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Tenant Work Order Decision Support SystemAnalytical Hierarchy Process (AHP) Method Based on Java Netbeans in Midplaza Building

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Abstract

This research develops a decision support system for managing tenant work orders at MidPlaza Building using the Analytical Hierarchy Process (AHP) method based on Java Netbeans. This system is designed to assist building management in prioritizing and evaluating repair and maintenance requests from various tenants effectively and efficiently. By utilizing the AHP method, the system can analyze various criteria such as urgency, complexity and impact of each work order, thereby producing an objective priority ranking. Netbeans' Java-based implementation enables a user-friendly interface and ease of system maintenance. The research results show that this system can increase the efficiency of work order management, speed up response times, and increase tenant satisfaction at MidPlaza Building. This system integrates historical work order data, tenant information, and available resources to provide accurate and contextual recommendations. Key features include a real-time dashboard for monitoring work order status, an automatic notification system, and comprehensive analytical reports. The use of the AHP method allows flexibility in adjusting criteria weights in accordance with building management policies. Evaluation of system performance shows significant improvements in operational efficiency, with reduced work order completion times and increased levels of tenant satisfaction. This system also facilitates more optimal resource allocation and more effective budget management, helping building management make better decisions and be responsive to tenant needs.

Keywords: *Decision Support Systems, Work Order Tenant, AHP, Java*

1. INTRODUCTION

The complexity of determining work order priorities increases with the increasein the number of tenants and variations in the type of request. Factors such as urgency, impact on building operations, costs, and resource availability need to be considered thoroughly in decision making. However, without a structured system and objective

methods, the decision-making process often becomes inconsistent and prone to errors. This can result in delays in handling critical problems or waste of resources on less significant problems.

To overcome this problem, a decision support system is needed that can help MidPlaza Building management evaluate and prioritize work orders more effectively and efficiently. The Analytical Hierarchy Process (AHP) method was chosen because of its ability to analyze multi-criteria problems and produce more objective decisions based on pairwise comparisons. The development of a Java Netbeans-based system will enable seamless integration with the existing information technology infrastructure at MidPlaza Building, as well as providing a user-friendly interface for easy use by building management staff. With this system, it is hoped that the work order management process can become more structured, transparent, and in accordance with priorities that have been determined objectively.

Technical Quotes

A decision support system is a computer-assisted decision-making method that uses specific data and models to tackle unstructured situations. The purpose of SPK in businesses or organizations is to assist decision makers in their decision-making process, not to take the place of their duties. by making decisions from semi-structured situations utilizing data that has been transformed into information. When using SPK, the decision-maker retains control over the process and the system's output is not used as a standard. The system only generates output that computes information that a decision maker can use. So that the work of decision makers inconsidering decisions can be made easier (Wibowo, 2018:12).

Table. 1. Previous Research

No.	Researcher (Year)	Research Title	Research Method	Research Findings
1	Iis Afrianty (2018)	AHP Method Decision Support System for Choosing the Best Employee	AHP	Testing results show that selecting the best employee using F-AHP pays greater attention to the subjectivity of criteria and subcriteria compared to using standard AHP.
2	I Dewa Ayu Eka Yuliani (2016)	Using the Analytical Process to Choose the Best Employee Decision Support	AHP	The calculations using AHP provide a ranking of the importance of criteria and a recommendation for the best employee. The criteria ranked in importance are product quality, cleanliness,

		System Hierarchy Process (AHP) Method		accuracy, maintenance, speed, and hospitality. The alternative matrix calculation results in a score of 53% for Juliansyah, 24% for Novi Natalia, and 23% for Lenny, with Juliansyah recommended as the best employee at KFC Gajah Mada Pontianak due to having the highest score.
3	Tri Annisa Hidayati, Rusdah (2018)	Decision Support System for Selecting the Best Employee Using AHP and Simple Additive Weighting (SAW) at PT Primasolusi Informatika Nusantara	SAW	This research discusses decision-making for selecting the best employee at PT Primasolusi Informatika Nusantara. Challenges include the lack of weighting for each criterion and the occurrence of identical scores among employees, making it difficult for the division head to identify a candidate for the best employee. Additionally, the process is time-consuming due to data collection requirements like weekly reports.

2. METHOD

Literature study is a data collection method used in research. Through literature studies, researchers can review theories in their field. This activity is very helpful in research. In this research, researchers looked for sources from several books, scientific articles and journals related to decision support systems and analytical hierarchy process(AHP) methods.

According to Suwendra (2018:7), "Qualitative research is intensive research using scientific procedures to produce narrative conclusions, both written and verbal, based onanalysis of certain data."

Data source sampling was done purposively and snowballing, the collection technique was triangulation (combination), the data analysis was inductive/qualitative, and the qualitative research results focused on meaning rather than generalization, according to Anggito & Setiawan (2018: 8). Qualitative research is gathering data in a natural setting with the aim of interpreting phenomena that occur where the researcher is the key instrument.

Table 2. Triangulation Data

Importance Intensity	Description	Explanation
1	Both components are equally significant.	Both factors have an equally significant impact on the goal.
3	One element is slightly more important than the other	One component is marginally favored above the other by experience and judgment.

5	There is one component that is more significant than the other.	One component is substantially supported over the other by experience and judgment.
7	Clearly, one component is more significant than the other.	In practice, one component is clearly dominating and has substantial support.
9	One component is far more crucial than the other.	The strongest level of affirmation is seen in evidence that favors one component over another.
2, 4, 6, 8	Values in the middle of two close values	When two alternatives are compromised, this value is assigned.
Reciprocal	Activity j has the reciprocal value in relation to activity i if activity i has a particular value.	

3. RESULTS AND DISCUSSION

1. Manual Analytical Hierarchy Process (AHP) calculations
    a. Criterion Data

    Criteria data is used as a reference/basis for assessment. In the criteria, we can add the criteria code and criteria name. because whether the criteria are important or notwill be seen from the comparison between the criteria.

Tabel 3. Criteria Data

CODE	Name
C01	Urgency
C02	Impact
C03	Cost
C04	Resource Availability
C05	Complexity

b. Alternative Data

Alternative data is something/person that will be assessed. Alternatives usually containalternative codes and alternative names. The following is an example of alternative data in the AHP method SPK calculation:

Tabel 4. Alternative Data

CODE	NAME
A01	Meeting Room AC Repair
A02	Toilet Water Pipe Leakage
A03	Corridor Light Replacement
A04	Floor Repair
A05	Room Maintenance and Cleaning

c. Comparison Value

In AHP the comparison value is given between 1 and 9 in accordance with Saaty'stheory. Following are the names of the Saaty values:

Tabel 5. Data Comparison

Value	Name
1	As important as
2	Approaching a little more important than
3	A little more important than
4	Approaching more important than
5	More important than
6	Approaching very important than
7	Very important than
8	Approaching absolutely important than
9	Absolutely very important than

Figures and Tables

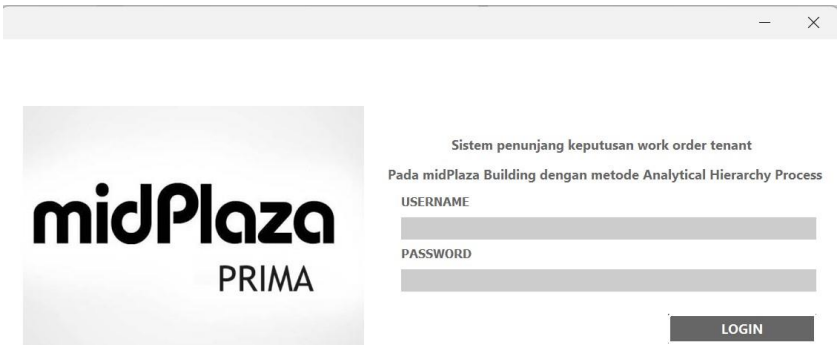


Figure 1. Login Display
Source: Personal Document

This display is at the beginning of the program. The login menu is used as a keyword before entering the main program. So that not just anyone can access this program. So that in the login menu form confidentiality is maintained properly. If the user can enter the username and password correctly, the main menu will appear and the program is ready to run.

Figure 2 Main Menu Display

Source: Personal Document

The screen above displays the Main Menu display for the Work Order Selection Decision Support System using the AHP Method. On the main screen, a menu is available consisting of a menu containing Alternative Data, Criteria, Criteria Assessment, Alternative Assessment, AHP Calculation, Reports and Logout.

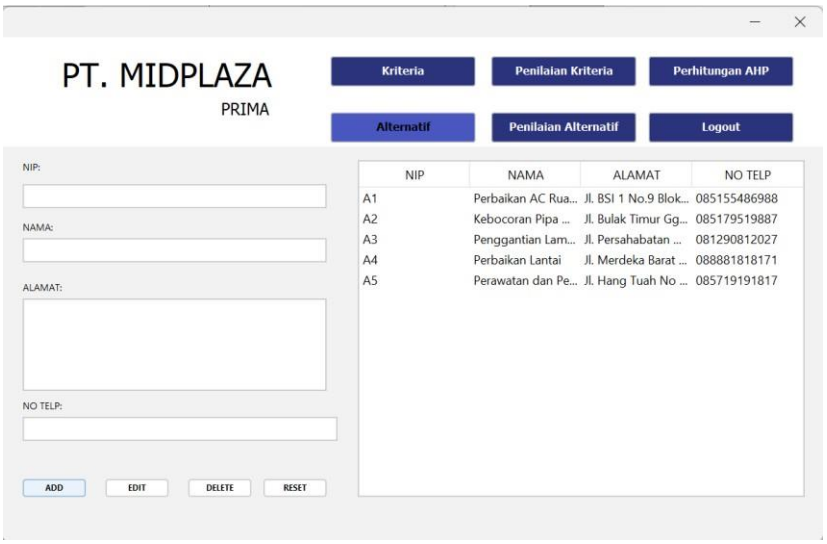


Figure 3. Alternative Data Display Source: Personal Document

The screen above displays an alternative data menu display. The alternative data menu screen will display input of alternative data consisting of alternative ID, name, address and Telephone number.

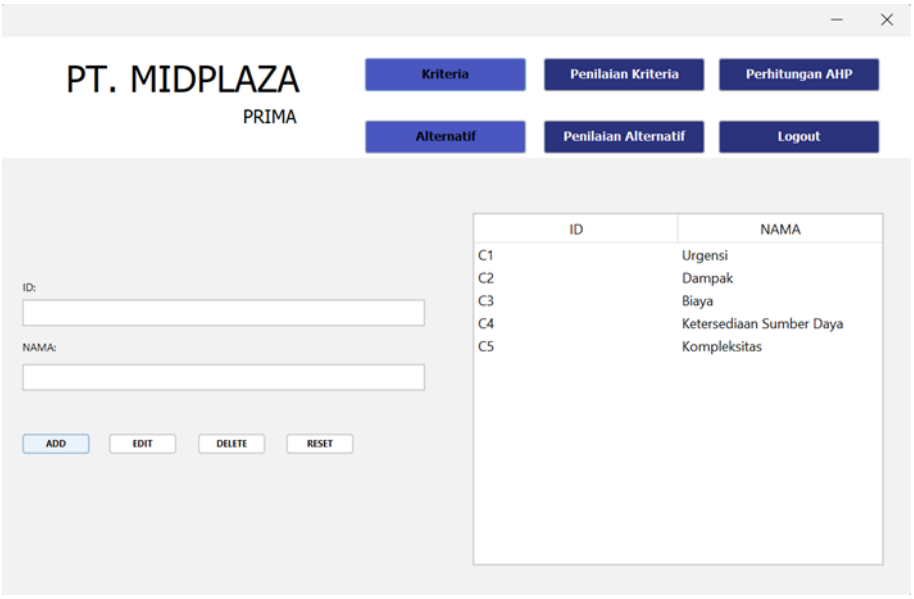


Figure 4. Criteria Data Display

The screen above displays the criteria menu display. The criteria menu screen will display input of criteria data consisting of Criterion ID and Criterion Name.

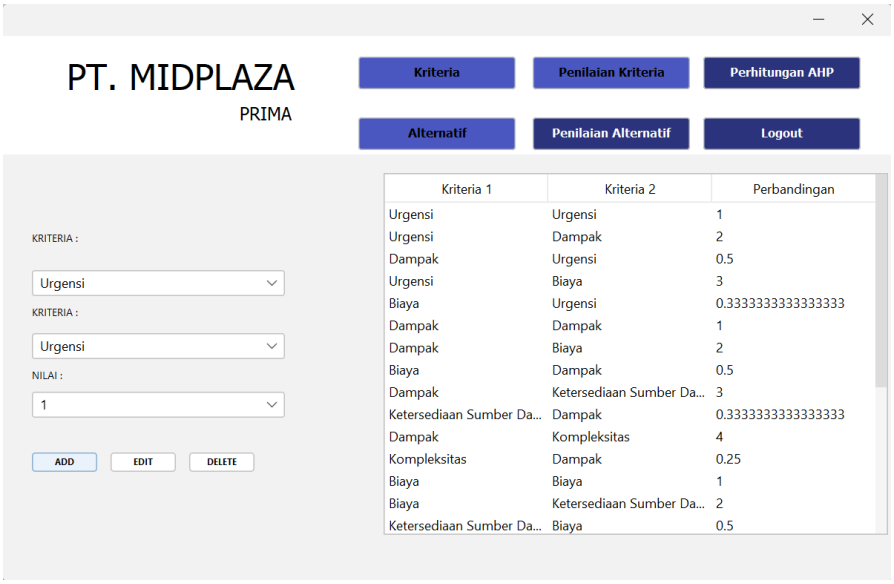


Figure 5. Criteria Assessment Display

The screen above displays the criteria assessment menu display. On the criteria assessment menu screen, it is used to input the comparison criteria assessment in the form of comparison values for Criterion 1 and Criterion 2.

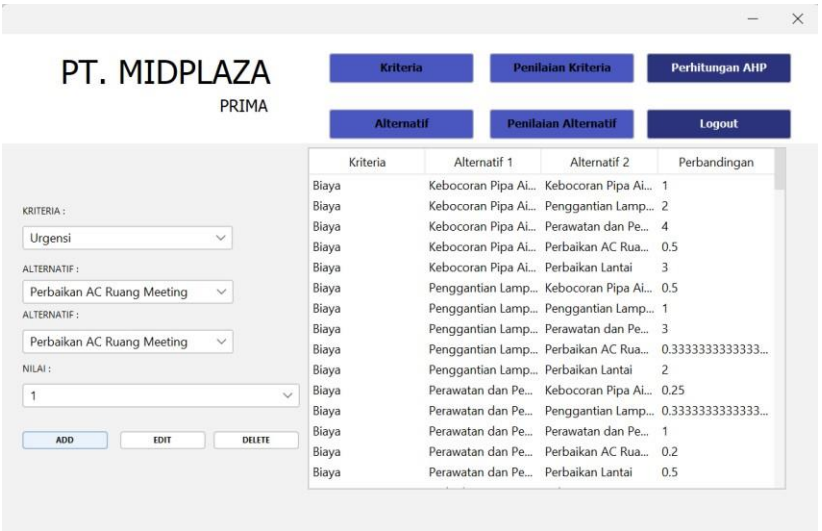
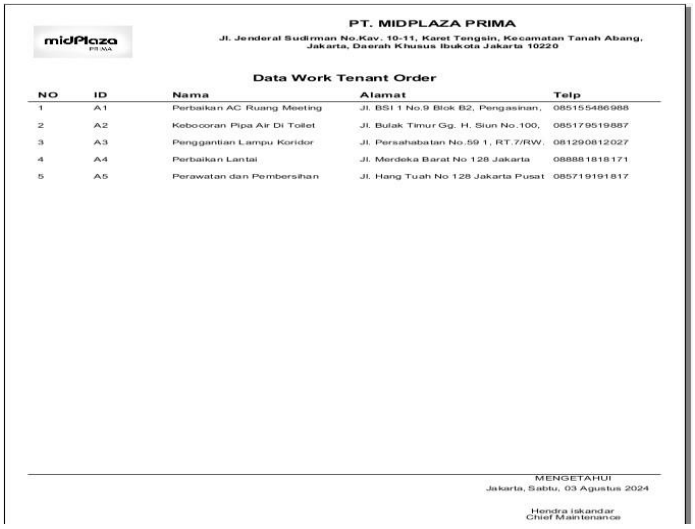


Figure 6. Alternative Assessment Display

The screen above displays the alternative assessment menu display. On the criteria weight menu screen, the criteria data is displayed, then the values between alternatives are compared.



PT. MIDPLAZA PRIMA

Jl. Jenderal Sudirman No.Kav. 10-11, Karet Tengsin, Kecamatan Tanah Abang, Jakarta, Daerah Khusus Ibukota Jakarta 10220

Data Work Tenant Order

NO	ID	Nama	Alamat	Telp
1	A1	Perbaikan AC Ruang Meeting	Jl. BSI 1 No.9 Blok B2, Pengasinan,	085155486988
2	A2	Kebocoran Pipa Air Di Toilet	Jl. Bulak Timur Gg. H. Siun No.100,	085179519887
3	A3	Penggantian Lampu Koridor	Jl. Persahabatan No.59 1, RT.7/RW.	081290812027
4	A4	Perbaikan Lantai	Jl. Merdeka Barat No 128 Jakarta	08888181817 1
5	A5	Perawatan dan Pembersihan	Jl. Hang Tuah No 128 Jakarta Pusat	085719191817

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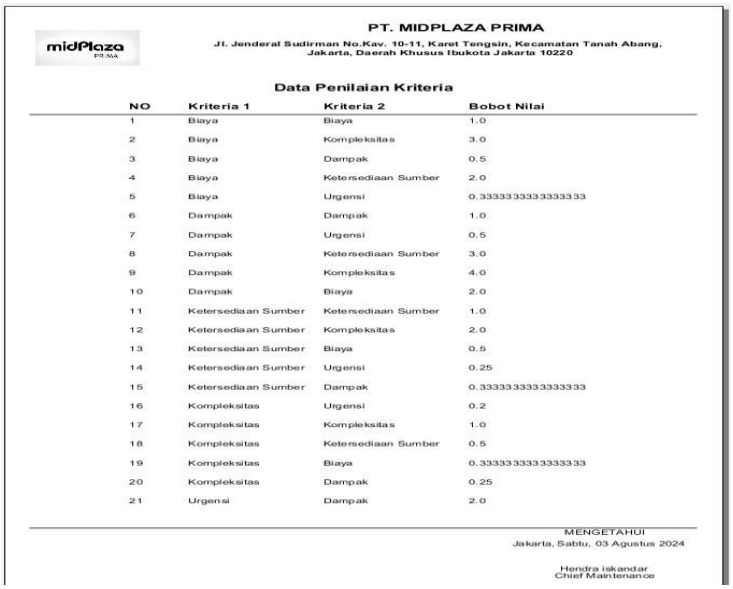
Hendra iskandar
Chief Maintenance

Figure 7. Alternative Data View

The screen above displays an alternative data report view. The screen displays No., ID, Name, Address and Telp.



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Data Penilaian Kriteria

NO	Kriteria 1	Kriteria 2	Bobot Nilai
1	Biaya	Biaya	1.0
2	Biaya	Kompleksitas	3.0
3	Biaya	Dampak	0.5
4	Biaya	Ketersediaan Sumber	2.0
5	Biaya	Urgensi	0.3333333333333333
6	Dampak	Dampak	1.0
7	Dampak	Urgensi	0.5
8	Dampak	Ketersediaan Sumber	3.0
9	Dampak	Kompleksitas	4.0
10	Dampak	Biaya	2.0
11	Ketersediaan Sumber	Ketersediaan Sumber	1.0
12	Ketersediaan Sumber	Kompleksitas	2.0
13	Ketersediaan Sumber	Biaya	0.5
14	Ketersediaan Sumber	Urgensi	0.25
15	Ketersediaan Sumber	Dampak	0.3333333333333333
16	Kompleksitas	Urgensi	0.2
17	Kompleksitas	Kompleksitas	1.0
18	Kompleksitas	Ketersediaan Sumber	0.5
19	Kompleksitas	Biaya	0.3333333333333333
20	Kompleksitas	Dampak	0.25
21	Urgensi	Dampak	2.0

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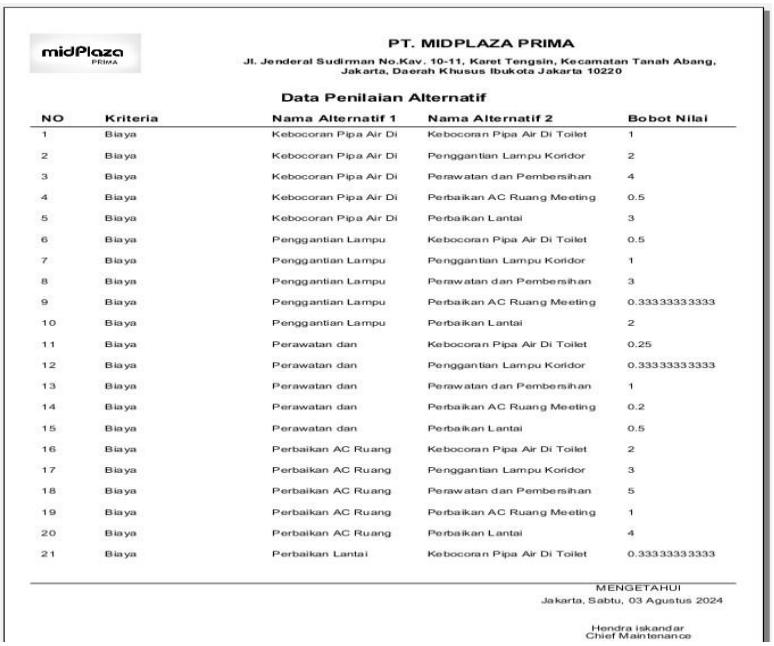
Figure 8. Criteria Assessment Report Display

The screen above displays the criteria assessment report display. The screen displays No., Criteria 1, Criteria 2 and Value.



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Data Penilaian Alternatif

NO	Kriteria	Nama Alternatif 1	Nama Alternatif 2	Bobot Nilai
1	Biaya	Kebocoran Pipa Air Di	Kebocoran Pipa Air Di Toilet	1
2	Biaya	Kebocoran Pipa Air Di	Penggantian Lampu Koridor	2
3	Biaya	Kebocoran Pipa Air Di	Perawatan dan Pembersihan	4
4	Biaya	Kebocoran Pipa Air Di	Perbaikan AC Ruang Meeting	0.5
5	Biaya	Kebocoran Pipa Air Di	Perbaikan Lantai	3
6	Biaya	Penggantian Lampu	Kebocoran Pipa Air Di Toilet	0.5
7	Biaya	Penggantian Lampu	Penggantian Lampu Koridor	1
8	Biaya	Penggantian Lampu	Perawatan dan Pembersihan	3
9	Biaya	Penggantian Lampu	Perbaikan AC Ruang Meeting	0.33333333333
10	Biaya	Penggantian Lampu	Perbaikan Lantai	2
11	Biaya	Perawatan dan	Kebocoran Pipa Air Di Toilet	0.25
12	Biaya	Perawatan dan	Penggantian Lampu Koridor	0.33333333333
13	Biaya	Perawatan dan	Perawatan dan Pembersihan	1
14	Biaya	Perawatan dan	Perbaikan AC Ruang Meeting	0.2
15	Biaya	Perawatan dan	Perbaikan Lantai	0.5
16	Biaya	Perbaikan AC Ruang	Kebocoran Pipa Air Di Toilet	2
17	Biaya	Perbaikan AC Ruang	Penggantian Lampu Koridor	3
18	Biaya	Perbaikan AC Ruang	Perawatan dan Pembersihan	5
19	Biaya	Perbaikan AC Ruang	Perbaikan AC Ruang Meeting	1
20	Biaya	Perbaikan AC Ruang	Perbaikan Lantai	4
21	Biaya	Perbaikan Lantai	Kebocoran Pipa Air Di Toilet	0.33333333333

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Figure 9. Alternative Assessment Report View

The screen above shows the alternative data report view. The screen displays No, Criteria, Alternative Name 1, Alternative Name 2 and value.

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Data Hasil Metode AHP

NO	Nama	NILAI
1	Perbaikan AC Ruang Meeting	0.4162124454553051
2	Kebocoran Pipa Air Di Toilet	0.261787988116735
3	Penggantian Lampu Koridor	0.1610504069885031
4	Perbaikan Lantai	0.09857277288697212
5	Perawatan dan Pembersihan Ruangan	0.06237638655248462

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Figure 10. AHP Results Report Display

The screen above displays the AHP result report. The screen displays No., Name, and Value.

4. CONCLUSION

This study focuses on the development of a Decision Support System (DSS) to select tenant work order priorities. The method used in this DSS is the Analytical Hierarchy Process (AHP), which is a multi-criteria decision-making method. The use of AHP allows for the weighting and assessment of various criteria in selectingwork orders in a systematic and structured manner. This system aims to increase the effectiveness and objectivity of the work orderselection process at midPlaza.

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