluation of the goodness-of fit in structural equations models.

2.2.5 Metrics for measuring survey quality (Cronbach’s alpha)

Cronbach's alpha coefficient is another statistical technique used to assess the internal consistency of a scale or test. This coefficient is widely used in field of educational studies for evaluation of the reliability of questionnaires.

It is calculated by analyzing correlation between all pairs of items in a scale or questionnaire and ranges from 0 to 1, the bigger value is the bigger internal consistency. If value is 0.70 or higher is commonly regarded admissible for research purposes.

Similar to any statistical measure, it has several advantages and disadvantages that will be discussed further:

The advantages:

1. The Cronbach alpha coefficient is relatively easy to calculate, and it does not require advanced statistical knowledge.

2. This coefficient allows you to assess the internal consistency of different kinds of scale, for example Likert scales, Thurstone scales, and Guttman scales.

The disadvantages:

1. Requires unidimensionality: Cronbach's alpha coefficient assumes that the items in an scale or questionnaire measure one and same underlying construction. If items measure different constructs, the coefficient may not exactly show internal consistency of scale.

2. The sensitivity of sample size: if the size of sample is small, the reliability of the coefficient lowers, that leads to more inaccurate results.

4. In addition, the coefficient can be affected by item wording: if the items are poorly worded or ambiguous, it is possible to not precisely detect internal consistency of scale.

As the result of this, Cronbach's alpha coefficient is a useful statistical measure for assessing the internal consistency of a scale or questionnaire. However, it has limitations and assumptions that need to be considered when interpreting its results.

Summary

Chapter 2 described method of analysis that can be applied to the assessment of student satisfaction at university. The main method for this assessment is Structural Equation Modeling. It is applied when we cannot specifically measure a variable, but we suspect that there is an influence of the measured variables on this latent variable.

To create a SEM framework for a survey, indicator variables are established based on questionnaire responses. The process begins with an EFA to analyze latent constructs and understand relationships between measured variables and their corresponding factors. This is followed by a CFA to confirm factor structures and loadings of indicator variables on latent factors. The SEM model includes both measurement and structural aspects, revealing interrelations and causal relationships between treated variables. Model-fit indices are then calculated to assess the quality of the model's fit to actual data.

Chapter 3 Exploring factors and research results

3.1 Identifying groups of key factors

For our research we needed to identify non-academic factors that make impact on student's satisfaction. First of all, it is required to define the term "student's satisfaction" because it can be interpreted in various ways by different research. For our study we created this definition: 'student satisfaction' refers to the level of happiness and fulfillment of expectations that students feel about non-academic experiences at university. It might include multiple factors such as student's life, academic support services, campus facilities, social life, extracurricular activities, and overall sense of belonging and atmosphere.

Secondly, we analyzed relevant articles that study similar topics in different universities worldwide, in order to understand the common methods and factors used. One of the main studies we refer is written by Elliott and Healy (2001), they evaluated students' satisfaction using eleven academic and non-academic dimensions. The researches applied multiple regression model to dataset collected based on questionnaire using Likert 7-point range scale. They found that 'campus climate' makes the largest impact on students 'satisfaction. Also, 'Campus life' and 'campus support services' were mentioned to be important; the same findings were discovered by studies written by Nasser et al. (2008b). However, the researchers created different constructs in aforementioned dimensions, for example, Nasser et al. (2008b) used 3 constructs in 'Campus life' while Elliott and Healy (2001) used 15. This means, the content of dimensions highly depends on local university's factors, as result we need to find relevant constructs for these dimensions based on unique traits of our university.

Another valuable study for us was written by Douglas et al. (2006). They analyzed Liverpool university service offering by ranking top 10 most and least important for different categories of students (full-time and part-time at law facility). Both types of students emphasized the roles of IT services, usefulness of learning management systems (Blackboard), and 'the way of how timetable is organized'. Surprisingly, they found out that equipment of classrooms (including computers, decoration, sizes etc.), food (caterings, vending machines) to be one of the least significant factors. The study created by Kärnä and Julin (2015) confirms these findings, however, highlights the importance of availability of places for individual studies/ workspace and outdoor areas.

Some researches include dimensions such as 'personal development', 'business procedures', 'professional development'. It was pointed in studies by Nasser et al. (2008b) and Yusoff et al. (2015).

The majority of articles include some personal factors such as age, gender, study aspects (university course, level of degree, average student's GPA, class attendance etc.), mood or

happiness level, employment etc. These factors can help to filter data, for instance, we can find out the difference between bachelor and master students satisfaction factors, or we can try to find the relationship between mood and satisfaction rate and filter the dataset from some respondents who are negative or critical about the university.

For our research we have conducted several in-depth interviews with the university staff and students in order to test our assumptions, find out how university's services are currently analyzed, discuss the draft of questionnaire, generate meaningful insights. As a result, we decided to add several factors to our research. First of all, we have included 'international office', this is done due to specifics of the university as it offers everyone a unique opportunity to get an exchange program, this is one of the reasons why the school is so prestigious. Secondly, we added 'Appearance of buildings/territory', 'dormitory', 'canteen, vending machines', during the interviews, student who live in suburb campus "Mikhailovskaya Dacha" noted these factors to be significant as they sometimes suffer from the lack of plants and 'green' on the territory, poor infrastructure (lack of shops, pharmacies, too far from city center) and small number of sport rooms. Finally, we added 'University's support' as many students seek help in their scientific and professional beginnings.

3.2 Creating a questionnaire

For our research we decided to analyze students from bachelor and master programs who are actively participating in social life and extracurricular activities of the university. We have chosen this category due to the several reasons: they are more likely to answer to our questionnaire, have some experience with analyzed facilities and services, and are able to give honest feedback. Our study is more oriented on bachelor students, this decision is supported by several factors:

1. Bachelor programs have bigger number of students, consequently the larger number of respondents from this group will participate in the survey.
2. Bachelor students interact more with university services (dormitory, career office, sport facilities) and non-academic activities much more in comparison to master students.
3. Bachelor students are more prompt to give feedbacks according to the insights received during in-depth interviews. It happens because bachelor programs last for four years, students write feedbacks and able to see and feel the changes/improvements. In general, many changes are conducted in a year after the feedback, so that master students participate less in surveys/feedback forms as they will never see result of it.

The survey consists of several personal questions and constructs that evaluate chosen factors. The total number of questions does not exceed fifty questions and can be finished within

five to seven minutes. This is done in order to achieve higher response rate, lower rates of non-response or drop-out, avoid biased data (Kato & Miura, 2021).

Personal questions include age, gender, study aspects (university course, level of degree, average student's GPA, dormitory question), mood or happiness level. We decided to add question that evaluates the level of happiness of a respondent in order to understand answers deeper and avoid biases. For example, Matovic and Forgas (2018) while analyzing the impact of the mood on responses, discovered that: if someone is in a negative mood, he or she is more prompt to give negative responses, whereas respondent in a positive mood can be more likely to give positive responses, neutral moods may not have a significant impact on survey responses. However, it is not clear to what extend mood makes impact on answers as it can vary from case to case. As an experiment we will, compare the results of students with level of happiness higher than 3 (it ranged from 1 to 5, where 5 - absolutely happy, 4 - somewhat happy, 3 - neutral (neither happy nor unhappy), 2 - somewhat unhappy, 1 - very unhappy (depression, depression)) with the other groups to check the difference.

All chosen variables and its constructs are described in Table 1, they are all designed using Likert scale from 1 to 5, where 1 stands for very dissatisfied, 2 for somewhat dissatisfied, 3 for neither satisfied nor dissatisfied, 4 for somewhat satisfied, 5 for very satisfied (Joshi et al., 2015).

Table 2. Factors and constructs

Variable	**Code**	**Construct**
University's atmosphere	UA1	Sociability
	UA2	Support
	UA3	Mutual help
Professional development opportunities	PD1	Relevance and Diversity
	PD1	Frequency
	PD1	Usefulness
University's support	US1	Scholarships and grants
	US2	Professional Support
	US3	Scientific support
Extracurricular activities	EA1	Diversity
	EA2	Regularity
	EA3	Well organized/nice atmosphere
Canteen, vending machines	CV1	Food quality and variety
	CV2	Price policy
	CV3	The queue at the dining room

Career Center	CC1	Usefulness and variety
	CC2	Timeliness of career development information
	CC3	Ability to communicate with the center
Study office	SO1	Schedule
	SO2	Response time and timeliness of information provision
	SO3	Problem Response
International office	IO1	Diversity of countries
	IO2	Availability
	IO3	Availability of information
	IO4	Financing
IT resources	IT1	GSOM SPbU website
	IT2	Black Board
	IT3	MS Teams
	IT4	Library website
Dormitory	DO1	Conditions
	DO2	Infrastructure
	DO3	Availability
Classrooms / places of individual studies	CL1	Classrooms
	CL2	Places for group activities
	CL3	Places for hobbies (dance/music)
	CL4	Sport facilities
Appearance of buildings/territory	AB1	Repair
	AB2	Landscaping
Loyalty	LO1	Recommendations
	LO2	Further education
	LO3	Desire to help
Satisfaction with non-academic activities	SA	Experience
Overall satisfaction	OS1	Experience

Source: [author research]

3.3 Research hypotheses

Based on Chapter 3, where assumptions were made about what factors might influence students' non-academic satisfaction, a model was developed that included 11 factors with a direct impact on non-academic satisfaction.

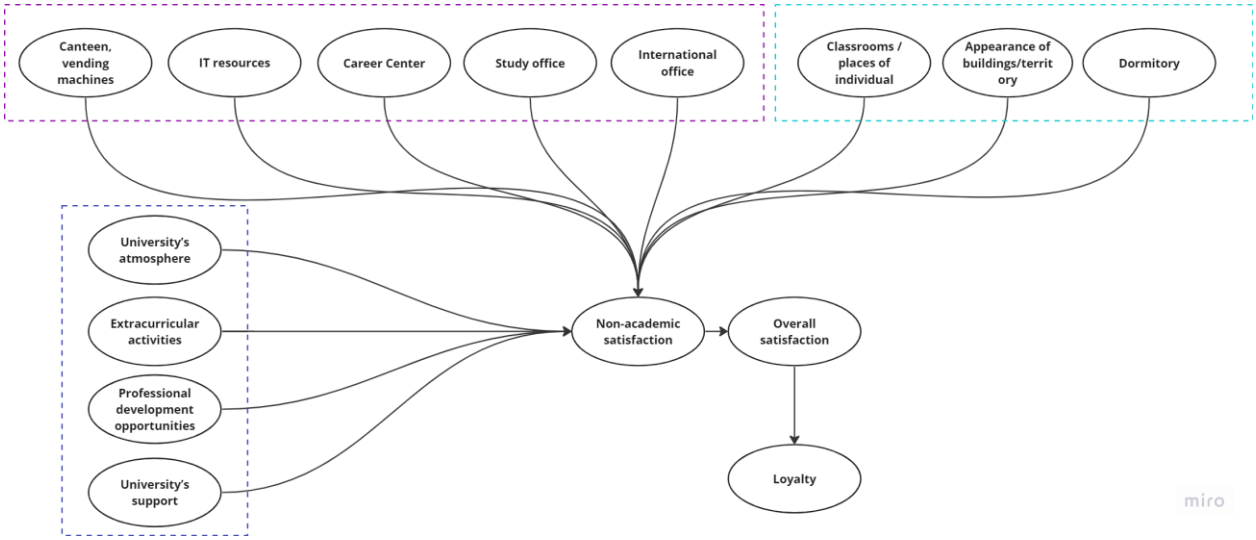


Figure 9. Model non-academic student satisfaction

Source: [author research]

Together it was assumed that non-academic satisfaction affects overall student satisfaction and loyalty. On the basis of the model created, the following hypotheses were put forward. Hypotheses were made based on assumptions about student satisfaction from the reviewed literature.

Based on the assumptions about student satisfaction, the following hypotheses were made and will be tested during the modeling:

H1: Canteen service has a positive effect on non-academic satisfaction.

H2: IT resources has a positive effect on non-academic satisfaction.

H3: International office has a positive effect on non-academic satisfaction.

H4: Classrooms/places of individual studies has a positive effect on non-academic satisfaction.

H5: Appearance of buildings/territory has a positive effect on non-academic satisfaction.

H6: Dormitory has a positive effect on non-academic satisfaction.

H7: Career Center has a positive effect on non-academic satisfaction.

H8: Study office has a positive effect on non-academic satisfaction.

H9: University's atmosphere has a positive effect on non-academic satisfaction.

H10: University's support has a positive effect on non-academic satisfaction.

H11: Extracurricular activities has a positive effect on non-academic satisfaction.

H12: Professional development opportunities has a positive effect on non-academic satisfaction.

H13: Non-academic satisfaction has a positive effect on overall satisfaction.

H14: Overall satisfaction has a positive effect on loyalty.

Structural equation modelling will be used to test the hypotheses. The model to be tested contains 12 main factors, based on the survey described in Chapter 3. The model does not take into account the impact on overall student satisfaction of such factors as teaching lectures, quality of teaching, etc. The list of factors is not exhaustive, but we assume that the influence of factors not considered is minimal.

3.4 Data collection

The survey was predominantly conducted among undergraduate and postgraduate students. Questions related to gender, year of study, grade point average, happiness level, involvement in extracurricular activities and employment were added to the survey. As a result, 176 observations were collected.

The sample contained a total of 176 observations, with the majority of responses coming from undergraduate students 95% and a smaller proportion from graduate students 5% (Fig.10). Master's students were not removed from the study as originally intended; this is due to the fact that the sample of 176 people is already the minimum for this study.

Also, initially a total of 12 factors were derived for the study, but after data collection it turned out that **dormitory cannot be considered** as a model parameter and should be excluded, as very few responses were collected for it (only 34 observations).

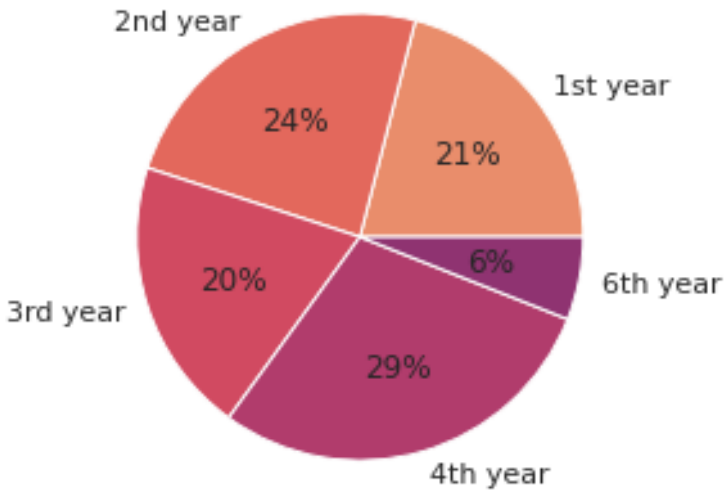


Figure 10. Distribution of students by academic year

Source: [author research]

Together with the year of study, the students' employment was also considered. The highest percentage of employment was observed for second year Master's students (year 6 on the graph), only 2 out of 11 students were unemployed. Next in the percentage ratio are the 4th year bachelor students. Out of 50 respondents, 30 are employed. The most unemployed were 1-3 year students (Fig. 11)

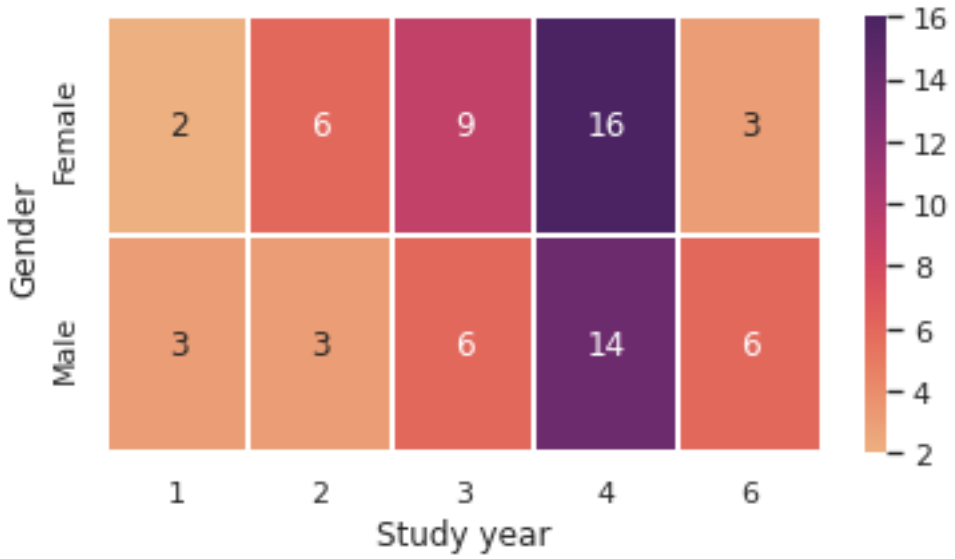


Figure 11. Number of working students by year of study

Source: [author research]

Figure 12 shows the distribution of male and female students according to GPA and level of happiness. Most of the students have a happiness level above 3 and GPA above 4.0, which indicates that our sample of students is able to objectively assess their satisfaction, a very small percentage of students consider themselves unhappy.

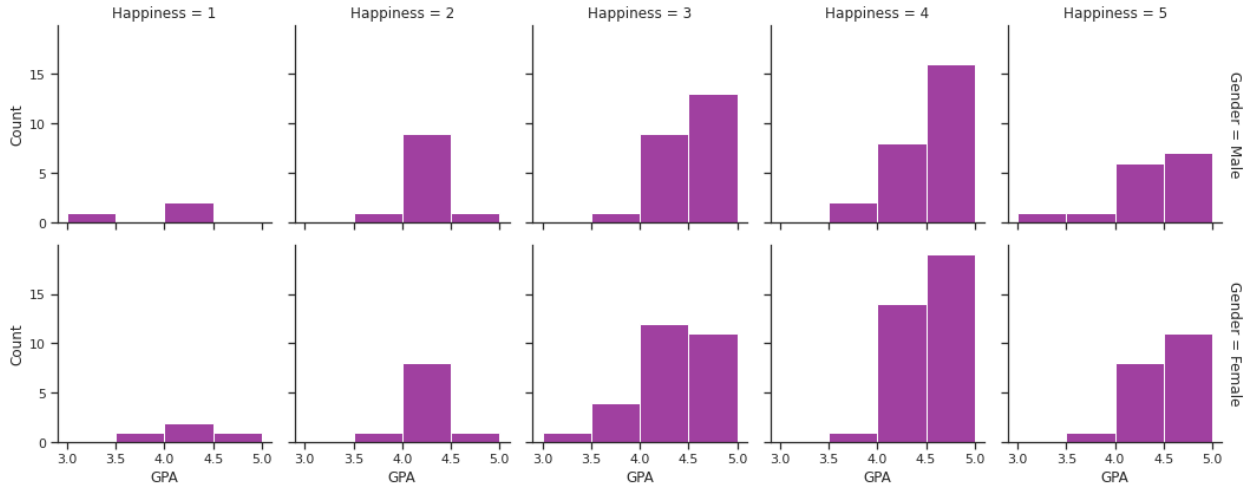


Figure 12. Distribution of female and male students according to GPA and level of happiness

Source: [author research]

Most students rate their overall satisfaction higher than 3. At the same time, the overall distribution of observations on the three indicators of GPA, happiness level, and overall satisfaction lies in the bottom right quadrant, indicating that the students in the sample will not be distorted by their poor mood and underachievement. (Fig. 13)

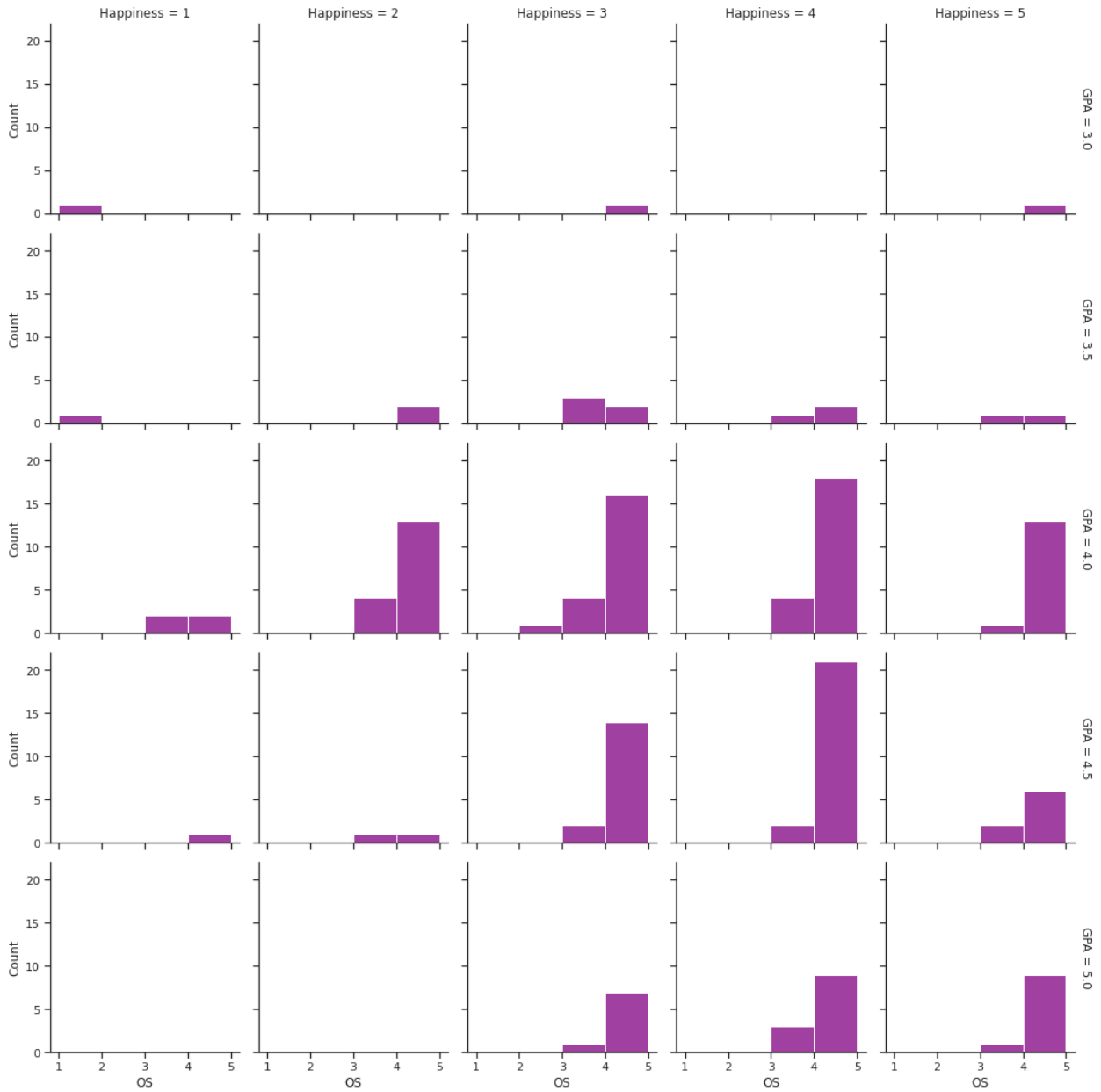


Figure 13. Distribution of overall student satisfaction according to GPA and level of happiness

Source: [author research]

In what follows, we will look at the 12 main influencing factors on students' satisfaction with non-academic activities. Along with this, 2 other parameters were chosen: overall satisfaction and loyalty. Fig. 14 shows the correlation graph of these three parameters. We can conclude from

it that these 2 additional parameters will not be superfluous during model building and perhaps we will find a correlation between them.

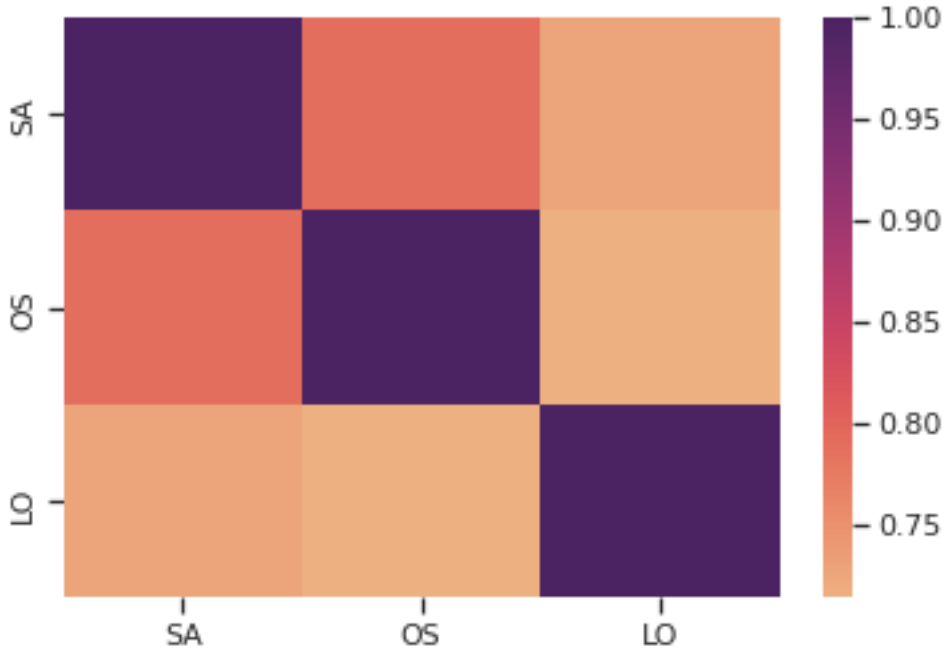


Figure 14. Correlation matrix for satisfaction with non-academic activities, overall satisfaction and loyalty.

Source: [author research]

A more detailed analysis of the investigated factors will be carried out in the next paragraph, where the 12 factors that influence non-academic student satisfaction will be examined.

3.5 Evaluation of reliability and validity of questionnaire components

According to the principles and guidelines of component analysis in SEM, our data were performed in SPSS and Python (semopy) software. Confirmatory factor analysis (CFA) was performed to evaluate the one dimensionality of the components.

A total of 11 factors are considered in the CFA analysis with the following abbreviations:

UA - University's atmosphere; PD - Professional development opportunities; US - University's support; EA - Extracurricular activities; CV - Canteen, vending machines; CC - Career Center; SO - Study office; IO - International office; IT - IT resources; CL - Classrooms / places of individual studies; AB - Appearance of buildings/territory

Figure 15 depicts factors that will be further considered as influencing factors outside of student academic satisfaction. On the left are blocks that contain data on answers to questions. Each individual square block denotes a separate question. Then they merge into one factor. Specifically in the case of CFA, we test the effect of factors on each other. In the future, when

conducting SEM analysis, we will check how they affect outside academic satisfaction of students. CFA analysis was performed in SPSS and visualization is shown in Figure 15.

In this study, to evaluate the models Khi2, GFI fitness index, and the critical Root Mean Square Error of Approximation index (RMSEA) have been used.

Ideally, the chi-square value should have a significance level greater than 0.05 or a chi-square value of 2 divided by the degree of freedom less than 5, in our study it is **1.3**. However, the ratio (X2/DF) is highly dependent on sample size, the larger the sample, the greater the ratio. Because of this, an incorrect model can be estimated as correct.

The GFI is in the range between 0 and 1. The closer to 1, the better the model fits. In our model it is **0.821.** To investigate how the model combines fit and savings, the RMSEA was used. This index is **0.043** for our model.

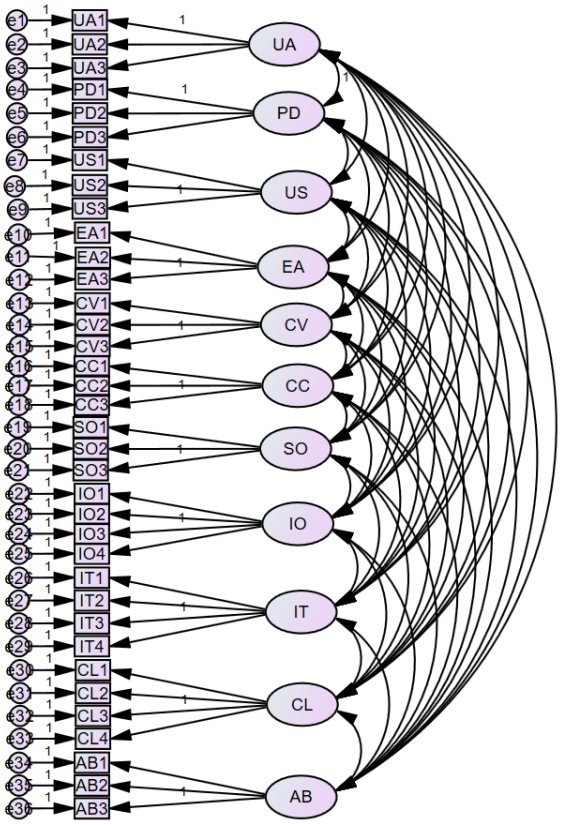


Figure 15. Visualizing CFA in SPSS

Source: [author research]

The scales with factor loadings of 0.50 or greater are considered very significant and Cronbach alpha must be greater than 0.7 (Table 3). The CFA found that some factors had a load well below 0.5, for which reason they should be removed: CC1: Usefulness and variety, IT4: Library website, CL4: Sport facilities, AB3: Landscaping. Total Cronbach's Ratio for the whole sample 0.78.

Table 3. Reliability and validity of components of student's non-academic satisfaction

Factors	**Component**	**Loading**	**Cronbach alpha**
UA	UA1: Sociability	0.8	0.694828
UA	UA2: Support	0.8	
UA	UA3: Mutual help	0.6	
PD	PD1: Relevance and Diversity	0.9	0.724602
PD	PD1: Frequency	0.6	
PD	PD1: Usefulness	0.7	
US	US1: Scholarships and grants	0.8	0.729121
US	US2: Professional Support	0.6	
US	US3: Scientific support	0.7	
EA	EA1: Diversity	0.7	0.608644
EA	EA2: Regularity	0.5	
EA	EA3: Well organized/nice atmosphere	0.7	
CV	CV1: Food quality and variety	0.9	0.803837
CV	CV2: Price policy	0.7	
CV	CV3: The queue at the dining room	0.7	
CC	CC1: Usefulness and variety*	0.3	0.550262
CC	CC2: Timeliness of career development information	0.9	
CC	CC3: Ability to communicate with the center	0.5	
SO	SO1: Schedule	0.9	0.78361
SO	SO2: Response time and timeliness of information provision	0.7	
SO	SO3: Problem Response	0.7	
IO	IO1: Diversity of countries	0.5	0.648622
IO	IO2: Availability	0.7	
IO	IO3: Availability of information	0.6	
IO	IO4: Financing	0.5	
IT	IT1: GSOM SPbU website	0.8	0.640424
IT	IT2: Black Board	0.6	
IT	IT3: MS Teams	0.5	
IT	IT4: Library website*	0.4	

CL	CL1: Classrooms	0.8	0.598306
CL	CL2: Places for group activities	0.5	
CL	CL3: Places for hobbies (dance/music)	0.6	
CL	CL4: Sport facilities*	0.3	
AB	AB1: Repair	0.8	0.550443
AB	AB2: Modernity	0.5	
AB	AB3: Landscaping*	0.4	

Source: [author research]

After deletion, the Cronbach coefficients were recalculated. The results are presented in Table 4.

Table 4. Cronbach Index after adjustment

Group name	**Cronbach Alpha coefficient**
UA	0.69
PD	0.72
US	0.73
EA	0.61
CV	0.80
CC	0.56
SO	0.78
IO	0.65
IT	0.64
CL	0.62
AB	0.59

Source: [author research]

Although some of the Cronbach's coefficients were less than 0.7, we will not remove these factors from the model, as we assume that the problem is not with the estimated model, but with the small sample size. As a result of our analysis, it appears that we need to remove several factor components: CC1, IT4, CL4, AB3. Almost all the selected components were found to be significant for the factors, as shown in Table 5

Table 5. Factor Score Weights

	AB	**CL**	**IT**	**IO**	**SO**	**CC**	**CV**	**EA**	**US**	**PD**	**UA**
AB1	**0.3**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AB2	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AB3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL1	0.0	**0.3**	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL2	0.0	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL3	0.0	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IT4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IT1	0.0	0.0	**0.3**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IT2	0.0	0.0	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IT3	0.0	0.0	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IO4	0.0	0.0	0.0	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IO1	0.0	0.0	0.0	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IO2	0.0	0.0	0.0	**0.2**	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IO3	0.0	0.0	0.0	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SO1	0.0	0.0	0.0	0.0	**0.4**	0.0	0.0	0.0	0.0	0.0	0.0
SO2	0.0	0.0	0.0	0.0	**0.2**	0.0	0.0	0.0	0.0	0.0	0.0
SO3	0.0	0.0	0.0	0.0	**0.2**	0.0	0.0	0.0	0.0	0.0	0.0
CC1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC2	0.0	0.0	0.0	0.0	0.0	**0.3**	0.0	0.0	0.0	0.0	0.0
CC3	0.0	0.0	0.0	0.0	0.0	**0.1**	0.0	0.0	0.0	0.0	0.0
CV1	0.0	0.0	0.0	0.0	0.0	0.0	**0.5**	0.0	0.0	0.0	0.0
CV2	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**	0.0	0.0	0.0	0.0
CV3	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**	0.0	0.0	0.0	0.0
EA1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	0.0	0.0	0.0
EA2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**	0.0	0.0	0.0
EA3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	0.0	0.0	0.0
US1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.4**	0.0	0.0
US2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**	0.0	0.0
US3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	0.0	0.0
PD3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**	0.0
PD2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**	0.0
PD1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.6**	0.1
UA3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**
UA2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**
UA1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.4**

Source: [author research]

Once we have confirmed that our data can be used for modelling purposes. We can move on to building the full model with satisfaction and loyalty.

3.6 Results of Structural Equation Modeling

For the study, we will consider 3 models.

Original model – the model that was created based on our assumptions about what factors might influence non-academic student satisfaction.

Adjusted model - the model that was adjusted after applying the CFA and removing the factor components whose load was less than 0.5.

Significant model - the model that was derived as a result of removing non-significant factors from the adjusted model.

Original model:

The semopy package in Python was used to evaluate the base model. The original model looks like this:

```
"""
   UA =~ UA1 + UA2 + UA3
   PD =~ PD1 + PD2 + PD3
   US =~ US1 + US2 + US3
   EA =~ EA1 + EA2 + EA3
   CV =~ CV1 + CV2 + CV3
   CC =~ CC1 + CC2 + CC3
   SO =~ SO1 + SO2 + SO3
   IO =~ IO1 + IO2 + IO3 + IO4
   IT =~ IT1 + IT2 + IT3 + IT4
   CL =~ CL1 + CL2 + CL3 + CL4
   AB =~ AB1 + AB2 + AB3
   LO =~ LO1 + LO2 + LO3
   SA =~ SA1
   OS =~ OS1
   SA ~ UA + PD + US + EA + CV + CC + SO + IO + IT + CL + AB
   OS ~ SA
   LO ~ OS
"""
```

The analysis resulted in estimated coefficients and a significance level whereby only 5 factors that influence non-academic student satisfaction are significant. At the same time, non-academic satisfaction affects overall satisfaction, which affects loyalty. The output table looks as follows:

Table 6. Regression weight for original model.

lval	op	rval	Estimate	Std. Err	p-value
SA	**~**	**UA**	**0.271487**	**0.073465**	**0.000**
SA	**~**	**IO**	**0.313184**	**0.060813**	**0.000**
SA	~	US	0.065632	0.044857	0.143
SA	~	EA	0.014771	0.054494	0.786
SA	~	CV	-0.02961	0.035781	0.408
SA	**~**	**CC**	**0.447235**	**0.169871**	**0.008**
SA	**~**	**SO**	**0.098891**	**0.039057**	**0.011**
SA	**~**	**PD**	**0.440043**	**0.101118**	**0.000**
SA	~	IT	-0.02439	0.064513	0.705
SA	~	CL	-0.17702	0.105138	0.092

SA	~	AB	0.026583	0.084803	0.754
OS	**~**	**SA**	**0.886127**	**0.05936**	**0.000**
LO	**~**	**OS**	**0.806138**	**0.066685**	**0.000**

Source: [author research]

Adjusted model:

After testing the original model, the components of the factors that were not found to be significant by the CFA were removed from the model. The adjusted model looks like this:

```
"""
   UA =~ UA1 + UA2 + UA3
   PD =~ PD1 + PD2 + PD3
   US =~ US1 + US2 + US3
   EA =~ EA1 + EA2 + EA3
   CV =~ CV1 + CV2 + CV3
   CC =~ CC2 + CC3
   SO =~ SO1 + SO2 + SO3
   IO =~ IO1 + IO2 + IO3 + IO4
   IT =~ IT1 + IT2 + IT3
   CL =~ CL1 + CL2 + CL3
   AB =~ AB1 + AB2
   LO =~ LO1 + LO2 + LO3
   SA =~ SA1
   OS =~ OS1
   SA ~ UA + PD + US + EA + CV + CC + SO + IO + IT + CL + AB
   OS ~ SA
   LO ~ OS
"""
```

The output table looks as follows:

Table 7. Regression weight for adjusted model.

lval	op	rval	Estimate	Std. Err	p-value
SA	**~**	**UA**	**0.274288**	**0.077217**	**0.000**
SA	**~**	**IO**	**0.326777**	**0.065453**	**0.000**
SA	~	US	0.072173	0.049476	0.145
SA	~	EA	-0.0187	0.067724	0.782
SA	~	CV	-0.04322	0.040774	0.289
SA	**~**	**CC**	**0.276463**	**0.1214**	**0.023**
SA	**~**	**SO**	**0.101787**	**0.041379**	**0.014**
SA	**~**	**PD**	**0.481552**	**0.111559**	**0.000**
SA	~	IT	-0.03694	0.072136	0.609
SA	~	CL	-0.18993	0.107041	0.076
SA	~	AB	0.034391	0.142909	0.810
OS	**~**	**SA**	**0.879372**	**0.059864**	**0.000**
LO	**~**	**OS**	**0.805729**	**0.066899**	**0.000**

Source: [author research]

Significant model:

After adjusting the model, all non-significant factors were removed, resulting in a model in which non-academic student satisfaction depends on the university atmosphere (UA), professional development (PD), career centre (CC), study office (SO), international office (IO).(Fig.16)

```
"""
UA =~ UA1 + UA2 + UA3
PD =~ PD1 + PD2 + PD3
CC =~ CC2 + CC3
SO =~ SO1 + SO2 + SO3
IO =~ IO1 + IO2 + IO3 + IO4
LO =~ LO1 + LO2 + LO3
SA =~ SA1
OS =~ OS1
SA ~ UA + PD + CC + SO + IO
OS ~ SA
LO ~ OS
"""
```

The output table looks as follows:

Table 8. Regression weight for significant model.

lval	op	rval	Estimate	Std. Err	p-value
SA	~	UA	0.237302	0.065725	0.000
SA	~	IO	0.305227	0.052947	0.000
SA	~	CC	0.191317	0.088137	0.030
SA	~	SO	0.086579	0.036202	0.017
SA	~	PD	0.395356	0.073377	0.000
OS	~	SA	0.875526	0.060488	0.000
LO	~	OS	0.806813	0.067221	0.000

Source: [author research]

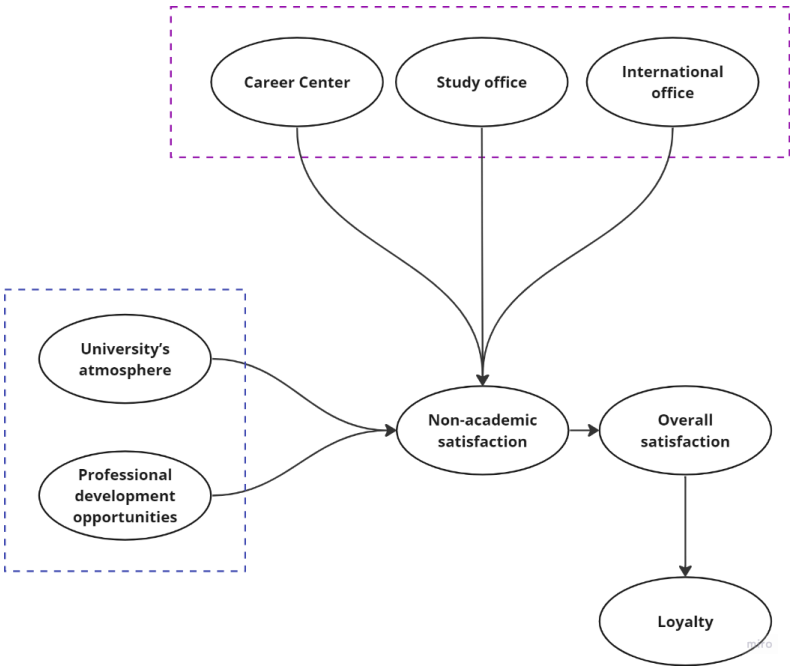


Figure 16. The resulting model

Source: [author research]

A comparative analysis was made of the results obtained. The analysis showed that the best model for evaluation is a significant model, from which unnecessary factors have been excluded. This model has an RMSE of less than 0.08, CFI and TLI of 0.9 and is the best model according to Akaike's criterion.

Table 9. Comparison of results of 3 models

	RMSE	**CFI**	**GFI**	**AGFI**	**TLI**	**AIC**
Original	0.0	0.9	0.7	0.6	0.8	288.8
Adjusted	0.0	0.9	0.7	0.6	0.9	275.0
Significant	0.07	0.9	0.8	0.8	0.9	110.7
Recommended value	*<0.08*	*>0.9*	*>0.9*	*>0.8*	*>0.9*	*n/a*

Source: [author research]

The analysis resulted in the factors that have an impact on non-academic student satisfaction. The most influential factor was found to be the opportunity for professional development, followed by the international office, then the atmosphere at the university, then the work of the career centre and lastly the study office. The resulting non-academic satisfaction affects overall satisfaction, which in turn affects loyalty. However, in the specific case, it should be taken into account that a limited group of factors was considered which influenced overall satisfaction and loyalty. That is, the impact of students' satisfaction with extracurricular activities on overall satisfaction can hardly be assessed by the coefficient 0.87, as we do not consider

students' satisfaction with the learning process. The same can be said about loyalty, as it is likely to consist of more than just overall satisfaction.

Table 10. Influence of factors and the most common value

Variable	**Estimate**	**Mode**
University’s atmosphere	0.237302	5
Professional development opportunities	0.395356	4
Career center	0.191317	3
Study office	0.086579	3
International office	0.305227	3

Source: [author research]

Table 10 displays the influence coefficients of each factor and the most common score given by students on the Likert scale. The majority of students rated the non-academic work of the university as good, with the university atmosphere receiving the highest score of 5 and ranking 3rd in importance. The opportunity for professional development received a score of 4 and was ranked as the most important factor, while the international office received a score of 3 and ranked 2nd in importance.

3.7 Recommendations and further development

As mentioned earlier, the model does not include an evaluation of academic factors such as teacher qualifications and course quality. If these factors were added to the model, the degree of influence of non-academic student satisfaction on overall satisfaction could change. Similarly, the list of proposed influencing factors is not exhaustive, so when new non-academic factors are added, the influence of the initial ones may also change.

Therefore, in order to create a more accurate model that could fully assess the influence of a particular factor on overall student satisfaction, not just academic or non-academic, a complete list of factors that could have such an impact must be compiled. However, creating and analyzing such a model may be complicated by the collection of data, the required amount of which should be four times greater than the number of observed variables.

For this reason, the set of factors cannot be chosen based on the principle of "the more, the better." In further refining the model, only necessary and relevant factors that are assumed to have a strong influence should be included.

Summary

In the Chapter 3, the models were analyzed. As a result of the CFA analysis, some questions that had a low factor load were excluded. After that, a comparative analysis of three models was carried out, which showed that the exclusion of factors such as canteen service, the appearance of the territory, extracurricular activities, support for university, IT resources, places for individual classes do not have a significant impact on student satisfaction. Based on this, a model was developed that includes only significant factors, such as: career center, study office, exchange program office, atmosphere at the university and the possibility of professional development.

As a result of the analysis, it was found that the greatest influence on non-academic satisfaction of students is the opportunity for professional development, followed by the international exchange office, then the atmosphere in the university, career center, and study office.

CONCLUSION

Each year, there is a rise in the number of higher education institutions and new educational programs, leading to increased competition among universities and applicants. Universities must constantly improve their facilities and research centers to attract the most talented students, spending millions on advertising. However, the best form of advertising is positive feedback from current students. To remain competitive, universities must monitor student satisfaction, considering various aspects of the learning process. A more complex education system requires sophisticated models for detailed analysis of findings.

As a result of the literature review, it was found that the most popular way to study the topic of student satisfaction is Structural Equation Analysis. Data obtained from a survey, which was based on interviews with students, were used to build the model. The questionnaire included a total of 51 questions, 7 of which were general questions (gender, age, employment status, happiness level, etc.) and 44 questions related to variables for assessing satisfaction, which were used to construct the model.

As a result of the analysis the opportunity for professional development was found to be the most significant factor, followed by the international office, university atmosphere, career center, and study office. Table 10 presents the coefficients of influence of each factor on extracurricular satisfaction and the most frequent score that was given when assessing student satisfaction. Since a Likert scale was used in the study, the values in the above table denote the following. 5 - Very good, 4 - Good, 3 - Neither good nor bad, 2 - Bad, 1 - Very bad.

As can be seen, the majority of students rate the non-academic work of the university at a good level. The atmosphere at the university is the most well rated and is in 3rd place in importance with a score of 5. With a score of 4, the opportunity for professional development is ranked 1st in importance. The international office is ranked 2nd with a score of 3.

Considering the results, it can be said that attention needs to be paid to the international exchange office and professional development opportunities in order to increase student satisfaction. Changes in these areas should raise student satisfaction more than, for example, changes in the study office and career centre.

The resulting non-academic satisfaction has an impact on overall satisfaction, which in turn affects loyalty. However, it is important to note that only a limited group of factors were considered in this study. Therefore, it may not accurately reflect the impact of extracurricular activities on overall satisfaction or the factors that contribute to loyalty beyond overall satisfaction.

To create a more precise model that can accurately evaluate the impact of a specific factor on overall student satisfaction, a comprehensive list of factors that could potentially affect it must be compiled. However, data collection and analysis for this model may be complex, as the amount

of required data should be four times greater than the number of observed variables. Therefore, selecting factors based on the principle of quantity over quality is not advisable. Instead, only essential and relevant factors with a significant influence should be included in further refining the model.

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ANNEX

Full text of the questionnaire

1) Gender
2) Year of study
3) How happy or unhappy do you feel overall?
4) Approximate average score
5) Are you currently employed?
6) Do you live in a dormitory?
7) Rate your involvement in extracurricular university life on a scale of 1 to 5 on a scale of 1 to 5.
8) Rate your satisfaction with the following dormitory characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Living conditions]
9) Rate your satisfaction with the following dormitory characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Development of the surrounding area infrastructure]
10) Rate your satisfaction with the following dormitory characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Availability of vacant rooms]
11) Rate the following student characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Openness to communication]
12) Rate the following student characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Emotional support]
13) Rate the following student characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Willingness to help].
14) Rate your satisfaction with the following conference, case championship, and open talk characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Relevance to your interests]
15) Rate your satisfaction with the following conference, case championship, and open talk characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Frequency]
16) Rate your satisfaction with the following conference, case championship, and open talk characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Benefit for professional development]
17) Rate your satisfaction with the following university support characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Amount of scholarships and grants]
18) Rate your satisfaction with the following university support characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Support for professional activities]
19) Rate your satisfaction with the following university support characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Support for scientific activities]

20) Rate your satisfaction with the following extracurricular activity characteristics (such as sports sections, non-academic events like GSOM Family Day, etc.) on a scale of 1 to 5 on a scale of 1 to 5: [Relevance to your interests]
21) Rate your satisfaction with the following extracurricular activity characteristics (such as sports sections, non-academic events like GSOM Family Day, etc.) on a scale of 1 to 5 on a scale of 1 to 5: [Frequency]
22) Rate your satisfaction with the following extracurricular activity characteristics (such as sports sections, non-academic events like GSOM Family Day, etc.) on a scale of 1 to 5 on a scale of 1 to 5: [Organization]
23) Rate your satisfaction with the following career center and career development event characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Relevance to your interests].
24) Rate your satisfaction with the following career center and career development event characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Timeliness of information provided]
25) Rate your satisfaction with the following career center and career development event characteristics on a scale of 1 to 5 on a scale of 1 to 5: [Promptness of response to questions]
26) Rate your satisfaction with the following career center and career de characteristics of the academic office on a scale of 1 to 5: [Optimal and balanced schedule]
27) Rate your satisfaction with the following characteristics of the academic office on a scale of 1 to 5: [Timeliness of providing necessary information and promptness of response]
28) Rate your satisfaction with the following characteristics of the academic office on a scale of 1 to 5: [Assistance with problem-solving]
29) Rate your satisfaction with the following characteristics of the international exchange center on a scale of 1 to 5: [Variety of countries]
30) Rate your satisfaction with the following characteristics of the international exchange center on a scale of 1 to 5: [Availability of spots]
31) Rate your satisfaction with the following characteristics of the international exchange center on a scale of 1 to 5: [Informational support during application process]
32) Rate your satisfaction with the following characteristics of the international exchange center on a scale of 1 to 5: [Amount of financial aid]
33) Rate your satisfaction with the following IT resources on a scale of 1 to 5: [GSOM SPbU website]
34) Rate your satisfaction with the following IT resources on a scale of 1 to 5: [BlackBoard]
35) Rate your satisfaction with the following IT resources on a scale of 1 to 5: [MSTeams]
36) Rate your satisfaction with the following IT resources on a scale of 1 to 5: [Library website]

37) Rate your satisfaction with the following characteristics of dining facilities on a scale of 1 to 5: [Quality and variety of food]
38) Rate your satisfaction with the following characteristics of dining facilities on a scale of 1 to 5: [Price policy]
39) Rate your satisfaction with the following characteristics of dining facilities on a scale of 1 to 5: [Accessibility (lack of lines in the cafeteria)]
40) Rate your satisfaction with the equipment in the following common areas on a scale of 1 to 5: [Classrooms]
41) Rate your satisfaction with the equipment in the following common areas on a scale of 1 to 5: [Group study spaces]
42) Rate your satisfaction with the equipment in the following common areas on a scale of 1 to 5: [Spaces for hobby activities (dance/music)]
43) Rate your satisfaction with the equipment in the following common areas on a scale of 1 to 5: [Sports facilities]
44) Rate your satisfaction with the following characteristics of the appearance of buildings and grounds on a scale of 1 to 5: [Maintenance]
45) Rate your satisfaction with the following characteristics of the appearance of buildings and grounds on a scale of 1 to 5: [Modernity]
46) Rate your satisfaction with the following characteristics of the appearance of buildings and grounds on a scale of 1 to 5: [Landscaping]
47) I would recommend my university to friends and colleagues for education
48) If I were to pursue a master's/PhD degree, I would consider my university first
49) I would like to help the university after graduation (e.g. participate in events)
50) I am fully satisfied with extracurricular activities and services provided
51) I am fully satisfied with my education at the university.