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Prioritizing Higher Education Facilities Using TOPSIS Based on Student Preferences

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Abstract

This research aims to prioritize campus facilities for development based on student preferences using the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method. Recognizing the critical role of facilities in enhancing student success and retention, this study evaluates key criteria such as needs, comfort, current conditions, accessibility, and frequency of use. Data were collected through a random sampling survey involving 98 active students, determined using Slovin's formula with a 10% margin of error. The analysis identifies WiFi as the top priority for improvement, followed by toilets and lifts. This research highlights how TOPSIS has been applied effectively in decision-making processes within education and facility management, offering a structured approach for optimizing resource allocation.

Keywords: Campus Facilities, Facility Development, Priority Analysis, TOPSIS

1. INTRODUCTION

Campus facilities are a crucial factor in educational and instructional activities, as they significantly contribute to creating an effective and enjoyable learning environment for students [1]. Well-developed facilities not only enhance the quality of education but also play a vital role in improving student success and retention. Recognizing the importance of campus facilities, this study focuses on identifying priority areas for development to maximize their impact on the academic and social experiences of students. Based on student preferences, facilities such as WiFi, toilets, and lifts have been identified as the top priorities for improvement.

However, universities face various challenges in the development of facilities, one of which is the diverse needs of students. Each student has different preferences regarding the facilities they require, such as stable internet access, clean toilets, adequate lifts, and so on. In addition, universities are also confronted with the challenge of maintaining existing facilities to ensure they remain in optimal condition. It is not enough to simply build new facilities; regular maintenance and

periodic repairs are essential. These efforts are key to ensuring the comfort and safety of students in their daily activities and preventing any disruptions that could affect their learning and social interactions.

Given these challenges, a systematic and data-driven approach is necessary to determine the priority areas for facility development that will have the most significant impact on students. The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is employed in this research, as it enables structured decision-making by accommodating multiple criteria and stakeholder preferences. This approach not only provides actionable insights for higher education institutions but also sets a foundation for data-driven facility management.

Study by [2], revealed that the TOPSIS is used in decision-making by assessing how near an alternative is to the most favorable ideal solution while also considering its distance from the least favorable ideal solution. Applying the TOPSIS method can optimize facility development based on students' preferences and needs. Various studies have shown that using the TOPSIS method provides significant benefits in the decision-making process. Research [3] concludes that the TOPSIS method can aid in determining aid recipients by reducing errors in the selection process. The test results indicate that Iresa Aulia Zein, with a score of 7.39, is the most deserving alternative for the scholarship.

The research [4] successfully identified the optimal selection for distributing employee bonuses via the TOPSIS approach. This strategy is regarded as straightforward for identifying employees eligible for incentives due to its uncomplicated and comprehensible stages of completion. The test results demonstrate that the employee, Niko, with a weight of 0.800981, is the most qualified for a bonus.

Furthermore, study [5] demonstrated that the TOPSIS technique assists consumers in selecting a laptop that fulfills their specified criteria. The research effectively generated results that assist customers in selecting a laptop that meets their requirements, while also promoting an accurate, efficient, and effective decision-making process. According to the test findings, we determined that the Asus laptop is the optimal choice, exhibiting the greatest preference score of 0.6031 relative to other brands.

It is known that the use of TOPSIS can facilitate more structured and objective decision-making by considering various relevant criteria. This demonstrates the significant value of TOPSIS as a valuable tool in the context of decision-making regarding the prioritization of FST UIN Jakarta Facilities Development based on student preferences.

This study contributes to the comprehension of issues and solutions in higher education as outlined as follow (1) ranking the facilities that require development is necessary, (2) The student preference model uses TOPSIS, and (3) The faculty can implement the recommendation.

2. METHODS

2.1. Research Stages

This research stage is a structured research description of the research to be carried out. Figure 1 is the design of the research method used in Prioritizing the Development of FST UIN Jakarta Facilities Based on Student Preferences with the TOPSIS method to provide the best solution in decision making related to the development of FST UIN Jakarta facilities.

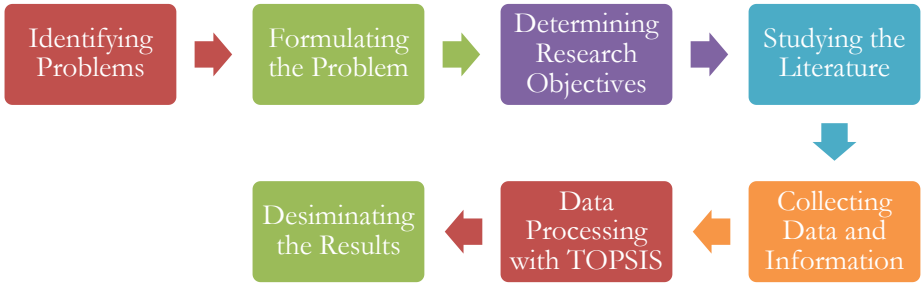

Figure 1. Research Stages

Base on research steps in Figure 1, the explanation as follows.

1) Identifying Problems
The initial stage in this research is to identify the facilities available at FST UIN Jakarta, especially related to the use of the TOPSIS method to determine the priority of facility development. This problem identification involves determining the problem formulation based on the literature and information obtained regarding decision support systems using the TOPSIS method.

2) Formulating the Problem
Once the problem is identified, the next step is to formulate the problem in terms of the criteria to be used in the analysis. This involves determining the assessment criteria that are relevant and important for the development of the facility. These criteria will be the basis for applying the TOPSIS method to prioritize facility development alternatives.

3) Determining Research Objectives
Research objectives refer to the desired results of an investigation or study being conducted. This goal is expected to be achieved after the research is completed with an ideal end result. Before the research begins, objectives must be set first. Determining the research objectives is very important so that the research conducted provides benefits to its users.

4) Studying the Literature
It is important to review and understand the relevant literature before it is used. This process involves selecting and assessing literature from various sources such as books, scientific journals, and other references. The purpose of this literature review is to facilitate the resolution of the research problem in an efficient and timely manner.

5) Collecting Data and Information
Data was collected through the use of Google Forms given to FST UIN Jakarta students. This data collection aims to collect information needed in the research, which will then be analyzed and processed for further research purposes.

6) Data Processing with TOPSIS
At this stage, the understanding of the existing problem is analyzed based on the data that has been collected, using the TOPSIS method procedure. First, criteria and alternatives are determined. After the criteria and alternatives are determined, data from observations will be processed. At this stage, the researcher analyzes the data to determine the results of the facility development priorities.

7) Disseminating Results
The results show the priority of facility development in FST UIN Jakarta based on TOPSIS analysis. Each facility is ranked according to its preference value, with facilities that best support academic activities and have the broadest impact on students getting the highest priority. In conclusion, this research provides practical guidance for more effective and beneficial facility development.

2.2. Research Methods

A Decision Support System (DSS) is a tool created to address problems in an efficient and effective manner [6]. In addition, DSS combines the intellectual resources of individuals with computer assistance to support the decision-making process [7]. This method aims to assist managers in semi-structured decision-making situations without replacing their role in evaluating decisions [8]. A popular technique for multi-criteria decision-making is TOPSIS [9]. Finding an alternative that is the most distant from the ideal negative answer and the closest to the ideal positive solution is the core notion behind the TOPSIS technique [10], [11]. To

ascertain the relative proximity of each option, this method uses Euclidean distance, which is the measurement of the distance between two points. The TOPSIS method goes through several stages.

1) Define Criteria

In this study, the criteria for evaluating and prioritizing facility development at the Faculty of Science and Technology (FST) UIN Jakarta were chosen based on student feedback to ensure the development aligns with their needs and expectations. The Needs criterion evaluates how well the facilities support both academic and non-academic activities, with students emphasizing the importance of spaces that enhance learning and student life. Comfort was highlighted as a key factor for a productive learning environment. The Current Condition criterion assesses the state of the facilities, with feedback indicating the need for repairs and updates to outdated or damaged infrastructure. Accessibility focuses on the importance of inclusive facilities, ensuring easy access for all students. Lastly, Frequency of Use measures how often each facility is utilized, prioritizing those that have the greatest impact on student activities. These criteria provide a comprehensive framework to guide facility development, ensuring improvements are relevant, impactful, and aligned with student priorities.

2) Normalization matrix and weighted normalized matrix

Create a decision matrix X that includes alternatives evaluated based on criteria, and then normalize the decision matrix using Equation 1.

$$r_{ij} = \frac{X_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \quad (1)$$

A normalized matrix element is denoted by r_{ij}, represents an element of the normalized matrix, whereas an element of the initial decision matrix prior to normalization is denoted by X_{ij}. refers to an element of the original decision matrix before normalization. The next step is to construct a weighted normalized decision matrix using Equation 2.

$$y_{ij} = w_i r_{ij} \quad (2)$$

Where y_{ij} is a weighted and normalized decision matrix entry. The weight of the i-th is indicated by w_i. One component of the normalized decision matrix obtained from the preceding step is r_{ij}.

3) Determining the ideal solution

Equations 3 and 4 show how to determine the positive ideal solution A^+ and the negative ideal solution A^- based on the normalized weighted scores Y.

$$A^{+}=(y_1^{+},y_2^{+},...,y_n^{+}) \quad (3)$$

This solution reflects the best possible value for each criterion. It is a perfect solution that seeks to optimize the benefit criteria and minimizing reduce the cost criteria.

$$A^{-}=(y_1^{-},y_2^{-},...,y_n^{-}) \quad (4)$$

This solution reflects the worst possible value for each criterion. It is a hypothetical solution that reduces the benefit criteria and increases the cost criteria. In decision making using both benefit and cost attributes, y_j^{+} is the value obtained by taking the maximum of y_{ij} if j is a benefit attribute, or the minimum of y_{ij} if j is a cost attribute. Conversely, y_j^{-} is the value obtained by taking the minimum of y_{ij} if j is a benefit attribute, or the maximum of y_{ij} if j is a cost attribute.

4) Calculating distance to ideal solution

As indicated in Equation 5, determine the separation between the i-th alternative and the positive ideal solution.

$$D_i^{+}=\sqrt{\sum_{j=1}^{n}(y_i^{+}-y_{ij})^2} \quad (5)$$

The difference between the i-th choice and the optimal solution is represented by the equation D_i^{+}. he value of the *i*-th option for the j-th is represented by y_{ij}, and the value of the positive ideal solution for the j-th is indicated by y_i^{+}. Determining the separation, as indicated in Equation 6, between the i-th alternative and the negative ideal solution.

$$D_i^{-}=\sqrt{\sum_{j=1}^{n}(y_{ij}-y_i^{-})^2} \quad (6)$$

where D_i^{-} is the difference between the worst-case scenario and the *i*-th choice. The value of the *i*-th option for the j-th is y_{ij}, and the value of the negative ideal solution for the j-th is y_i^{-}.

5) Determining preference value

Equation 7 can be used to calculate the preference value for each alternative V_i:

$$V_i=\frac{D_i^{-}}{D_i^{-}+D_i^{+}} \quad (7)$$

The degree to which each alternative is near the ideal solution is denoted by V_i. The i-th alternative's distance from the positive ideal solution, or positive ideal solution, is shown by D_i^+, whereas its distance from the negative ideal solution is indicated by D_i^-. The i-th option is preferred more when the V_i value is higher.

6) Ranking

Ranking alternatives based on the calculated preference values.

2.3. Population and Sample

1) Population

Population is what refers to all elements that have similar characteristics and become the focus of research, including individuals in certain groups, events or objects to be studied, and which are identified based on the same attributes or characteristics [12], [13]. In this study, the population consists of all Faculty of Science and Technology UIN Jakarta students, totaling 3,660 people. This data was obtained from the official website of FST UIN Jakarta [14].

2) Sample

To determine the sample size that is representative of the population, the Slovin formula is used by considering an error margin of 10%. Slovin's formula provides a useful guideline for determining a sufficient sample size in a survey or research, taking into account the population size and an acceptable error rate [15], as shown in Equation 8.

$$n = \frac{N}{1+N(e^2)} \tag{8}$$

With n representing the calculated sample size, N as the population size, and e as the margin of error. The calculating the sample size as follow.

$$n = \frac{3660}{1+3660(0,10^2)}$$
$$n = \frac{3660}{1+3660(0,01)}$$
$$n = \frac{3660}{37,6}$$
$$n = 97,34$$
$$n \approx 98$$

By replacing the total population and the allowable error with the values in the equation, a sample size of 98 students was obtained. This sample was selected using a random sampling technique, where each individual in the population has an equal probability of being chosen [16], which is expected to be able to represent the overall views of FST UIN Jakarta students regarding the priority of campus facility

development. This stratified representation ensures that perspectives from students with different academic experiences and backgrounds are adequately represented in the analysis. Primary data was obtained through a survey by sending questionnaires to respondents. A questionnaire is a data collection tool that asks respondents to answer a series of questions or written statements [17].

2.4. Tools

There two tools used in this research as follow.

1) Google Form
Google Form will be utilized to gather data from FST UIN Jakarta, enabling the creation of an accessible online questionnaire to explore students' preferences and opinions on FST facility development. This tool ensures representative and reliable results and allows easy data import into Google Sheets for analysis.

2) Google Sheets
Google Sheets will be utilized to analyze data from Google Forms, utilizing various analysis techniques like filters, sorting, and statistical calculations. Real-time collaboration will facilitate data-driven decision-making, with the processed data generating criteria weights and rankings.

3. RESULTS AND DISCUSSION

3.1. Respondent Criteria

The following section presents the results and discussion regarding the criteria of respondents who completed the questionnaire, based on the data obtained.

1) Gender

The distribution of respondents by gender is shown in Figure 2. Based on Figure 2, out of a total of 98 respondents, 55 were women, representing 56.1% of the total respondents, while the remaining 43 respondents were men, accounting for 43.9%. The majority of respondents were female, as indicated by the respondent gender distribution. This may suggest higher participation of female students in the survey, potentially reflecting their greater interest or concern regarding the development of facilities at FST UIN Jakarta

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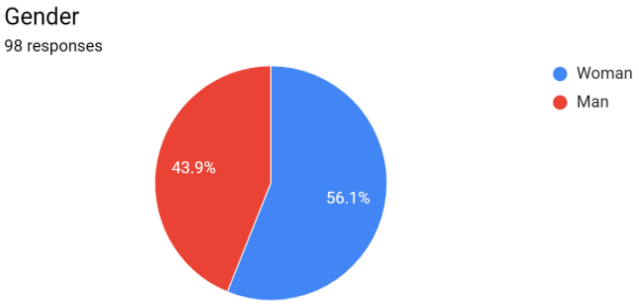

Figure 2. Respondents' Gender

2) Study Program

The distribution of respondents by study program is shown in Figure 3. Based on Figure 3, out of a total of 98 respondents, the majority were from the Information Systems study program, with 47 respondents (48%), which accounted for nearly half of the total respondents. This demonstrates the high interest and participation of Information Systems students in the development of FST facilities. Other study programs had fewer respondents, but their input is still important to consider in the development of facilities to meet the needs of all FST students.

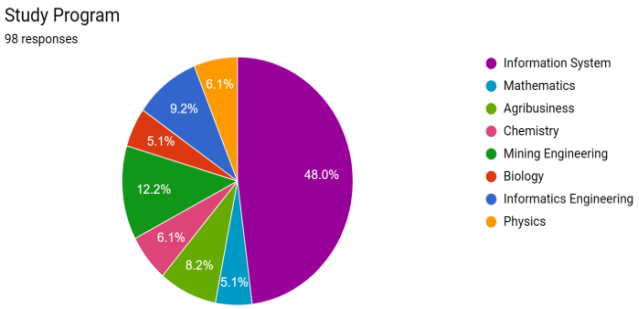

Figure 3. Respondents' Study Programs

3) Semester

The distribution of respondents by current semester is shown in Figure 4. Based on Figure 4, of the total 98 respondents, most were in semester 6, with 46 respondents (46.9%). The remaining respondents were distributed across semester 4, with 22 respondents (22.4%), and semester 2 and semester 8, each having 15 respondents (15.3%). The majority of respondents were in semester 6, indicating that students in the middle to late stages of their studies are more active in providing preferences regarding facility development. This may be due to their

greater experience using campus facilities, giving them a more comprehensive understanding of which facilities require improvement.

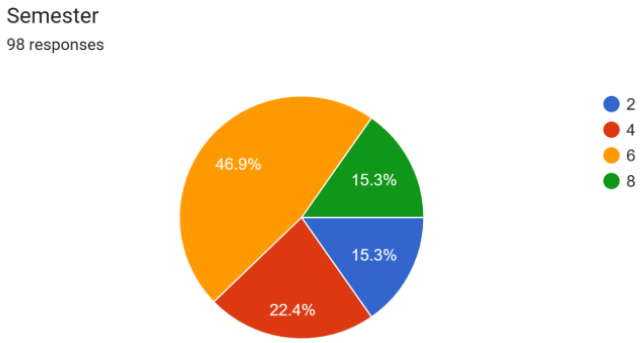

Figure 4. Respondents' Current Semester

3.2 Determination of Criteria and Alternatives

Tables 1 to 3 present the various key components used in this study, including the rating scale, evaluation criteria, and alternatives considered. Table 1 contains the rating scale that describes the size and level used to evaluate each criterion. Table 2 contains the criteria on which the assessment is based, including various factors or aspects relevant to the research objectives. Meanwhile, Table 3 lists the alternatives considered in this study, i.e., the various choices or options evaluated based on the established criteria.

Table 1. Grading Scale

Importance Score	Description
5	Strongly Disagree
4	Disagree
3	Neutral
2	Agree
1	Strongly Agree

Table 2. Criteria Data

Criteria	Description
K1	Needs
K2	Comfort
K3	Current Condition
K4	Accessibility
K5	Frequency of Use

Table 3. Alternative Data

Alternative	Description
A1	AC
A2	FST Library
A3	Projector
A4	Canteen
A5	Lift
A6	Ablution Area
A7	Musholla
A8	Classroom Chairs
A9	FST WiFi
A10	Toilet

3.3 Prioritizing Higher Education Facilities

A total of 98 active FST students at UIN Jakarta provided the assessments for this study. The data collection process involved distributing Google Form links to students, who were asked to complete the online questionnaire. After all responses were collected, the data were processed and analyzed using Google Sheets. Based on student preferences for various factors relevant to this research, Table 4 displays the weight values of the criteria. These criteria weights reflect the level of importance that students assign to each criterion, as determined by the researcher.

Table 4. Criteria/Factor Weight Value Matrix (NBF)

Criteria	Weight
Needs	0.1462585034
Comfort	0.2040816327
Current Condition	0.2285714286
Accessibility	0.1931972789
Frequency of Use	0.2278911565

Table 5 displays the results of students' preferences for the various alternatives designed and presented by the researcher. The values in this table indicate the level of students' selection and evaluation of each alternative, based on the criteria established earlier in the study.

Table 5. Criteria/Factor Evaluation Score (NEF)

Alternative	Needs	Comfort	Current condition	Accessibility	Frequency of Use
AC	112	332	345	220	141
FST Library	114	352	350	285	137
Projector	118	275	302	231	111

Alternative	Needs	Comfort	Current condition	Accessibility	Frequency of Use
Canteen	113	367	370	255	133
Lift	116	296	289	156	110
Ablution Area	141	231	233	216	172
Musholla	115	276	297	177	128
Classroom Chairs	116	424	437	413	295
FST WiFi	220	293	292	220	280
Toilet	165	206	217	198	259

Table 6 presents the outcomes of the normalizing procedure for each possible value, yielding a normalized matrix. The normalization process is performed to align all possible values on a uniform scale, hence enabling subsequent comparison and analysis.

Table 6. Normalized Matrix

Needs	Comfort	Current Condition	Accessibility	Frequency of Use
0.2584	0.3372	0.3418	0.2820	0.2353
0.2630	0.3575	0.3467	0.3654	0.2286
0.2722	0.2793	0.2992	0.2961	0.1852
0.2607	0.3727	0.3665	0.3269	0.2219
0.2676	0.3006	0.2863	0.2000	0.1835
0.3253	0.2346	0.2308	0.2769	0.2870
0.2653	0.2803	0.2942	0.2269	0.2136
0.2676	0.4306	0.4329	0.5294	0.4922
0.5076	0.2975	0.2893	0.2820	0.4672
0.3807	0.2092	0.2150	0.2538	0.4321

Table 7 presents the results of the weighted normalized matrix, which represents the next phase in the data analysis of this study. The weighted normalization matrix is derived by multiplying the values in the normalized matrix (from Table 6) by the weights of each criterion that were determined earlier.

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Table 7. Weighted Normalization Matrix

K1	K2	K3	K4	K5
0.0378	0.0688	0.0781	0.0545	0.0536
0.0385	0.0730	0.0793	0.0706	0.0521
0.0398	0.0570	0.0684	0.0572	0.0422
0.0381	0.0761	0.0838	0.0632	0.0506
0.0391	0.0613	0.0654	0.0386	0.0418
0.0476	0.0479	0.0528	0.0535	0.0654
0.0388	0.0572	0.0673	0.0438	0.0487
0.0391	0.0879	0.0990	0.1023	0.1122
0.0742	0.0607	0.0661	0.0545	0.1065
0.0557	0.0427	0.0491	0.0490	0.0985

Table 8 presents the results of the positive and negative ideal solution analysis, which is a crucial step in the evaluation and decision-making process. The positive ideal solution represents the optimal scenario by selecting the highest value for each criterion across all alternatives. Conversely, the negative ideal solution reflects the least desirable scenario by considering the lowest value for each criterion.

Table 8. Weighted Normalization Matrix

K1	K2	K3	K4	K5
0.0378	0.0688	0.0781	0.0545	0.0536
0.0385	0.0730	0.0793	0.0706	0.0521
0.0398	0.0570	0.0684	0.0572	0.0422
0.0381	0.0761	0.0838	0.0632	0.0506
0.0391	0.0613	0.0654	0.0386	0.0418
0.0476	0.0479	0.0528	0.0535	0.0654
0.0388	0.0572	0.0673	0.0438	0.0487
0.0391	0.0879	0.0990	0.1023	0.1122
0.0742	0.0607	0.0661	0.0545	0.1065
0.0378	0.0688	0.0781	0.0545	0.0536

Table 9 presents the results of the distance calculations for both the positive and negative ideal solutions. The distance to the positive ideal solution reflects how close each alternative is to the optimal scenario, while the distance to the negative ideal solution indicates how far each alternative is from the least desirable scenario.

This data allows researchers to assess the relative performance of each alternative based on predefined criteria, facilitating the selection of the most appropriate option through a structured and systematic analysis.

Table 9. Ideal Solution

Positive Ideal Solution	Negative Ideal Solution
0.0742	0.0378
0.0879	0.0427
0.0491	0.0990
0.0386	0.1023
0.1122	0.0418

Table 10 presents the results of calculating the preference weights, which reflect the level of importance of each criterion as determined by the respondents' preferences. This information was obtained from a questionnaire completed by 98 active students from FST at UIN Jakarta. These preference weights are crucial for understanding the prioritization of criteria in the evaluation of alternatives, helping researchers make more informed decisions that align with the stated research objectives.

Table 10. Distance to Ideal Solution

Distance for Positive Ideal Solution	Distance to Negative Ideal Solution
0.0788	0.0595
0.0839	0.0491
0.0880	0.0563
0.0839	0.0543
0.0846	0.1063
0.0688	0.0721
0.0811	0.0684
0.0881	0.0836
0.0362	0.0959
0.0518	0.0941

The final value of each option determines the preferred order, as shown in Table 11. With a value of 0.7260, FST WiFi holds the highest ranking, followed by toilet at 0.6449 and lift at 0.5569. The FST Library occupies the lowest rank with a rating of 0.3694.

Table 11. Ranking

Alternative Name	Final Score	Description
AC	0.4302	7
FST Library	0.3694	10
Projector	0.3903	9
Canteen	0.3930	8
Lift	0.5569	3
Ablution Area	0.5116	4
Musholla	0.4574	6
Classroom Chairs	0.4869	5
FST WiFi	0.7260	1
Toilet	0.6449	2

This research shows that WiFi, toilets, and lifts are the three most prioritized facilities for development on the FST campus. WiFi in FST is considered the optimal choice due to its significant role in supporting access to online learning resources, virtual collaboration, and efficient completion of academic tasks. The availability of clean and well-maintained restrooms creates a comfortable and hygienic environment, improving students' concentration while on campus as well as reducing the risk of health issues. Meanwhile, optimally functioning lifts provide better accessibility, especially for students with disabilities or who need quick mobility between floors, which saves time and energy.

This assessment provides a clear direction for decision-making on resource distribution and facility upgrades on the FST campus, focusing on these three key facilities to have a significant positive impact on student well-being, productivity, and their academic and social experience. Further clarification on the methods/analysis and synthesis of the discussion results is needed to ensure a thorough answer to the problem under study. In addition, the suggestion to add a discussion comparing the results with other studies on facility development in higher education is beneficial. This could help validate the effectiveness of the TOPSIS approach used as well as provide additional insight into general trends in universities regarding facilities management and improvement.

3.4 Discussion

The application of the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method in facility development has been extensively studied across various sectors, including higher education institutions. This approach provides a structured and objective framework for evaluating multiple facility

improvement alternatives based on predefined criteria. Previous studies have demonstrated the effectiveness of TOPSIS in academic library evaluation at the University of Niš, where the method was applied to rank libraries based on factors such as search time, library space, and available resources. The findings enabled university administrators to identify the most efficient library, thereby guiding resource allocation and improvement strategies [18].

Similarly, research in the hospitality sector has shown how TOPSIS can enhance facility procurement decision-making. A study evaluating alternatives such as guest rooms, spas, gyms, and travel corners found that the method provided a clear ranking system that informed procurement strategies, ultimately improving service quality and operational efficiency [19]. These studies emphasize the versatility and reliability of TOPSIS across different contexts, particularly in higher education. By systematically analyzing multiple criteria, the method allows decision-makers to prioritize facility developments that align with institutional goals and user needs.

At Fakultas Sains dan Teknologi (FST) UIN Jakarta, the application of TOPSIS has revealed key priorities in campus facility improvements, with WiFi connectivity, toilet facilities, and lift functionality emerging as the top-ranked needs. According to the analysis, WiFi received the highest priority score (0.7260), followed by toilet facilities (0.6449), and lift functionality (0.5569). This prioritization highlights the essential role these facilities play in supporting students' academic experiences and overall well-being. WiFi connectivity, in particular, was ranked as the most critical facility, reflecting its importance in facilitating access to online learning resources, virtual collaboration, and academic research. Given the increasing reliance on digital learning tools, stable and high-speed WiFi is essential to ensure uninterrupted educational activities. The study suggests that investments in network infrastructure upgrades, expanded bandwidth, and reliable connectivity across classrooms, libraries, and common areas would significantly improve the student experience.

The prioritization of toilet facilities also underscores the need for hygienic, well-maintained restrooms on campus. Poor restroom conditions can negatively impact student comfort and concentration, making facility cleanliness a crucial factor in academic performance. Regular maintenance, sanitation improvements, and smart restroom monitoring systems could enhance restroom conditions and contribute to a more positive campus environment. Additionally, the importance of lifts was emphasized, particularly for students with disabilities and those requiring efficient mobility between floors. Given the multi-story structure of FST buildings, fully functional lifts can reduce congestion, enhance accessibility, and improve time efficiency for students and staff.

The prioritization results were derived from a survey of 98 active FST students, who provided assessments based on criteria such as needs, comfort, current condition, accessibility, and frequency of use. The demographic distribution of respondents reveals that 56.1% were female and 43.9% were male, suggesting a higher level of participation among female students. This may indicate greater engagement from female students in facility development discussions, potentially reflecting their concern for campus infrastructure improvements.

Additionally, a large proportion of respondents were from the Information Systems study program (48%), highlighting strong interest in digital infrastructure enhancements, particularly WiFi improvements. The semester-wise distribution of respondents shows that 46.9% were in semester 6, followed by 22.4% in semester 4, and 15.3% in both semesters 2 and 8. This suggests that students in the middle to late stages of their studies are more active in providing feedback, possibly due to their more extensive use of campus facilities over time. Their experiences allow them to provide more informed evaluations of the infrastructure and identify key areas needing improvement.

The criteria weighting in the TOPSIS analysis further validates the prioritization results. The current condition of facilities (22.86%) and frequency of use (22.79%) emerged as the most influential factors, suggesting that students are particularly concerned about the state of infrastructure and how frequently they rely on these facilities. Comfort (20.41%) and accessibility (19.32%) were also significant factors, emphasizing the importance of usability and convenience. Needs (14.63%), while still relevant, had a slightly lower weight, indicating that students prioritize functional and frequently used facilities over perceived necessity alone.

The findings from FST UIN Jakarta align with previous studies that have applied TOPSIS in higher education facility management. For example, at the University of Niš, the method was used to evaluate academic libraries based on efficiency metrics, resulting in targeted resource allocation for library improvements [18]. Similarly, research in hotel procurement decision-making demonstrated the practical application of TOPSIS in ranking and selecting the best facilities, such as guest services and recreational amenities, ensuring cost-effective investment and enhanced customer satisfaction [19].

Comparing these studies with the results from FST UIN Jakarta, it is evident that WiFi, restroom facilities, and lifts are universally recognized as critical infrastructure components in higher education institutions. The ability of TOPSIS to provide a quantifiable ranking system ensures that decision-makers prioritize infrastructure investments based on objective data rather than subjective opinions. Unlike traditional decision-making approaches that may rely on anecdotal

evidence, TOPSIS introduces a systematic, multi-criteria decision-making framework that aligns investments with institutional goals and student needs.

The findings from this study provide actionable insights for campus facility planning and resource allocation at FST UIN Jakarta. Given that WiFi connectivity emerged as the top priority, significant investments should be made to enhance network infrastructure, ensuring seamless digital learning experiences, uninterrupted access to academic resources, and improved online collaboration. Expanding bandwidth, upgrading routers, and optimizing network coverage in lecture halls and common areas can significantly enhance digital accessibility for students and faculty. Similarly, prioritizing restroom renovations and maintenance is essential to improve sanitation, comfort, and overall campus hygiene. Implementing regular maintenance schedules and ensuring proper ventilation, lighting, and cleanliness will positively impact students' daily campus experiences. Likewise, maintaining fully functional lifts is crucial to enhancing campus accessibility and mobility, particularly for students with disabilities. Regular inspections, emergency response mechanisms, and modernized lift systems will ensure smooth and safe operations.

Moreover, the structured TOPSIS evaluation model used in this study could serve as a replicable framework for other universities looking to optimize facility management and infrastructure development. Continuous engagement with students through structured surveys and feedback mechanisms can help universities adapt to evolving student needs and technological advancements, ensuring that future infrastructure investments remain aligned with academic and institutional priorities.

The application of TOPSIS in higher education facility management provides a structured, objective, and data-driven approach to prioritizing infrastructure improvements. The findings from FST UIN Jakarta reinforce the importance of digital connectivity, sanitation, and accessibility, with WiFi, toilet facilities, and lift functionality emerging as the top three priorities for development. These results emphasize the need for institutions to align infrastructure investments with student needs, focusing on frequently used and essential facilities.

By utilizing multi-criteria decision-making models like TOPSIS, universities can improve resource allocation, enhance student satisfaction, and ensure that campus infrastructure evolves in response to changing academic demands. Future research could explore comparative analyses with other universities, validating TOPSIS as a reliable tool for facility development planning. Additionally, integrating smart campus solutions and digital monitoring technologies could further streamline facility management, ensuring a continuous cycle of improvement that benefits students and faculty alike.

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4. CONCLUSION

This study demonstrates that the TOPSIS method is an effective tool for prioritizing campus facility development based on student preferences, with WiFi, toilets, and lifts identified as the top three facilities that require immediate attention. Improving WiFi quality is crucial to support online learning, research, and collaboration, while enhancing toilet conditions and ensuring the optimal functionality of lifts will significantly improve campus comfort and accessibility. To implement these improvements, universities can adopt a phased development and maintenance process, starting with enhancing WiFi capacity, conducting routine repairs of toilets, and performing periodic checks on lifts to ensure optimal functionality and user safety. Utilizing the findings from this study, universities can better allocate budgets, focusing on facilities that have the most impact on student experiences, ultimately ensuring optimal conditions and providing comfort and accessibility for students in their daily activities. Furthermore, future research is recommended to refine the study's criteria by incorporating additional variables such as safety, aesthetics, and environmental impact, while expanding respondent coverage to ensure more representative results. Additionally, comparing the TOPSIS method with other decision-making techniques would strengthen the robustness and applicability of the findings. Through these steps, universities can sustainably improve their facilities and remain responsive to the evolving needs of their students.

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