JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. X No 2, Maret 2024, hlm. 387 - 394 ISSN 2550- 020 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v10i2.3106
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

IMPLEMENTATION OF MAUT METHOD GRANTING BUSINESS LICENSES IN TANJUNGBALAI CITY

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Abstract: Establishing a business or industrial location must obtain permission from the government which aims to protect the surrounding community from possible disturbances or pollution resulting from the industry. Therefore, in order to achieve this, it is necessary to have a system that automatically provides accurate and fast decisions in determining which companies or industries are worthy of being granted a business license. The aim of this research is to build a decision support system in determining permits to disturb business or industrial premises using the Multi-Attribute Utility Theory (MAUT) method. The data analysis technique used is the MAUT method to determine the final decision in granting a disturbance permit to a company or industry. The sample or training data consists of 20 names in the Tanjungbalai City area. This system is tested with a black box which aims to find out that all components in the system are running well. Our findings show that the system we have created is appropriate based on the results of the analysis using the MAUT method. Apart from that, the results of black box testing show that all components in this system are valid and functioning well.

Keywords: granting business licenses; maut method; web based.

Abstrak: Mendirikan tempat usaha atau industri harus mendapatkan izin dari pemerintah yang bertujuan untuk melindungi masyarakat sekitar agar terlindungi dari kemungkinan timbulnya gangguan atau polusi yang diakibatkan dari industry tersebut. Oleh karena itu, demi tercapainya hal tersebut perlu adanya sistem yang secara otomatis memberikan keputusan secara akurat dan cepat dalam menentukan suatu perusahaan atau industry mana yang layak diberikan izin usaha. Tujuan penelitian ini adalah untuk membangun sistem pendukung keputusan dalam menentukan izin gangguan tempat usaha atau industri menggunakan metode Multi-Attribute Utility Theory (MAUT). Teknik analisis data yang digunakan menggunakan metode MAUT untuk menentukan keputusan akhir dalam memberikan izin gangguan kepada perusahaan atau industri. Sampel atau data training yang berjumlah 20 nama di wilayah Kota Tanjungbalai. Sistem ini diuji dengan *black box* yang bertujuan untuk mengetahui semua komponen pada sistem sudah berjalan dengan baik. Hasil penelitian menunjukkan bahwa sistem yang telah kami buat sudah sesuai berdasarkan hasil analisis menggunakan metode MAUT. Selain itu, hasil black box testing menunjukkan bahwa semua komponen pada sistem ini sudah valid dan berfungsi dengan baik.

Kata kunci: berbasis web; metode maut; pemberian izin usaha.

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INTRODUCTION

The advancement of information technology today, the capabilities of com puter technology are evolving beyond mere data processing or information presentation. They can become providers of options to support decision-making, thanks to the development of technology in both hardware and software aspects.

Disturbance permits, also known as HO permits (Hinder Ordonantie) for industries, involve granting business loca tion permits to individuals or entities in specific locations that may pose risks, losses, and disturbances to industrial companies. To anticipate any issues related to disruptions caused by business activities, the government establishes legal regulations governing permits for activities that have the potential to cause dis-turbances.

The Regional People's Representa-tive Council (DPRD) and the Mayor of Tanjungbalai City have enacted the Regional Regulation of Tanjungbalai City regarding Disturbance Permits in Tanjungbalai City No. 9 of 2006. In Article 4 of this regulation, it is explained that every individual or entity conducting business activities or owning a business location must have a disturbance permit from the local head. The business data in Tanjungbalai City is as follows table 1.

The presence of an Industrial Disturbance Permit (HO) aims to protect the surrounding community from potential hazards, losses, or disturbances that may arise from the establishment of a business, especially those causing air pollution or waste from business activities. Therefore, it is crucial for business operators to process their Industrial Disturbance Permit, and for this reason, a system is needed to facilitate the licensing process.In the information system to be developed, a method will be included to aid in decision-making, one of them namely Decision Support System (DSS).

This system used to assist decision-making in semistructured and unstruct ured situations where no one knows exactly how decisions should be made. In the decision-making process, the Multi-Attribute Utility Theory (MAUT) method is employed.

This method will be developed to recommend the Investment and Integrated One-Stop Licensing Service Agency of Tanjungbalai City within the Investment and Integrated One-Stop Licensing Service Agency of Tanjung balai City. This is to fulfill the respon sibility of the Investment and Integrated One-Stop Licensing Service Agency of Tanjungbalai City within the Investment and Integrated One-Stop Licensing Service Agency of Tanjungbalai City, consisting of eight (8) components.

The application of the Decision Support System (DSS) has been widely used to solve problems found in previous research, the aims to assist in assessing employee performance using predeterm ined criteria. So the highest value is obtained in alternative 2 with a value of 0.8889 and the lowest value in alternative 1 with a value of 0.4722 [1].

The subsequent research, applying the Multi Attribute Utility Theory (MAUT) method, can significantly assist pharmacists in decision-making for the control of medicine and healthcare supplies. Thus, this study is highly relevant for inventory management in pharmacies, providing valuable insights into effective control of medication and healthcare equipment inventory [2].

The subsequent research, Determi ning Outstanding Students by Applying the Multi Attribute Utility Theory

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(MAUT) Method, The result of this research is a student determination decision that has the highest score value, namely Netralman (A1) with a utility value of 0.462 [3]. The subsequent research, Multi Attribute Utility Theory (MAUT) Method for Decision Support Systems for Selection of Used Cars, The results of the study show that a decision support system using the MAUT method can assist sellers in selecting used cars that best suit consumer needs. The use of this system speeds up the process of recording used car sales, improves data accuracy, and facilitates analysis and reporting. The developed decision support system can be an effective and efficient tool in assisting sellers in making the right decisions in selecting used cars to be sold to consumers [4].

The subsequent research, Implementation of a Decision Support System Using the MAUT Method to Determine the Best Employees, With the application of a decision support system that has been built, the company is assisted in making decisions on selecting the best employees and can also consider further options regarding the continuity of employee status whether the employee concerned can be proposed for a promotion or get a job rotation [5].

The subsequent research, LAZIS MU Scholarship Recipient Decision Making Support System Using the MAUT Method, This system helps LAZISMU in making selection decisions prospective scholarship recipients more accurately and efficiently. By taking into account subjective preferences through MAUT method, scholarship recipients who have the highest utility scores will be recommended as recipients scholar ships, thereby ensuring appropriate allocation of resources and providing greater benefits to students who meet the specified criteria [6]. The subsequent research, BLT Acceptance Decision Support System Using the Multi Attribute Utility Theory Method, The purpose of this study is to be able to provide results for beneficiaries based on the criteria determined by the village using the MAUT method [7].

The subsequent research, pplication of the MAUT Method in receiving the National Amil Zakat Agency (BAZNAS) Education Scholarship, The results of this study used the Multi Attribute Utility Theory (MAUT) method to rank scholarship recipients. The tests carried out showed an accuracy rate of 85.71% for the correct scholarship recipients, resulting in the right students getting the scholarship [8].

The subsequent research, Applica tion of the Multi Attribute Utility Theory (MAUT) Method in the Hyundai Car Purchasing Decision Support System, Several implications can be obtained from the research findings, including the SPK for selecting the type of Hyundai car needed by using the MultiAttribute Utility Theory (MAUT) method, which can provide recommendations for choosing the type of Hyundai car for consumers [9].

The subsequent research, emplo ying the MAUT method, is expected to aid in determining the criteria for employees eligible for deactivation. The MAUT method conducts a ranking process based on attributes with different weights, resulting in more optimal outco mes. Subsequently, a ranking process is carried out to determine the optimal alternatives. The five (5) alternatives eligible for deactivation are A2 with a result of 0.9303, A8 with a result of 0.5561, A4 with a result of 0.533, A9 with a result of 0.4978, and A1 with a result of 0.4867. These are the five

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alternatives suitable for deactivation during the pandemic [10].

From this research, a solution is needed to simplify the decision-making process using the MAUT Method at the Tanjungbalai City One-Stop Integrated Investment and Licensing Services Servi ce in granting business permits.

METHOD

The stages carried out in desig ning the granting of business permits at the Tanjungbalai City One-Stop Integra ted Investment and Licensing Service using the MAUT Method using the PHP and MySQL programming languages.

The framework stages carried out are in image1:

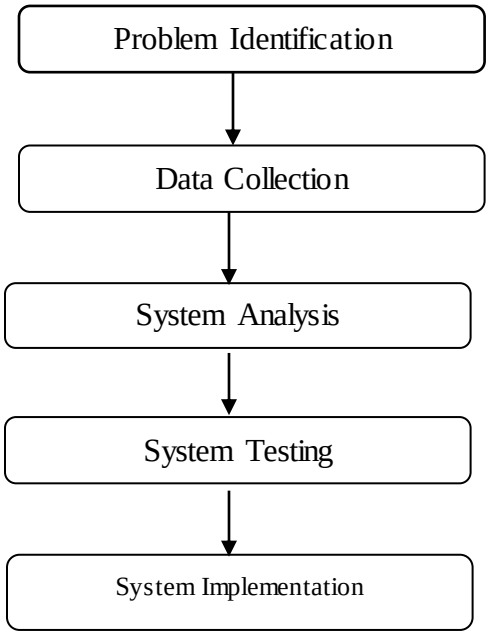

Image 1. Research Framework

The research framework, each stage is described as follows:

Identify the Problem

This stage identified what problems occurred in the One Stop Integrated Investment and Licensing Service Agency (DPM PPTSP) of Tanjungbalai City.

Data Collection

Data collection includes data collection on business permit applicants at the One Stop Integrated Investment and Licensing Services Agency (DPM PPTSP) of Tanjungbalai City as follows:

Table 1. Business Data in Tanjungbalai City

No	Business Name
1	Alternatif/Kriteria
2	Pabrik Kelapa Pelita
3	PT.Asianagoro Agung
4	CV. Terang Jaya
5	UD jaya logam
6	PT. Hatindo
7	PT. Asa
8	PT. Jampalan Baru
9	PT Halindo
10	PT AKA
11	Putra harapan CV
12	Erni Aluminium
13	Asahan Hasil Laut
14	Es Kristal UD.Aguaris
15	NJM Industri
16	Pabrik es kristal lina
17	Besi Buruk
18	Pustaka Maju
19	Coin Londri
20	Poltak machine CV

System Analysis

An analysis of the running system is carried out. In this way, it is hoped that can find problems that occur in the system so that it makes it easier for the Tanjungbalai City Investment and One-Stop Integrated Licensing Services Service (DPM PPTSP) to provide business permits.

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System Testing

System testing carried out after the system design process is complete. This is to find out whether the system created is as expected.

System Implementation

At this stage, we will discuss how the user will use the system and explain the flow of application use so that the user can re-optimize the system that has been created.

Decision Support System (DSS) is a computer-based information system that generates various decision alternatives to assist management in addressing structured and unstructured problems using data and models. Multi Attribute Utility Theory (MAUT) is a scheme in which the final evaluation, v(x), of an object x is defined as the weight added to a value relevant to its dimension value. The expression usually used to call it is utility value. Multi-Attribute Utility Theory is used to convert several interests into numerical values on a 0-1 scale with 0 representing the worst option and 1 the best. This allows direct comparison of various measures.

Multi Attribute Utility Theory (MAUT) is a scheme where the final evaluation, v(x), of an object x is defined as weights summed with a value relevant to its dimension. The commonly used expression for this is referred to as utility value [10].

In summary, the steps in the MAUT method are to determine the relative weight for each criterion, where the total weight is 1.

$$\sum_{i=1}^{n} \mathrm{Wi} = 1 \qquad (1)$$

Information:
Wi : Criterion Weight
List all alternatives. Calculate the matrix normalization utility value for each alternative according to its attributes:

$$U(x) = \frac{x - xi^{-}}{xi^{+} - xi^{-}} \qquad (2)$$

Information:
U (x) : Normalized alternative weights
xi- : Minimum criteria value (worst weight)
xi+ : Maximum criterion value (best weight)
x : Alternative weight

Multiply the criteria weight by the utility value to determine the ranking value for each alternative:

$$\mathrm{V(x)} = \sum_{i=1}^{n} Wi.Vi\ (x) \qquad (3)$$

Where v(x) is the evaluation value of the i object and wi is the weight that determines the value of how important the i element is compared to other elements. While n is the number of elements.

RESULT AND DISCUSSION

Therefore, this research will discuss a decision support system expected to assist the Investment and Integrated One-Stop Licensing. Service Agency of Tanjungbalai City in issuing Business Licenses. The following is the criteria weighting table 1.

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Table 2. Weighting of Completeness of Criteria

criteria	Scale	Score
CI	Incomplete	3
	Less Complete	4
	Complete	5
C2	> 5000 m^2	1
	2500 m^2	2
	2000 m^2	3
	1500 m^2	4
	< 1000 m^2	5
C3	Less Complete	1
	Insufficient	2
	Sufficient	3
	Good	4
	Very Good	5
C4	Rejected	1
	Pending	2
	Observation Stage	3
	Assessment Stage	4
	Finished!	5
C5	< 5	1
	5 – 10	2
	11 – 15	3
	16 – 20	4
	> 20	5

Results of the assessment of granting a permit. This business in Tanjungbalai City uses the MAUT Method where v(x) is the evaluation value of an object i, wi is the weight determining the value of how important element i is compared to other elements.

Meanwhile, n is the number of all elements with the weights used. The steps for solving problems using the Multi Attribute Utility Theory method are to determine the smallest value (Min) and the largest value (Max) in Table 3.

Table 3. Finding Min and Max Values

Alternative / Criteria	C1	C2	C3	C4	C5
Pabrik Kelapa Pelita	5	5	5	5	5
PT.Asianagoro Agung	4	5	4	5	5
CV. Terang Jaya	4	5	4	5	5
UD jaya logam	4	5	4	5	5
PT. Hatindo	4	5	4	5	5
PT. Asa	5	4	5	4	5
PT. Jampalan Baru	5	4	5	5	5
PT Halindo	4	5	4	5	5
PT AKA	4	5	4	5	5
Putra harapan CV	4	4	4	3	4
Erni Aluminium	3	4	4	3	4
……	…	…	…	…	…
Coin Londri	3	4	4	5	2
Poltak machine CV	4	4	4	4	1
Percetakan Nadira	4	4	4	4	1
Min	3	4	4	3	1
Max	5	5	5	5	5

Table 4. Result Values of Multiplication and Summation for Each Alternative

Alternative / Criteria Weight	Total	Rank
Alternatif/Kriteria	1	1
Pabrik Kelapa Pelita	0,6429	9
PT.AsianagoroAgung	0,6429	11
CV. Terang Jaya	0,6429	12
UD jaya logam	0,6429	10
PT. Hatindo	0,7381	3
PT. Asa	0,8571	2
PT. Jampalan Baru	0,6429	8
PT Halindo	0,6429	7
PT AKA	0,2262	17
Putra harapan CV	0,1071	19
Erni Aluminium	0,7024	4
Asahan Hasil Laut	0,7024	5
Es Kristal UD.Aguaris	0,1905	18
NJM Industri	0,0714	20
Pabrik es kristal lina	0,3095	13
Besi Buruk	0,6667	6
Pustaka Maju	0,2738	14
Coin Londri	0,2381	15

The implementation of this interface design consists of the

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implementation of the user interface design. The user interface implementa tion consists of several menu options including the home menu, criteria data, alternative data, calculations and passw ords.

MAUT Method Calculation Result

The MAUT Method calculation results form is a display of the results of the criteria and alternative values which can be seen in Image 2.

Image 2. MAUT Method Calculation Result Form

After the system implementation process is complete, a program is produced that is ready to be used. Before that, testing is needed to test the capabilities of the program. The main goal of this stage is to ensure that the elements of the system function as expected. If the system that has been created is still deemed inadequate, improvements must be made so that the system created is complete and accurate.

The system that has been repaired will be tested again until the system is complete and accurate, and suitable for use. In terms of implementing a decision support system for granting a business license, program testing uses a black box testing method which focuses on the functionality requirements of a program being created.

Table 5. Testing Details

Test Class	Testing Details	Result
New selection inputs, alternatives and criteria	process for granting permits, as well as the process of saving, editing, and searching for alternative data and criteria	*Success*
Displays data, new selections, alternatives andcriteria.	Displaying the input results, new selections, alternatives and criteria appear.	*Success*
Testing user added data input	The process of adding user data also the process of saving, editing, deleting and canceling.	*Success*
The test displays user added data	Displaying the input results, user added data appears.	*Success*
Spk process testing	process for granting business permits as well as the yes, no, go action and close processes.	*Success*

CONCLUSION

The implementation of the Decisi on Support System application in determining the issuance of Business Licenses at the Investment and Integrated One-Stop Licensing Service Agency (DPM PPTSP) of Tanjungbalai City is created to obtain more objective and efficient results. The Decision Support System for Business License Issuance at the Investment and Integrated One-Stop Licensing Service Agency (DPM PPTSP)

of Tanjungbalai City uses the MAUT method, so the results of the assessments, through many calculation processes, involve weighting the values of all criteria and determining scores to identify potential Business License issuances at the Investment and Integrated One-Stop Licensing Service Agency (DPM PPTSP) of Tanjungbalai City.

ACKNOWLEDGMENTS

I would like to express my gratitude to LPPM of STMIK Royal Kisaran for providing the opportunity to publish this article in the new journal. Additionally, I extend my thanks to all the lecturer who has motivated and guided me in the development of this thesis as a valuable source of research.

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