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THE EFFICIENCY MEASUREMENT SYSTEM OF INN USING DATA ENVELOPMENT ANALYSIS

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ABSTRACT

The development of inn locations is closely related to the tourist areas, where statistical data is calculated that the higher tourist attractions in an area are directly proportional to the number of inns available. The system uses a Data Envelopment Analysis (DEA) Model to analyze an inn's efficiency measures. The innovation of inn efficiency measurement systems using DEA includes developing and applying analytical methods allowing inns to measure their operational efficiency objectively. This innovation involves using the DEA to measure the inns' efficiency. Method. This system uses three output variables: customer satisfaction value, hotel rating, and tourist attraction efficiency, as well as four input variables of facilities: price, number of employees and type of inns. If the efficiency value is greater than 1, then a Decision Making Unit (DMU) can be considered efficient, but if the efficiency value is less than one, then the DMU is considered inefficient. Property developer companies can also use this system to build inns by looking at the efficiency value in advance to minimize loss so that the inn business in tourist areas is better organized. Potential users of this innovation include inns and other stakeholders in the hospitality industry. Inns of all sizes and types, including hotels, inns, guesthouses, and various other inns, can use DEA efficiency measurement systems to improve their operational performance. The tourism office can also use this system to audit the feasibility of an inn and provide assessment standards for inns in tourist areas. By knowing the value of the efficiency level of its inn compared to competing inns, the inn can identify areas of improvement and improve operational efficiency. Benefits of this innovation include identifying and improving waste areas: DEA helps inns identify areas where waste occurs in operations, such as inefficient use of resources. Informed decision-making: Efficiency measurement systems using DEA provide inn management with helpful information regarding resource allocation, strategic planning, and operational improvement. Improved service quality: By optimizing operational efficiency, inn can improve customer service quality. The advantages of this innovation include Objectivity: Efficiency measurement using DEA is based on input and output data, providing measurements that are objective and unaffected by subjective factors. Comparability: The DEA method compares inn efficiency performance with similar competitors. Identify areas of improvement: This system helps inns identify areas that need improvement to improve operational efficiency. Decision-making support: Information generated by the DEA system enables inn management to make well-informed and strategic decisions related to operations.

Keywords: Data Envelopment Analysis, Decision Making Unit, in information system, Department of Tourism, Efficiency Value.

1. INTRODUCTION

Geographically, one of the advantages of tourist areas is the distance between tourist sites and inns, which is affordable and accessible to travel. With the development of natural tourism enhancement activities, tourist attractions are increasingly in demand by tourists. The surrounding community and specific groups use this as a driver of economic activity, which usually relies on several sectors: agriculture, trade, and tourism. In this context, the tourism sector significantly impacts trade due to the increase in tourist visits. In addition, tourism also plays an essential role in absorbing labour and contributes considerably to the local economy.

Prototype testing was carried out in Central Aceh Regency because of the increasing number of tourists coming to Central Aceh Regency, increasing the demand for inns. There is no denying that the inn is an alternative option

for many tourists to take a break from their trip or have an important meeting. As one of the districts in the province with many tourist attractions, inn in Central Aceh Regency also experiences rapid development yearly. Most of these inns are located in the tourist centre area, so tourists can easily reach the tourist centre location. In terms of price, the inns in Central Aceh Regency vary greatly, ranging from low-cost inns to high-end inns. Central Aceh Regency Province is increasingly attractive for investors to invest in the inn business. In various regions, many new inns were built in multiple locations, ranging from highways and suburbs to narrow streets in some areas. As the number of tourists increases, new inns continue to appear.

According to data from the Statistics Central Bureau of Aceh Province, in 2021 there were 48 inns, and in 2022, there were 68 inns in Central Aceh Regency. The rapid growth of inns will undoubtedly increase the level of business competition. Therefore, managers or managers must consider the inputs used to achieve maximum output to survive. In addition, the inn must have certain advantages to be one step ahead of its competitors, especially in serving guests visiting the inn. Today's consumers are very selective and cautious in spending their money. They consider many factors to choose a product or service, including inn services. Therefore, inns need to design the right and attractive service concept. Because only businesses with the right consumer insights and service concepts can survive, every company, including those engaged in the inn industry, must be able to provide more value by focusing and delivering what consumers want.

Measuring the efficiency of inn is essential because it is closely related to the quality of inn. One way to measure an inn's effectiveness is by applying the DEA (Data Envelopment Analysis) Method. DEA is a powerful optimization tool used to measure the efficiency of any sectoral unit in terms of technical and allocative efficiency. This method compares decision-making units (DMUs) with targets at thresholds. Thresholds are the frontier of best practices based on the current data set. DEA is a decision-making system with many criteria, and before someone applies the DEA model, they must select a set of DMU units in DEA; it means that the units being evaluated or compared are suitable to be applied to various sectors, ultimately, DEA is intended as a method for performance evaluation and benchmarking against best practices (1). DEA is a mathematical technique used to evaluate the efficiency of DMUs that convert inputs into outputs. In other words, it is a method for assessing the performance of various entities, such as businesses or organizations, based on how much they can earn with available resources (2)

Homogeneous refers to the similarity or similarity between the inputs and outputs of the evaluated DMU. In simple terms, DEA is used to measure productivity by comparing the ratio of output and input. The DEA method can provide an overview of productivity both partially and as a whole and identify the input factors that significantly impact producing output. The main advantage of DEA is its ability to address many input and output variables without the need to assume a functional relationship between the two, in measuring inn efficiency, several important points must be considered. First is analyzing the efficiency and inefficiencies of the inn business in the last few years of operation. During that period, there were many times tourism getting increased significantly, which was then followed by stagnation and a sharp decline due to several factors that had a direct impact on tourism. Second, compare the efficiency and inefficiencies of the inn business. Third, testing the influence of hotel management factors to ensure efficiency (3)

The prototype of the inn efficiency measuring system is designed to measure the level of inn efficiency in terms of inn location, number of rooms, number of beds, facilities provided (breakfast, snacks) and number of employees. The purpose of developing this system is seen in the number of inns in tourist areas with similar prices but different facilities. The irony is the condition of the inn is at the same standard level. This will harm consumers and reduce the level of trust for the tourist area. Therefore, a system is needed to measure the efficiency value of predetermined variables. The system can be used by individuals, entrepreneurs, or companies engaged in the inn sector and the tourism industry. The system can be accessed online, and it is easy to use because it is designed to be user friendly. The system is able to be a benchmark for the feasibility value of inn by the tourism office and the system is also able to audit the feasibility of an inn

This system is intended for entrepreneurs or companies engaged in inn tourist areas. This system can be a reference for the feasibility of building inn at certain location points. Determination of the value of the location point from the lowest to the highest seen from the reach of the inn to the nearest tourist point. The more tourist location points are detected, the higher the range value (close to the tourist point) and the higher the variable's value. Inns that use this system can see the effectiveness value for their stays., and the application also provides features to improve the value so that it can be input to hotel owners to make improvements so as to increase the value and income of the inn This study helps research that uses applications to measure the efficiency of inn using the Data Envelopment Analysis (DEA) method because it makes it easy for readers who want to assess the level of effectiveness of inn. In addition, this study also provides information and practical knowledge on how to implement DEA methods effectively

2. LITERATURE REVIEW

The inn efficiency measurement system using Data Envelopment Analysis (DEA) is an analytical method used to measure the relative efficiency of business units in the hotel and inn industry. This method compares the inputs and outputs of business units to identify their relative levels of efficiency. DEA uses a non-parametric approach that can handle complex input-output variations. Input variables in this context include various elements on which inn capital is based, including internal, physical, non-physical, software, and hardware aspects, all used to improve inn quality. The output variable is a factor that describes the level of achievement of the target results of the inn efficiency process. The output variable focuses on the price and inn facilities. There are three situations that can be categorized as efficient. The first is when the use of the number of inputs results in a larger output. Second, is when the same output can be produced using fewer inputs. Third, is when more inputs are used to produce a larger output.

The ratio of total output to total input is a basic measure of efficiency used in Data Envelopment Analysis (DEA) methods. In this formulation, x and y symbols are used to represent inputs and outputs in general, while i and j are used to represent specific inputs and outputs. In mathematical notation, it can be expressed as follows (4):

$$Efficiency = \frac{Virtual\ Output}{Virtual\ Input} = \frac{\sum_{i=1}^{I} U_i\, X_i}{\sum_{j=1}^{J}\ v_j\, y_j}$$

According to Cooper, Seiford, and Tone (5), DEA uses a technically mathematical approach to handle variables with complex constraints, without limiting the selection of inputs and outputs based on the technology used. First developed by Farrell in 1957, the DEA method was expanded by Charnes, Cooper, and Rhodes in 1978 by developing a model called the CCR model. In this model, the efficiency rate is calculated using a weighted ratio between input and output, and a linear method is used to calculate the weight. The relative efficiency of DMU can be calculated using the equation model developed by Charnes, Cooper, and Rhodes in 1978 as follows:

$$max = \frac{\sum_{k=1}^{s} v_k\, y_{ki}}{\sum_{j=1}^{m} u_j\, x_{ji}}$$

$$s.t. = \frac{\sum_{k=1}^{s} v_k\, y_{ki}}{\sum_{j=1}^{m} u_j\, x_{ji}} = 1$$

$$vk, uj \geq 0$$

The advantages of inn efficiency measurement systems can be seen in various aspects including Objective measurement: DEA provides objective efficiency measurement based on input and output data. This allows innkeepers to gain insight into their efficiency performance without the bias of human subjectivity. Identify areas of improvement: The DEA can identify areas where the location is inefficient or less efficient compared to its competitors. With this information, innkeepers can focus on the improvements needed to improve operational efficiency and reduce waste. Comparison with competitors: The DEA allows the inn to compare its efficiency performance with similar competitors. It provides insight into the competitive position of the inn and can assist in

adopting best practices within the industry. Informed decision-making: With data generated by DEA, innkeepers can make better decisions related to resource allocation, operational improvement, and overall business strategy.

The inn efficiency measurement system has a real social impact in terms of sustainability and improving service quality. By implementing an efficiency measurement system using the DEA, inns can improve their operational efficiency. This can reduce the environmental footprint, help achieve sustainability goals in the hospitality industry, and enhance the quality of service they provide guests. This impact can create a better customer experience and improve the inn's image in the eyes of the public.

The perceived economic impact is shown in the value of operational efficiency, which, by improving operational efficiency, can reduce production costs, including energy savings and waste reduction. This has the potential to increase the profitability of their business. By measuring and improving operational efficiency, inn can contribute to local and regional economic growth. This includes increased employment, income, and investment in the hospitality sector.

3. METHODS

The system is designed using PHP (Hypertext Preprocessor) programming language, with Visual Studio code compiler and codeigneiter as frameworks. As well as requiring a domain and server to access online. Hardware is needed to help the tracking process with a minimum requirement of i7 Processor, 8Gb RAM, 1T SSD. The scheme of the system "Inn Efficiency Measurement System Using Data Envelopment Analysis (Case Study: In Central Aceh Regency)" can be seen in the following figure:

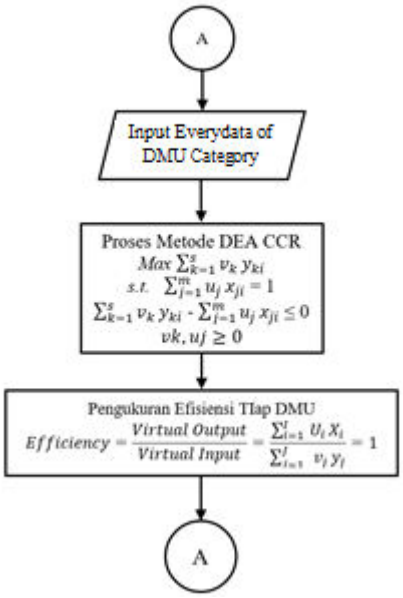

Fig 1: System scheme

The efficiency measurement process in this application begins by entering the required data, namely inn data, in Central Aceh Regency. After entering the Inn data, enter the category data for each DMU. DMU is a unit or organization that is the research subject, and this study uses DMU data in the form of inn names in Central Aceh Regency. After entering the DMU data, the next step is to apply the DEA CCR search method to calculate the weight of each DMU that has been previously inputted. Once the weight search process is complete and the weight results of all DMUs are found, the next step is to calculate the efficiency for each DMU.

The system goes through the stages of usability testing and reliability testing. Usability testing includes identifying usage scenarios and determining everyday tasks that users will perform in the system, such as entering

input data, running DEA analysis, and interpreting the results. Record user interactions: Ask users to use the system and record their interactions. This will provide information about any obstacles, difficulties, or problems users encounter in using the DEA system. User experience evaluation: Gathers user feedback about the interface, navigation, instructions, and overall user experience. This helps identify areas of improvement and improve the user experience of DEA systems. Reliability testing tests include stability testing, which tests the system over a long enough period to ensure that the system continues to run correctly without significant disruption or damage. Data variation testing: Testing a system with various types of input data, including complex or extreme input data, to see if the system can produce consistent and accurate results. Retesting: Repeats the same test under the same conditions to ensure the system delivers consistent and reliable results each time it runs.

Both tests are essential to ensure that inn efficiency measurement systems using DEA function properly, are easy to use, and provide reliable results. By performing these tests, system developers can identify and fix problems that may arise before the system is introduced to users.

4. RESULTS AND DISCUSSION

The research using the Data Envelopment Analysis (DEA) Method to measure the efficiency of lodging in Central Aceh is intended to calculate the efficiency value of lodging with input variables in the form of facilities, prices, number of employees, and types of lodging. As output data, customer satisfaction scores obtained from questionnaires, online hotel assessments obtained from maps, and efficiency of distance to tourist attractions (measured at a maximum of 5 kilometres) are used. The DMU (Decision Making Unit) data came from various 30 inns in the Central Aceh Regency area.

The initial data collection stage is carried out to meet the amount of input and output data for all variables. In visitor satisfaction data was obtained from the questionnaire results on ten visitors who were asked to fill out the form provided. The form used is as shown in the following picture:

KUISIONER KEPUASAN

Kepuasan (Satisfaction)							
No	**Item**	**STS**	**TS**	**ATS**	**AS**	**S**	**SS**
S1	Layanan yang diberikan hotel ini memuaskan						
S2	Layanan yang diberikan hotel ini sangat baik						
S3	Pengalaman saya menginap di hotel ini seperti yang saya harapkan						
S4	Sejak saya datang, hotel ini memberikan layanan yang tepat						
Bukti Fisik (Tangible)							
Q1	Hotel ini memiliki interior kamar yang lengkap, nyaman, bersih dan tertata dengan baik						
Q2	Hotel ini memiliki fasilitas lengkap seperti kolam renang, fitness, convention dan spa serta outlet food and beverage.						
Q3	Hotel ini memiliki karyawan berpenampilan rapi, bersih, dan menarik.						
Q4	Brosur hotel ini memberikan informasi yang jelas.						
Kehandalan (Reliability)							
Q5	Karyawan hotel memberikan pelayanan yang maksimal						
Q6	Kemauan dan kejujuran karyawan hotel dalam melayani pelanggan.						
Q7	Prosedur pengurusan reservasi kamar/event dan transaksi lainnya akurat, cepat dan tepat						
Daya Tanggap (Responsiveness)							
Q8	Karyawan hotel tanggap menjawab pertanyaan pelanggan						
Q9	Karyawan hotel menangani masalah atau keluhan yang dialami pelanggan secara tepat.						
Q10	Karyawan hotel memberikan informasi yang dibutuhkan pelanggan secara tepat						
Q11	Karyawan hotel merespon permintaan pelanggan secara tepat dan cepat						
Jaminan (Assurance)							
Q12	Karyawan hotel mampu meyakinkan pelanggan terhadap keamanan hotel						
Q13	Hotel Ini mempunyai karyawan yang memiliki kompetensi dan professional dalam melayani pelanggan						
Q14	Karyawan hotel memberikan rasa percaya kepada pelanggan untuk menangani masalah yang dihadapi pelanggan						
Empati (Empathy)							
Q15	Karyawan hotel mampu menjalin hubungan yang baik dengan pelanggan						
Q16	Karyawan hotel mampu berkomunikasi dengan baik						
Q17	Karyawan hotel mampu melayani pelanggan dengan penuh perhatian						
Q18	Karyawan hotel memahami kebutuhan pelanggan						

Fig 2: Questionnaire (Indonesian)

The results obtained from the questionnaire input are carried out in Excel as a reference for testing the initial data; the results of the questionnaire are used to determine the efficiency value of the customer satisfaction variable; the results of the questionnaire look like the following picture:

No	Penginapan	Responden /Soal	S1	S2	S3	S4	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Jumlan NRR Tertimbang	Nilai Indeks Kepuasan	Ratio	Nilai Efisiensi
1	parkside gayo hotel	1	6	6	5	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5,450	81,74	0,82	1,00
		2	5	5	5	6	5	5	5	5	6	6	5	5	5	5	6	6	6	6	6	5	5	5				
		3	6	6	6	5	5	4	6	5	6	6	6	6	5	5	6	6	6	6	6	6	6	6				
		4	6	5	5	5	5	4	6	5	6	6	6	6	5	5	5	5	5	5	6	6	6	6				
		5	5	5	6	6	5	5	6	6	6	6	6	6	5	6	5	6	5	5	5	5	5	5				
		6	5	5	5	5	5	5	6	5	6	5	6	5	6	5	6	6	5	6	5	5	5	6				
		7	6	6	5	5	5	5	5	5	4	6	6	5	5	5	6	6	5	6	6	6	6	5				
		8	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6				
		9	3	3	3	3	5	6	6	6	6	6	5	6	6	6	6	5	5	6	6	6	6	6				
		10	3	3	3	3	5	5	5	5	6	6	5	6	6	6	6	6	6	5	6	6	6	6				
	Σnilai/unsur		51	50	49	50	52	50	57	54	58	58	57	57	55	55	58	59	55	57	58	57	57	58				
	NRR/Unsur		5,1	5	4,9	5	5,2	5	5,7	5,4	5,8	5,8	5,7	5,7	5,5	5,5	5,8	5,8	5,5	5,7	5,8	5,7	5,7	5,8				
	NRR tertimbang/unsur		0,2295	0,225	0,2205	0,225	0,234	0,225	0,2565	0,243	0,261	0,261	0,2565	0,2565	0,2475	0,2475	0,261	0,261	0,2475	0,2565	0,261	0,2565	0,2565	0,261				
2	portola grand renggali hotel	1	4	4	4	4	6	4	5	5	6	5	5	6	6	6	6	5	5	5	5	5	5	5	5,369	80,53	0,81	0,98
		2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5				
		3	6	6	6	5	5	4	6	5	6	6	6	6	5	5	6	6	6	6	6	6	6	6				
		4	6	5	5	5	5	4	6	5	6	6	6	6	5	5	5	5	5	5	6	6	6	6				
		5	5	5	6	6	5	5	6	6	6	5	6	6	5	6	5	6	5	5	5	5	5	5				
		6	5	5	5	5	5	5	6	5	6	5	6	5	6	5	6	6	5	6	5	5	5	6				
		7	6	6	6	5	5	5	5	5	4	6	6	5	5	5	6	6	5	6	6	6	6	6				
		8	5	5	5	5	5	5	6	5	6	5	6	5	6	5	6	6	5	6	5	5	5	6				
		9	6	6	5	5	5	5	5	5	4	6	6	5	5	5	6	6	5	6	6	6	6	6				
		10	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6				
	Σnilai/unsur		54	53	53	51	52	48	56	52	55	55	58	56	54	53	57	57	52	56	55	55	55	57				
	NRR/Unsur		5,4	5,3	5,3	5,1	5,2	4,8	5,6	5,2	5,5	5,5	5,8	5,6	5,4	5,3	5,7	5,7	5,2	5,6	5,5	5,5	5,5	5,7				
	NRR tertimbang/unsur		0,243	0,2385	0,2385	0,2295	0,234	0,216	0,252	0,234	0,2475	0,2475	0,261	0,2475	0,243	0,2385	0,2565	0,2565	0,234	0,252	0,2475	0,2475	0,2475	0,2565				
3	Umah Bango Bungalow	1	6	6	6	6	5	6	6	6	6	6	5	6	6	6	6	5	5	6	6	6	6	6	5,472	82,08	0,82	1,00
		2	6	6	5	5	5	5	5	5	6	6	5	5	6	6	6	6	6	5	6	5	6	6				
		3	6	5	5	5	6	4	5	5	6	5	5	6	6	6	6	5	5	5	5	5	5	5				
		4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5				
		5	5	5	5	5	5	5	6	5	6	5	6	5	6	5	6	6	5	6	5	5	5	6				
		6	6	6	5	5	5	5	5	5	4	6	6	5	5	5	6	6	5	6	6	6	6	6				
		7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6				
		8	6	6	6	6	5	6	6	6	6	5	6	6	6	6	6	5	5	6	6	6	6	6				
		9	6	6	5	5	5	5	5	5	6	5	6	6	6	6	6	6	6	5	6	5	6	6				
		10	6	5	5	5	6	4	5	5	6	5	5	6	6	6	6	5	5	5	5	5	5	5				
	Σnilai/unsur		58	56	53	53	53	51	54	53	57	56	53	57	58	57	59	55	53	56	56	56	56	57				
	NRR/Unsur		5,8	5,6	5,3	5,3	5,3	5,1	5,4	5,3	5,7	5,6	5,3	5,7	5,8	5,7	5,9	5,5	5,3	5,5	5,6	5,6	5,6	5,7				
	NRR tertimbang/unsur		0,261	0,252	0,2385	0,2385	0,2385	0,2295	0,243	0,2385	0,2565	0,252	0,2385	0,2565	0,261	0,2565	0,2655	0,2475	0,2385	0,2475	0,252	0,252	0,252	0,2565				

Fig 2: Questionaire Efficiency Calculation

In the manual calculation, 30 samples are applied, After obtaining the weight value for each DMU, the following formula is used to determine the input and output for each DMU:

$$Virtual\ Input = \sum_{i=1}^{I} u_i\, x_i$$

$$Virtual\ Output = \sum_{j=1}^{J} v_j\, y_j$$

Keterangan :

Ui = Weight for output *i*

Xi = i-th Output Value

Vj = Value for input *j*

Yj = j-th Output Value

After getting the input and output values of each DMU, the next step is to calculate the efficiency for each DMU using the following mathematical equation:

$$Efisiensi = \frac{virtual\ output}{virtual\ input} = \frac{\sum_{j=1}^{J} v_j y_j}{\sum_{i=1}^{I} u_i x_i}$$

Table 1: Result of Efficiency Value

UNIT		INPUT				OUTPUT			RESULT
		L1	L2	L3	L4	R1	R2	R3	
No	DMU	Facility	Price	Number of Employees	Type	Satifactory Value	Hotel Value	The efficiency with tourism areas	Efficiency

1	parkside gayo hotel	1	1	1	1	1	0,9394	1	1
2	portola grand renggali hotel	1	1	0,925925926	1	0,98	1,0000	0,875	1
3	Umah Bango Bungalow	0,42857	0,428571429	0,733333333	1	1	0,1343	0,625	0.885
4	Dream Hill Villa Burtelege	0,57143	0,380952381	0,8	0,666666667	0,91	0,0439	0,875	0.857
5	Depik Inn Guest House	0,57143	0,19047619	0,714285714	0,333333333	0,93	0,1568	0,25	1
6	Biehomestay	0,57143	0,380952381	0,818181818	0,666666667	0,93	0,0385	0,25	0.628
7	Hotel Arafah	0,71429	0,476190476	0,857142857	0,666666667	0,81	0,4777	0,125	0.962
8	Fairuz Hotel	0,57143	0,380952381	0,666666667	0,666666667	0,92	0,0269	0,25	0.676
9	Linge Land Hotel	0,85714	0,857142857	0,933333333	1	0,88	0,5305	0,375	0.712
10	Mahara Hotel	0,85714	0,571428571	0,466666667	0,666666667	0,89	0,4763	0,5	1
11	Bayu Hill Hotel	0,85714	0,857142857	0,8	1	0,92	0,9096	0,5	1
12	At-Tamimi Guest House Syariah	0,42857	0,142857143	0,8	0,333333333	0,88	0,0355	0,5	1
13	Arani Guest House	0,42857	0,285714286	0,8	0,666666667	0,88	0,0164	0,125	0.7
14	AIA Residence	0,71429	0,238095238	0,8	0,333333333	0,82	0,0105	0,125	0.7
15	QQ Homestay	0,28571	0,095238095	0,6	0,333333333	0,89	0,0802	0,375	1
16	Al Fattah Boutique Hotel	0,71429	0,476190476	0,9	0,666666667	0,85	0,1682	0,125	0.552
17	Petro Inn	0,42857	0,142857143	0,733333333	0,333333333	0,77	0,0385	1	1
18	Pelangi Hotel	0,42857	0,285714286	0,733333333	0,666666667	0,85	0,0239	0,125	0.706
19	IPOAI Homestay	0,42857	0,142857143	0,533333333	0,333333333	0,88	0,0258	0,125	0.961

20	Qory Syariah Hotel	0,57143	0,380952381	0,666666667	0,666666667	0,89	0,0269	0,125	1
21	Jejunten Bango Homestay	0,42857	0,142857143	0,9	0,333333333	0,84	0,0137	0,625	0.947
22	Degayo Chalet	0,42857	0,142857143	0,7	0,333333333	0,9	0,0096	0,25	0.889
23	Pintu Waluh Homestay	0,42857	0,142857143	0,8	0,333333333	0,84	0,0285	0,125	0.829
24	Riyadh Hotel	0,71429	0,476190476	0,733333333	0,666666667	0,81	0,0444	0,125	0.444
25	Bunda Hotel	0,85714	0,571428571	0,466666667	0,666666667	0,89	0,3532	0,25	0.85
26	Belangi Syariah Hotel	0,42857	0,285714286	0,866666667	0,666666667	0,87	0,0739	0,375	0.647
27	Jeddah Hotel	0,57143	0,380952381	0,866666667	0,666666667	0,96	0,2713	0,375	0.761
28	Grand Penemas Hotel	0,57143	0,380952381	0,666666667	0,666666667	0,88	0,0848	0,375	0.596
29	Syariah Darussalam Hotel	0,57143	0,19047619	0,533333333	0,333333333	0,84	0,2452	0,375	1
30	Pondok Wisata Penginapan	0,28571	0,095238095	0,466666667	0,333333333	0,92	0,0622	0,5	1

From the calculation of the efficiency ratio, it can be concluded that DMUs with an efficiency ratio of less than 1 are considered inefficient, while DMUs with an efficiency ratio of 1 are assumed efficient. After calculating efficiency, it was found that of the 30 DMUs taken as samples, 11 DMUs were categorized as efficient, and the rest were categorized as inefficient. Some DMUs that have proven to be efficient can be seen in the following table:

Table 2: list of inn with efficiency status

No	DMU	Status
1	Parkside Gayo Hotel	Efisien
2	Depik Inn Guest House	Efisien
3	Mahara Hotel	Efisien
4	Portola Grand Renggali Hotel	Efisien
5	Bayu Hill Hotel	Efisien
6	Petro Inn	Efisien
7	At-Tamimi Guest House Syariah	Efisien
8	Qory Syariah Hotel	Efisien
9	QQ Homestay	Efisien
10	Pondok Wisata Penginapan	Efisien
11	Syariah Darussalam Hotel	Efisien

The system is designed web-based, using PHP programming language and MySQL as its database. The system design begins with initial data input derived from direct research and questionnaires. The system login display is shown in the following figure:

Fig 3: System Login Display

On the system dashboard page, there are several views in the form of analysis results and analysis graphs that make it easier for admins to conclude.

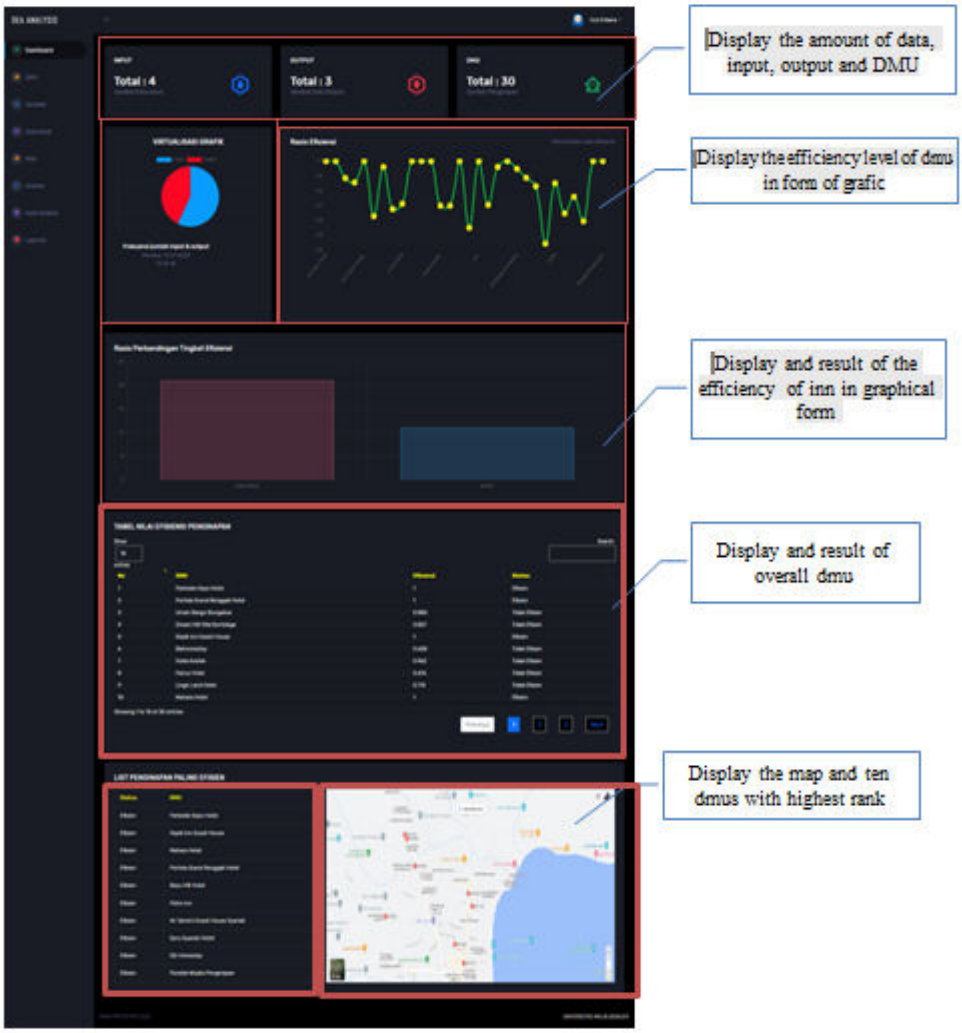

Fig 4: Dashboard System Display

The values page is reserved for admins to manage value data. The system will display a table on this page containing the previously inputted value data. This value table only consists of columns according to the number of variables and DMUs that have been inputted previously. In the values table, only one action can be done, which is editing, because each DMU and variable inputted must have a value. The value will automatically be filled with 0 if it has not been inputted. Therefore, admins can only edit the value data according to the data to be used.

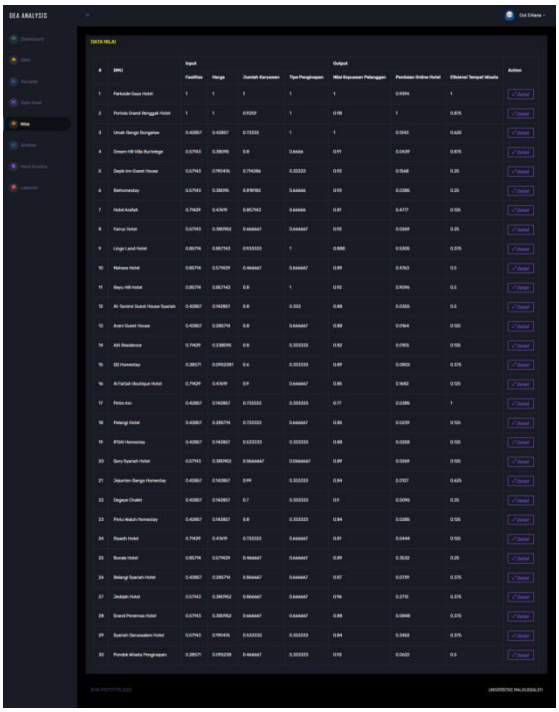

Fig 5: DEA Calculation Process

The analysis page is a section of the site reserved for administrators' management of the analysis process. The system will display a table on this page containing analysis data, including DMU (Data About Units), variables, and previously entered values. On this page, the system will analyze all data that has been inputted to determine the results of efficiency measurements based on available data. The system will also display value data so that administrators can double-check the correctness of the values that have been entered because these values will affect the results of the analysis and can cause discrepancies between the results of efficiency measurements and the actual data. The analysis results page is an area provided for administrators to view the results of the system's analysis. On this page, the system will display a table containing information related to the results of the analysis, including the name of the DMU that has been analyzed, the efficiency value that is the result of the efficiency analysis, the status that indicates whether the DMU is efficient or inefficient, and the advice given if the DMU is inefficient. This page displays analysis results and cannot be managed with add, edit, or delete actions like other pages. Administrators can only view the information displayed in the table without making changes or manipulating the data on this page.

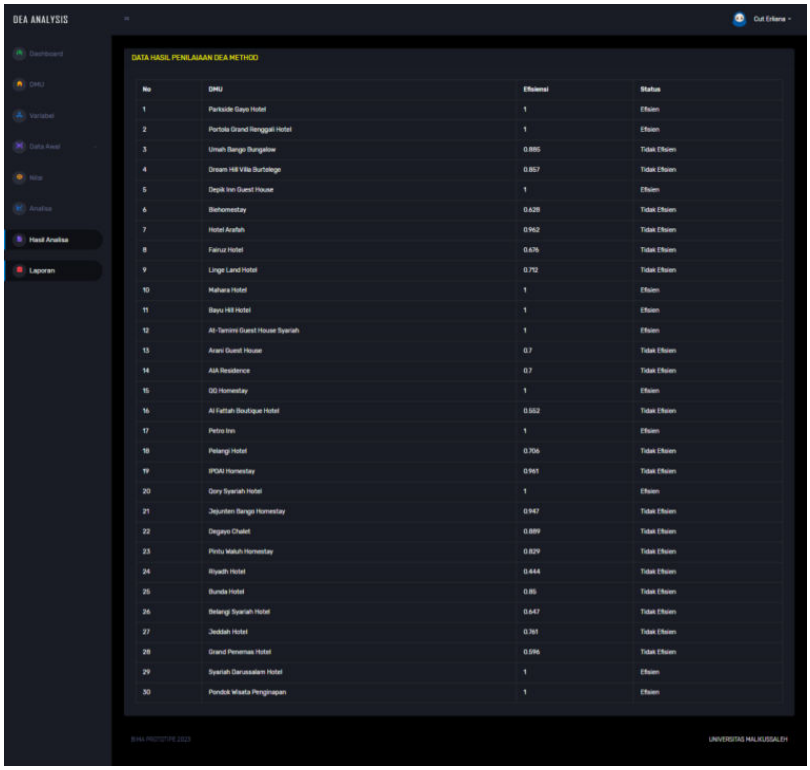

Fig 6: Result of DEA

5. CONCLUSION

This study resulted in the following conclusions:

1. Of the 30 inn samples (DMU) used in analyzing the level of lodging efficiency using the DEA method, 11 inns are categorized as "efficient", while 19 others are classified as "inefficient".
2. Measurement of lodging efficiency in Central Aceh District is carried out through a system using the DEA method. The input variables used include facilities, prices, number of employees, and type of lodging. The output data includes customer satisfaction scores, hotel online assessments, and tourist attraction efficiency. In this case, the number of inputs and outputs used significantly influences lodging efficiency in Central Aceh Regency.

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