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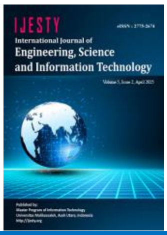

The Decision Support System for Feasibility Testing of Healthy Canteens at Malikussaleh University Using the Multi-Attribute Utility Theory Method

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Abstract

This research aims to develop a decision support system based on the Multi-Attribute Utility Theory (MAUT) method to evaluate the feasibility of healthy canteens at Malikussaleh University. The system is designed to assess the feasibility of canteens based on six main criteria: Selection of Raw Materials, Storage of Food Ingredients, Food Processing, Food Storage, Food Transportation, and Food Serving. This study evaluated 20 canteens on campus, with feasibility values calculated based on the weights assigned to each Criterion. The results showed that the canteen with the alternative code A11 (Kopita BI) received the highest score of 0.956, followed by A6 (Umi), with a score of 0.798, and A10 (Alisha), with a score of 0.620. Out of the 20 canteens evaluated, only three canteens were categorized as "Feasible," 3 as "Sufficiently Feasible," and the remaining 14 were deemed "Not Feasible." These findings highlight the urgent need to improve the quality of most canteens. The criteria for Selection of Raw Materials and Food Processing had the highest weights, emphasizing the importance of these two aspects in maintaining food quality and health standards. Implementing this system simplifies data management and analysis and provides clear recommendations for canteen managers to improve service and health standards. Thus, this system is expected to promote healthier and higher-quality campus canteens. This research enhances canteen service quality in university environments and can serve as a reference model for other educational institutions in evaluating and improving their canteen facilities.

Keywords: *Decision Support System, Healthy Canteen, Multi-Attribute Utility Theory, Unimal.*

1. Introduction

A campus is an educational institution that provides food sales facilities through a canteen for students, lecturers, and administrative staff. The presence of a canteen as a food processing facility at the university level aims to facilitate the fulfilment of students, lecturers, and administrative staff's food and beverage needs. This is expected to ensure that the food and beverage needs are met with protection and guaranteed health standards, thus creating a productive workforce. The health of the campus canteen needs to be considered in the context of health and hygiene standards. The campus must ensure that the canteen offers students healthy and nutritious food options, including various menus that meet nutritional needs [1].

According to research [2], hundreds of millions, even billions, of people suffering from foodborne diseases experience illness, and hundreds of thousands die each year. In 2015, there were 600 million cases of foodborne diseases caused by contaminated food, according to the WHO. Eighteen thousand one hundred forty-four people were exposed to foodborne diseases, and 128 exceptional cases occurred in 2011, as recorded by the National Agency of Drug and Food Control (BPOM). This situation will affect the health levels of consumers who consume such food. Various types of microorganisms can cause food contamination, leading to foodborne diseases, including Shiga toxin-producing Escherichia coli (STEC), Salmonella spp., Shigella spp., Brucella spp., Clostridium spp., Campylobacter spp., Listeria monocytogenes, Vibrio spp., Yersinia spp., and others. One of the most common pathogenic microorganisms causing contamination in food and beverages is Escherichia coli.

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The study [3] explains that preventive actions are carried out to prevent poisoning and other dangers related to foodborne diseases. The activities conducted include initial observation about the standards of a healthy canteen, as well as education about healthy canteens, sanitation hygiene, personal hygiene, menus that align with the principles of balanced nutrition, and positive changes related to the knowledge of food handlers. This includes reflecting good behaviour through complete personal protective equipment (PPE).

Efforts to improve the quality of life have been outlined in the national development goals to achieve the best possible improvement in the quality of life for the Indonesian people. Various parties and sectors' roles are crucial in the health sector, as determined by the national health system. Therefore, enhancing physical, mental, and social well-being is very important. One of these efforts is providing food and beverages that meet the required standards [4].

According to the study [5], a canteen can be considered healthy if it at least meets the criteria for food handlers who are healthy and trained, hygiene and sanitation standards, and the sale of healthy menu options. A canteen that is comfortable, safe, and provides nutritious menu options greatly supports healthy eating patterns in educational institutions. To date, no standard method for measuring the food environment has been agreed upon by various countries. However, several previous studies have attempted to explore student perceptions and satisfaction levels regarding canteens on their campuses. Students' knowledge and perceptions of quality canteen services can influence these food preferences. Some factors that impact student satisfaction and the frequency of food purchases in campus canteens include the food, ambience, economic value, menu options, and service quality. Another study indicates that the main predictor of consumer satisfaction with food service providers is the quality of food and the atmosphere of the eating environment. Meanwhile, the canteen management system and the nutritional content of food affect consumer satisfaction levels indirectly.

In addition to being a place for food processing, cooking, and preparing food to be served to consumers, a canteen can also become a medium for spreading diseases transmitted through food and beverages. Therefore, the food and drinks in the canteen can potentially cause foodborne diseases if not managed and handled correctly [6].

Improving the health quality of campus canteens can be achieved by using a decision support system with the Multi-Attribute Utility Theory (MAUT) method, which can help enhance the service quality in the canteen. Evaluation based on various criteria, such as raw material quality, cleanliness, and pricing, can assist in making better decisions.

Using technology to improve user efficiency with the Multi-Attribute Utility Theory (MAUT) method as the basis for the Decision Support System (DSS) demonstrates the university's commitment to fostering technology in enhancing efficiency and accuracy in decision-making related to canteen health. Consumer health and well-being are key factors when managing canteens or food stalls in various institutions. The health feasibility of the canteen becomes critical because the food served at these places directly impacts the consumers' health condition. Therefore, a systematic and holistic approach is needed to evaluate the health feasibility of the canteen [6].

Decision-making regarding the health feasibility of a canteen cannot rely solely on intuition but requires a framework that can integrate various aspects of health and user rights. The Decision Support System (DSS) is an appropriate solution in this context, serving as a tool to provide relevant information and support the decision-making process.

The Multi-Attribute Utility Theory (MAUT) method is a policy that can address decision-making issues by considering various criteria or attributes and the interests of the decision-makers. MAUT allows for integrating several relevant factors in evaluating the health feasibility of a canteen, including food quality, cleanliness, food safety, and other factors contributing to health. The application of MAUT in the DSS for canteen health feasibility testing is expected to provide more comprehensive and objective considerations. MAUT enables the weighting of criteria based on user rights [7].

Implementing the DSS with the MAUT method will benefit canteen managers in government institutions and consumers. Canteen management will gain a clearer understanding of the health feasibility of the canteen, enabling them to make appropriate improvements or enhancements. The government can use the information generated to monitor and regulate canteen health feasibility more effectively, and consumers will be assured that the food they consume meets the health standards set.

Therefore, based on this issue, the author has chosen the research title "Decision Support System for Feasibility Testing of Healthy Canteens at Malikussaleh University Using the Multi-Attribute Utility Theory (MAUT) Method," which is expected to improve consumer safety and health, as well as create a healthier canteen environment that supports community development oriented toward health.

2. Literature Review

2.1. System

The word "system" comes from the Latin word system and the Greek word systems. A system is a unity of interconnected components or elements to facilitate the flow of information, materials, or energy to achieve a specific goal. A system can also be understood as a collection of interrelated and interdependent elements that work together to achieve a common objective [8]. A system is a collection of objects, such as people, resources, concepts, and procedures, aimed at performing a specific function or achieving a particular goal. Furthermore, a system is a collection of components that interact collectively to accomplish the objective [9]. From the definition above, it can be concluded that a system is an integrated collection of all the elements within a given problem scope. As a result, any information within the system can be utilized by the relevant parties within the problem scope to achieve a specific goal [10].

2.2. Decision

Management literature states that a decision is the determination of a choice. Some define a decision as a choice regarding a specific action or course of action. According to Daihani, a decision is a selection of an action strategy or a strategy for action. According to Hasan, a decision is the result of problem-solving, and a decision must be able to answer questions about what is being discussed in the planning process. According to Agustina, a decision is a choice between alternatives. This definition contains three meanings: the selection is based on logic or consideration, there are several alternatives to choose from, intending to select the best one, and there is a desired objective that the decision will help achieve, bringing it closer to that goal [11].

2.3. Decision Support System

A Decision Support System (DSS) is an information system that assists decision-making by utilizing data, mathematical models, and specific analytical techniques. A Decision Support System aims to help make more accurate and effective decisions by providing relevant and reliable information [12]. According to Jopih, globally, it can be said that a Decision Support System (DSS) aims to enhance the capabilities of decision-makers by providing more decision alternatives and assisting in formulating problems. Thus, DSS can save time, effort, and costs. In short, the purpose of a DSS is to improve effectiveness (doing the right things) and efficiency (doing things right) in decision-making [13].

2.4. Health Feasibility Testing

Health feasibility testing or health assessment is an evaluation process to determine whether an individual or system has adequate or acceptable health conditions. A literature review on health feasibility testing may cover various aspects, including examination methods, health indicators being assessed, and the relevance of feasibility testing in different contexts [14].

2.4.1 Hygiene

The word "hygiene" comes from Greek, meaning the science of creating and maintaining health. Hygiene refers to health efforts aimed at preserving and protecting personal cleanliness, which can influence the overall health of a community. For example, washing hands to keep them clean and protected, cleaning equipment to keep them free of germs, and discarding spoiled food to maintain the integrity of the overall meal. Hygiene is a public health concept that encompasses all efforts to protect, preserve, and enhance physical and mental health, both for individuals and the general public, to provide the foundations for a healthy life and improve the well-being and productivity of human life [15].

2.4.2 Sanitation

Sanitation has the same meaning as hygiene. Sanitation refers to activities related to health aimed at maintaining and protecting the cleanliness of the environment, which can influence public health levels. Food hygiene is one of the efforts and actions to eliminate any hazards in food that could disrupt or endanger health, starting from before the food is processed until it is ready to be consumed by the public or consumers. It involves preventing diseases or controlling environmental factors that are part of the disease transmission chain and reducing disease occurrence [16].

2.5. Canteen Campuses

According to the Indonesian Dictionary (Kamus Besar Bahasa Indonesia), "Canteen is a space for selling drinks and food (in schools, universities, offices, dormitories, etc.)." A canteen is a place for food management, prepared to make it easier for individuals in an institution to obtain meals. The development of the canteen business on campuses is an up-and-coming venture, with its marketing target being the students within that environment, as food is a basic necessity for survival that will always be sought after. Especially if the food served is healthy, popular among many people—especially students—and has unique features and innovations that set it apart. When viewed in the future, the campus canteen business represents a broad market prospect, explicitly targeting the students within the campus itself [15].

2.6. Unified Modelling Language (UML)

Unified Modeling Language (UML) is a visual modelling language used in software engineering to describe, design, and document software systems. UML combines modelling languages developed by Booch, Object Modeling Technique (OMT), and Object-Oriented Software Engineering (OOSE). The Booch method by Grady Booch is well-known as the Object-Oriented Design method. This method breaks the analysis and design process into four iterative phases: identifying classes and objects, identifying the semantics of the relationships between objects and classes, detailing interfaces, and implementation [17].

2.7. Flowchart

A flowchart (also called a flow diagram) is a type of diagram that represents an algorithm or sequence of steps in a system. System analysts use flowcharts as documentation to explain to programmers the logical structure of the system they are building. In this way, flowcharts help solve potential issues that may arise when developing a system. Essentially, a flowchart is represented by symbols, with each symbol representing a specific process. On the other hand, the connections between a particular method and the following process are described using connecting paths. All process flows can be better explained using a flowchart. Additionally, adding new processes can be quickly done using this diagram. After the flowchart design is complete, a programmer translates the logical design into program code using various programming languages that have been agreed upon [18].

2.8. Hypertext Preprocessor (PHP)

PHP, or Personal Home Page, is one of the server-side programming languages used to address issues and build websites, and it can be used in conjunction with HTML (Hypertext Markup Language) [19]. PHP is called "server-side" because the program provided is executed or processed on the computer acting as the server. For example, when a user accesses a website, the web browser sends a request to the server.

PHP was created around 1995 by Rasmus Lerdorf, a software engineer from Greenland. Initially, Rasmus used PHP to track visitors to his website. This is why the language was initially called "Personal Home Page" (PHP) Tools. However, its development was well-received by the community, and he made PHP available to the public under an open-source license. Today, PHP is the most commonly used server-side scripting language for websites worldwide. It has reached version 5, and its usage continues to increase [17].

2.9. Multi-Attribute Utility Theory (MAUT)

Multi-Attribute Utility Theory (MAUT) is a framework where the final evaluation, v(x), of an object x is defined as the weighted sum of values relevant to its dimensions. The term commonly used for this is "utility value." MAUT transforms multiple interests into numerical values on a scale of 0 to 1, where 0 represents the worst choice and one represents the best. This allows for direct comparisons of different measures or criteria [20]. To calculate the overall evaluation value can be defined using several equations formulated with the steps that can be seen in Figure 1 below:

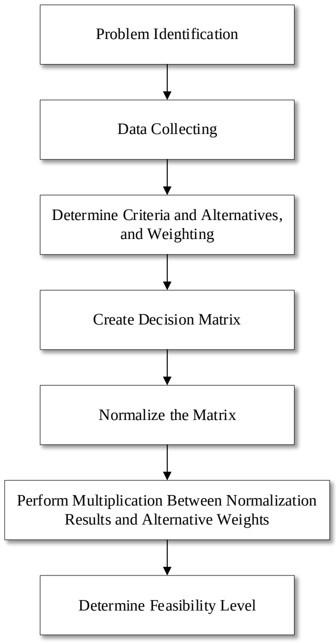


Fig 1. MAUT Method Flow

1. Identify the problem and collect data
2. Define alternatives, criteria, and the criteria values for each alternative
3. Assign weights to each Criterion according to the rule

4. Normalize the matrix using the equation: …….(1)

$$U(x) = \frac{x - xi^-}{xi^+ - xi^-}$$

Explanation:
U(X) = The utility value of each Criterion for alternative x
X = The value of each alternative x
Xi^- = The lowest value of each Criterion for alternative x
Xi^+ = The highest value of each Criterion for alternative x

5. Input the utility values from the normalized matrix, which results in the utility value for each alternative according to the attributes.
6. Multiply the utility values by the respective weights to obtain the alternatives using the equation: ....(2)

$$V(X) = \sum_{i=1}^{n} Wi.Vi(x)$$

Explanation:
V(x) = The total evaluation of alternative x
Wi = The weight of Criterion i
Vi(x) = The evaluation result of Criterion i for alternative x
i = Criterion index

7. Determine the feasibility level

3. Research Method

3.1. Place and Research Period

In the research on the Decision Support System for Health Feasibility Testing of Campus Canteens at Malikussaleh University using the Multi-Attribute Utility Theory (MAUT) method, the study was conducted during the odd semester, starting in October 2023 and continuing until completion. The research location was chosen at the canteens on the Malikussaleh University campus in Lhokseumawe, North Aceh.

3.2. Data Collecting

Data collection techniques refer to the methods used to gather information for research purposes. This study obtained data from several sources and data collection methods. The data collection process involved a predetermined sample. The data sources included:

a. Interviews: As part of the research, the author conducted interviews with relevant parties, such as the management or canteen operators, as well as the canteen users at Malikussaleh University's campus canteen.
b. Observation: The researcher also carried out observational steps, closely monitoring the canteen's operations to assess cleanliness, safety, and operational efficiency. This included reviewing the variety of menu offerings and identifying the most frequently purchased food items while also noting whether health and safety practices were being carried out following the established standards.

4. Results and Discussion

The health feasibility test of canteens at Malikussaleh University ensures that the available food facilities meet health and hygiene standards. Ensuring the feasibility of the canteens impacts not only consumer health but also the quality of service and the institution's reputation. One effective method for evaluating the feasibility of canteens is the Multi-Attribute Utility Theory (MAUT), which can integrate various criteria to produce objective assessments. This study focuses on applying the MAUT method to evaluate the feasibility of canteens at Malikussaleh University, using data from 20 canteens with main evaluation criteria, including raw material selection, food storage, food processing, food transportation, and food presentation. This research aims to identify canteens that meet feasibility standards and provide improvement recommendations for those that do not. This study also evaluates how well the MAUT method provides consistent results through manual calculations and automated systems. By comparing these two approaches, the research aims to ensure that the developed system can deliver accurate, efficient, and relevant results to support decision-making processes related to managing healthy canteens.

4.1. Dataset

Table 1. Dataset Research

Canteen Name	Raw Material Selection	Raw Material Storage	Food Processing	Food Storage	Food Transportation	Food Presentation
TAKANA JUO	44	16	82	29	38	34
IE BM	48	11	82	29	33	39
SAMBALADO	48	21	76	34	43	48
PAK GURU	72	49	133	33	43	72
KPR	63	41	116	43	53	58
UMI	72	75	170	71	67	87
D'ZASKIA	52	11	92	28	38	64
TEKNIK	48	15	86	24	43	48
KAK EL	48	15	80	24	48	38
ALISHA	52	58	200	43	58	96
KOPITA BI	85	85	212	57	80	87
ISOL	52	23	140	51	60	73
KITA BERSAMA	43	4	84	29	52	71
KAK NA	34	16	91	24	48	43
PEULALE HATE	48	8	104	29	58	56
MAK MAH	49	8	75	29	33	44
MAK ROS	54	11	80	29	38	34
RELAX	54	11	117	29	33	53
KAK MURNI	48	8	129	29	28	43
ADEK RIZKY	43	15	98	34	33	48

The dataset in this research includes data from 20 canteens at Malikussaleh University, each evaluated on multiple criteria to assess their health feasibility. The criteria for evaluation include Raw Material Selection, Food Storage (Raw Ingredients), Food Processing, Food Storage (Prepared Food), Food Transportation, and Food Presentation. Each canteen is rated based on these categories, with numerical scores assigned for each. For example, the canteen "TAKANA JUO" scored 44 for raw material selection, 16 for food storage (raw ingredients), 82 for food processing, 29 for food storage (prepared food), 38 for food transportation, and 34 for food presentation. The dataset provides valuable insight into the feasibility of each canteen, highlighting areas for improvement in maintaining health standards, such as ensuring better food storage or processing practices. This data is crucial for evaluating the health feasibility of the campus canteens and providing recommendations for enhancing their operational standards.

4.2. System Implementation

In this sub-chapter, the researcher discusses implementing the Multi-Attribute Utility Theory (MAUT) method in the Decision Support System for evaluating the health feasibility of canteens at Malikussaleh University, following the design analysis that was previously developed. This implementation follows the design phase, where the system allows users to interact with the application, input relevant data variables such as Raw Material Selection, Food Storage, and Food Presentation, and view the feasibility evaluation results based on the MAUT method. This process also enables efficient validation of the system interface and evaluation results, which are presented in tables and graphs to facilitate analysis. Implementing this system is a crucial step in assessing canteen feasibility, and it will serve as a foundation for developing more advanced decision support systems in the future.

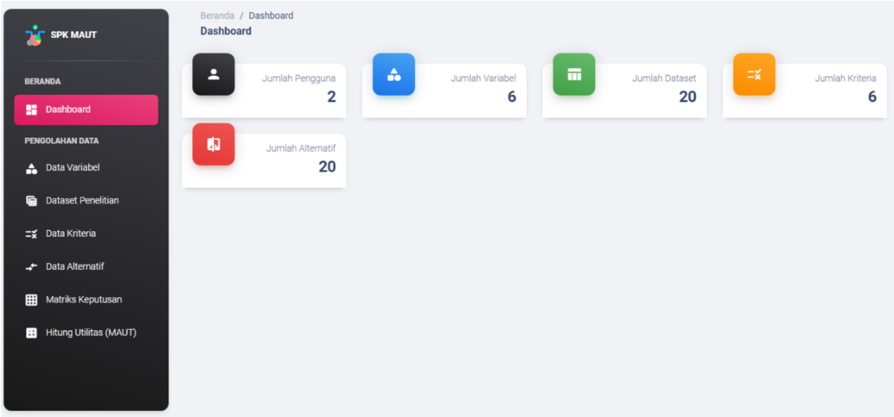


Fig 2. Dashboard Interface (Indonesia)

This dashboard page serves as the primary interface for the Decision Support System using the MAUT method, designed to provide a summary of information and quick navigation. In the central section, statistics show the number of users (2), the number of variables (6), the number of datasets (20), the number of alternatives (20), and the number of criteria (6), presented in cards with different icons and colours for easy identification. The navigation menu on the left includes various features such as Data Variables, Research Datasets, Criteria Data, Alternative Data, Decision Matrix, and Utility Calculation (MAUT), making it easy for users to manage and analyze data.

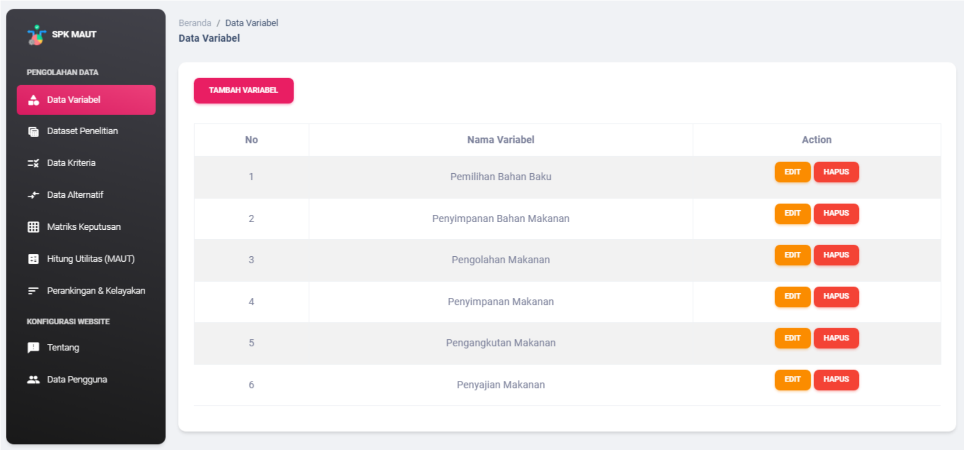


Fig 3. Variable Data Interface (Indonesia)

This data variables page is designed to manage the information variables used in the decision-making process. The main table displays a list of variables such as Raw Material Selection, Food Storage, Food Processing, Food Storage (Prepared Food), Food Transportation, and Food Presentation, each assigned a sequential number. Each row includes an orange Edit action button to modify the variable data and a red Delete button to remove the variable. A pink Add Variable button at the top of the table allows users to add a new variable to the system. This page ensures data variable management is more accessible, structured, and efficient, supporting the system's analysis.

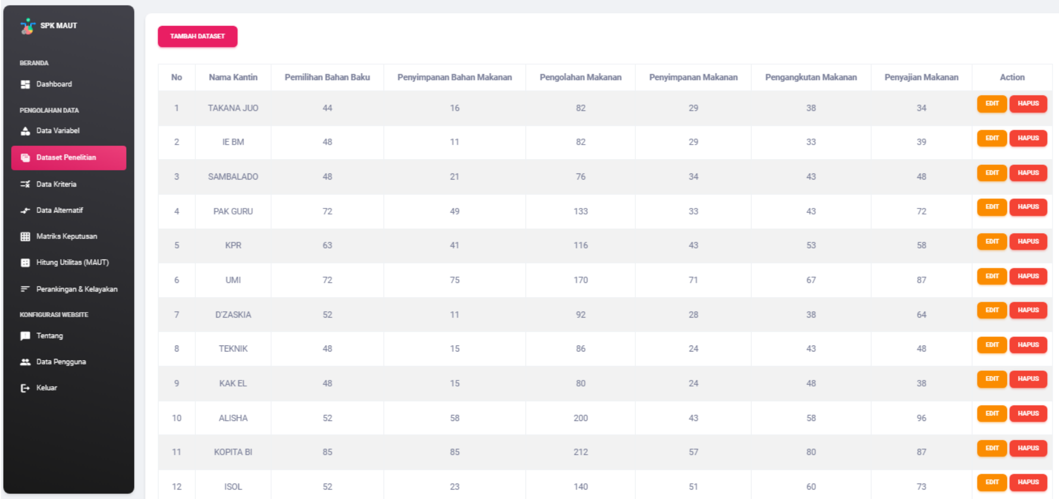


Fig 4. Research Dataset Interface (Indonesia)

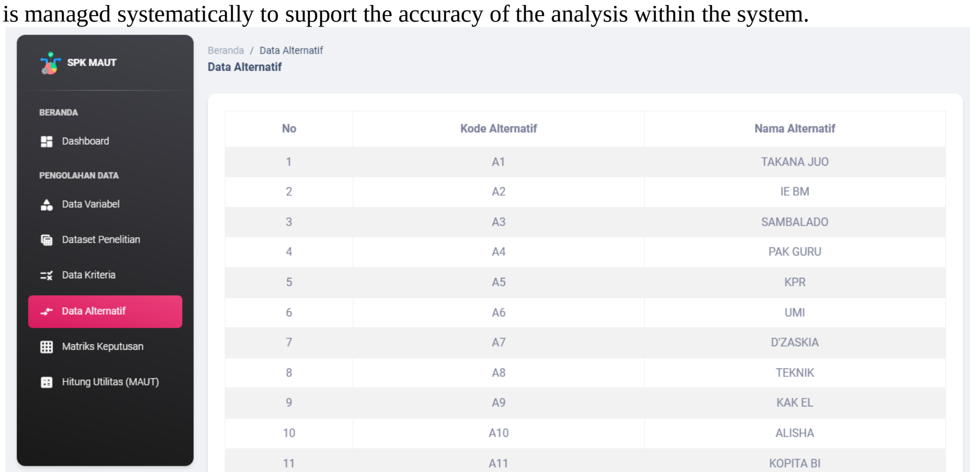
The research dataset page is designed to manage data related to canteens used as research objects. The main table displays a list of canteen names and the values for each variable, such as Raw Material Selection, Food Storage, Food Processing, Food Storage (Prepared Food), Food Transportation, and Food Presentation. Each data row includes an orange Edit action button to modify the data and a red

Delete button to remove the data. At the top of the table is a pink Add Dataset button for adding new data. This interface makes it easier for users to manage the research dataset in a structured and efficient manner, supporting the feasibility analysis of canteens using the MAUT method.

No	Kode Kriteria	Nama Kriteria	Bobot	Bobot Normalisasi	Action
1	C1	Pemilihan Bahan Baku	3	0.30	UPDATE
2	C2	Penyimpanan Bahan Makanan	2	0.20	UPDATE
3	C3	Pengolahan Makanan	2	0.20	UPDATE
4	C4	Penyimpanan Makanan	1	0.10	UPDATE
5	C5	Pengangkutan Makanan	1	0.10	UPDATE
6	C6	Penyajian Makanan	1	0.10	UPDATE

Fig 5. Criteria Data Interface (Indonesia)

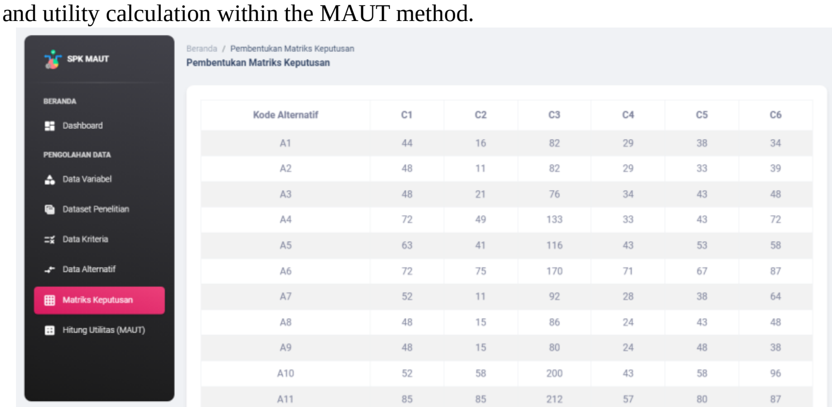
The criteria data page is used to manage the criteria that form the basis of the decision-making process using the MAUT method. The main table displays a list of criteria with columns for Criterion Code, Criterion Name, Weight, and Normalized Weight. The weight indicates the level of importance of each Criterion. In contrast, the normalized weight is obtained by dividing the weight by the total weight of all criteria to ensure consistency in the calculations. Each row includes a pink Update action button that allows users to update the criterion information. The displayed criteria include Raw Material Selection, Food Storage, and Food Processing. This page ensures that criterion data is managed systematically to support the accuracy of the analysis within the system.



No	Kode Alternatif	Nama Alternatif
1	A1	TAKANA JUO
2	A2	IE BM
3	A3	SAMBALADO
4	A4	PAK GURU
5	A5	KPR
6	A6	UMI
7	A7	D'ZASKIA
8	A8	TEKNIK
9	A9	KAK EL
10	A10	ALISHA
11	A11	KOPITA BI

Fig 6. Alternative Data Interface (Indonesia)

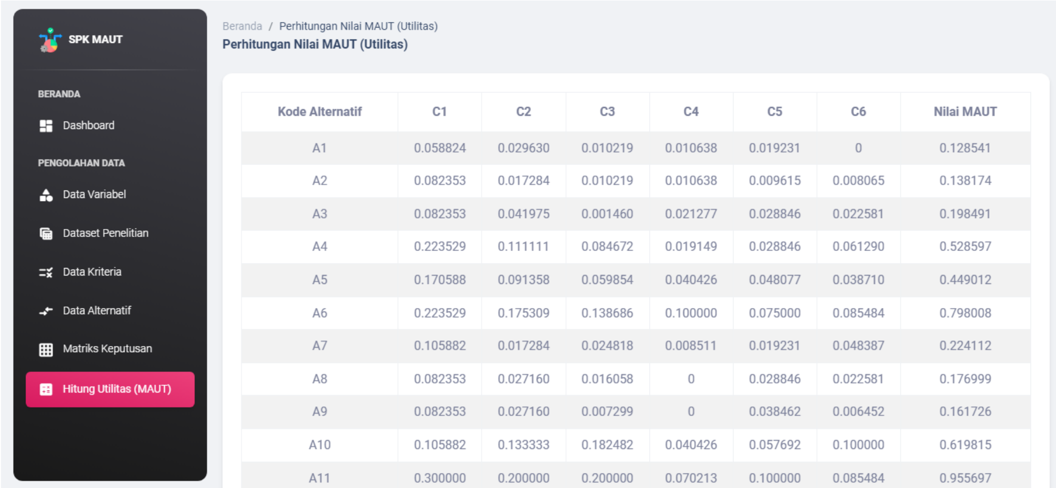
The alternative data page is designed to manage the list of alternatives to be evaluated in decision-making. This page provides a table displaying information about the alternative code and name, allowing users to add, edit, or delete alternative data as needed. The primary function of this page is to ensure that the alternative data is organized and ready for use in subsequent analysis processes, such as decision matrix creation and utility calculation within the MAUT method.



Kode Alternatif	C1	C2	C3	C4	C5	C6
A1	44	16	82	29	38	34
A2	48	11	82	29	33	39
A3	48	21	76	34	43	48
A4	72	49	133	33	43	72
A5	63	41	116	43	53	58
A6	72	75	170	71	67	87
A7	52	11	92	28	38	64
A8	48	15	86	24	43	48
A9	48	15	80	24	48	38
A10	52	58	200	43	58	96
A11	85	85	212	57	80	87

Fig 7. Decision Matrix Interface (Indonesia)

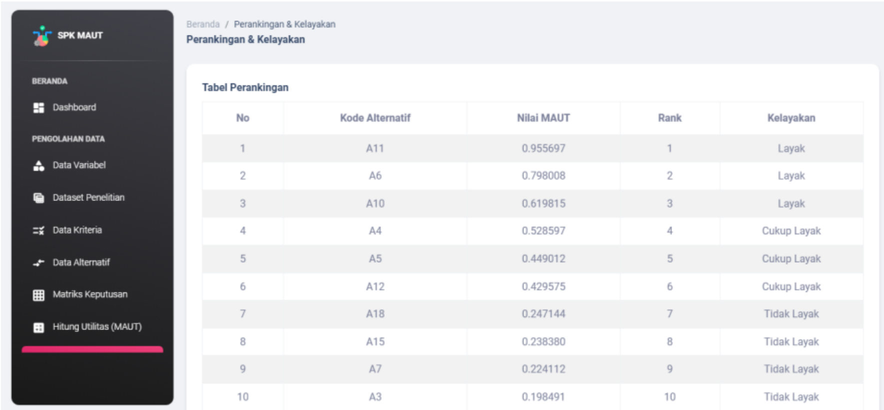
The decision matrix page is designed to present data in a table format, serving as the foundation for the analysis process within the MAUT method. This matrix contains the values of alternatives for each Criterion that has been previously defined. Each row represents an alternative, while the columns represent the criteria. The primary function of this page is to provide structured data ready for use in the normalization process, utility calculations, and further analysis within the decision support system. This page ensures that all necessary information is organized to support the efficiency and accuracy of the decision-making process.



Kode Alternatif	C1	C2	C3	C4	C5	C6	Nilai MAUT
A1	0.058824	0.029630	0.010219	0.010638	0.019231	0	0.128541
A2	0.082353	0.017284	0.010219	0.010638	0.009615	0.008065	0.138174
A3	0.082353	0.041975	0.001460	0.021277	0.028846	0.022581	0.198491
A4	0.223529	0.111111	0.084672	0.019149	0.028846	0.061290	0.528597
A5	0.170588	0.091358	0.059854	0.040426	0.048077	0.038710	0.449012
A6	0.223529	0.175309	0.138686	0.100000	0.075000	0.085484	0.798008
A7	0.105882	0.017284	0.024818	0.008511	0.019231	0.048387	0.224112
A8	0.082353	0.027160	0.016058	0	0.028846	0.022581	0.176999
A9	0.082353	0.027160	0.007299	0	0.038462	0.006452	0.161726
A10	0.105882	0.133333	0.182482	0.040426	0.057692	0.100000	0.619815
A11	0.300000	0.200000	0.200000	0.070213	0.100000	0.085484	0.955697

Fig 8. Utility Calculation (MAUT) (Indonesia)

The utility calculation (MAUT) page is designed to display the utility calculation results for each alternative based on the normalized and weighted criteria. The table on this page presents the utility values for each alternative's Criterion and the total MAUT score for each alternative. This total MAUT score is used to rank options in the decision-making process. The page is designed to ensure transparency and ease of analysis of the calculation results, allowing users to quickly understand and utilize the evaluation results in making the best decision.



No	Kode Alternatif	Nilai MAUT	Rank	Kelayakan
1	A11	0.955697	1	Layak
2	A6	0.798008	2	Layak
3	A10	0.619815	3	Layak
4	A4	0.528597	4	Cukup Layak
5	A5	0.449012	5	Cukup Layak
6	A12	0.429575	6	Cukup Layak
7	A18	0.247144	7	Tidak Layak
8	A15	0.238380	8	Tidak Layak
9	A7	0.224112	9	Tidak Layak
10	A3	0.198491	10	Tidak Layak

Fig 9. Ranking And Feasibility (Indonesia)

The ranking and feasibility page is the final step in applying the MAUT method, where the evaluation results are presented in a table showing the Alternative Code, MAUT Score, Rank, and Feasibility. The MAUT score is used to determine the ranking of each alternative. At the same time, the feasibility category is assigned based on the calculated score, such as Feasible, Moderately Feasible, or Not Feasible. This page provides the final overview of the analysis, making it easier for users to make decisions based on the ranking of alternatives. It ensures that the evaluation results can effectively support the decision-making process.

Fig 10. Chart Ranking and Feasibility (Indonesia)

This graphic presents a visualization of the final results of the MAUT method analysis to facilitate data interpretation. The pie chart on the left shows the distribution of the feasibility of alternatives categorized as Feasible, Moderately Feasible, and Not Feasible, providing a clear representation of the proportion of each category. Meanwhile, the bar chart on the right displays the ranking of alternatives based on their MAUT scores, allowing users to compare the performance of each alternative visually. The combination of these charts is designed to provide clear and quick insights for users in understanding the evaluation results and making decisions.

5. Conclusion

Based on the research on the application of the Multi-Attribute Utility Theory (MAUT) method in the Decision Support System for evaluating the feasibility of healthy canteens at Malikussaleh University, several key conclusions can be drawn: the MAUT method effectively provides an objective and comprehensive evaluation of canteen feasibility based on relevant criteria such as raw material selection, food storage, food processing, transportation, and presentation. The calculations show that canteen A11 (KOPITA BI) had the highest score of 0.956, followed by A6 (UMI) and A10 (ALISHA) with scores of 0.798 and 0.620, respectively, indicating their higher feasibility. Of the 20 canteens evaluated, three were categorized as feasible, three as moderately feasible, and 14 as not possible, highlighting the need for improvements in various aspects. The most weighted criteria, raw material selection and food processing were found to be crucial in determining feasibility, with canteens excelling in these areas and receiving higher rankings. This research provides valuable insights for canteen managers to improve weak areas, such as cleanliness and food quality, to meet healthy canteen standards. The MAUT system simplifies data processing, analysis, and presentation of evaluation results, enabling quick and accurate decision-making.

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