



AHP Approach for Indonesian Public Bus Station Commercial Asset Management Training

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ABSTRAK

Following the government's commitment in the state asset utilization, Indonesian bus stations management develops their commercial assets as a public activity center and a non-tax contributor. The problem is the bus station commercial asset management knowledge and skill should be improved through a specific training. The analytical Hierarchy Process (AHP) approach for the bus station commercial asset management training is essential. The training improves bus station commercial asset management knowledge and skills by hierarchical expertise and suitable selection. Conducted in the Tirtonadi bus Station located in Indonesian Surakarta city, three stages run the AHP training: Bus station commercial asset management hierarchical expertise and proper selection development, AHP software simulation, and AHP-based test. To create training attractiveness, two treatments are imposed: Asset utilization combination and group division. The training successfully improves bus station commercial asset management knowledge and skill on the hierarchical expertise and suitable selection. In addition, the training raises the bus station management's intention to analyze in general the bus station commercial asset management, readiness to organize the bus station commercial asset management training based on the AHP method, and readiness to become the bus station research key respondent based on the AHP method.

Keywords: Training, Expertise and Suitable Selection, AHP, Bus Station, Commercial Asset

1. Introduction

The Indonesian government pays serious attention to state asset (BMN= Barang Milik Negara) utilization. The government has issued sixteen state asset regulations (Amiri, 2016). In addition, the government has released the number 28/2020 regulation to replace the number 27/2014 regulation. All regulations ensure and open opportunities to utilize state assets based on Lease, Borrowing, Collaborative Utilization, Build-Operate-Transfer, Build-Transfer-Operate, and Infrastructure Financing Partnership schemes (Hamdi, 2016).

Concerning this opportunity, Indonesian bus stations try to optimize their commercial area based on Lease, Borrowing, and Collaborative Utilization schemes in order to develop the bus station as a public activity center and a non-tax state revenue contributor. While bus stations that have many food, souvenirs, and tickets outlets, in the attractive location, and supported by established cooperative typically prefers to the Lease scheme (Achyani & Riyardi, 2023), other bus stations that have a large space and building on their second floor that can be used for local government service and public gatherings are attracted by the Borrowing scheme.

Unfortunately, bus stations do not manage their commercial asset based on the expertise and suitable selection frameworks. Although bus stations understand that expertise and comparison are vital for bus station human resources professionalism as a part of transport human resource professionalism in the 5.0 Society Era (Amaliyah et al., 2023), indirectly relates to service improvement that is very important for bus station existence (Sasmito & Murdiyanto, 2017), and support bus station performance that faces the bus arrivals and passengers declining problem. (Hilmy et al., 2021), bus stations management does not consider an interdependency

expertise on asset utilization. For instance, bus station management decisions in the Lease scheme do not consider factors that influence the Lease scheme and the Lease impact. In addition, bus stations management does not consider schemes comparison. For example, a Lease decision does not made based on its comparison with Borrowing or other asset utilization schemes.

Bus station management needs training that can improve their knowledge and skills on expertise and proper selection. Training is the best approach because training is beneficial for individual and organization (Tramarico et al., 2015) from competency improvement (Som et al., 2022), motivation increasing (Tarmilia et al., 2021), and can be done in the form of practical training that employs information technology software (Nugroho et al., 2024).

The AHP training is the best training that can improve bus station commercial asset management knowledge and skills on expertise and the proper selection. The training exploits hierarchical structure and software to enhance the expertise and suitable selection knowledge and skills. While the hierachical structure improves the expertise and suitable selection knowledge and skills, the software enables participants to practice the knowledge and skills. To the best of our knowledge, previous studies apply AHP for transportation research purposes (Abastante et al., 2012; Akhrouf et al., 2024; Barić & Džambo, 2021; Baric & Starcevic, 2015; Bottero et al., 2012; Park & Lee, 2020; Stopka et al., 2021)the company could reduce the transport costs by entering shipments into the transport databank on its own. One out of three selected providers will be chosen using multi-criteria evaluation methods, specifically, the Analytic Hierarchy Process (hereinafter referred to as AHP. It means that this bus station commercial asset management training is the first that apply AHP method. The goal of this training is to provide knowledge and skill on expertise and

suitable selection for bus station commercial asset management.

2. Training Method

The training runs in three stages. The first is the bus station asset management hierarchy and the best choice development. The second is the AHP software practice. The third is the AHP testing.

The training provides several important things needed during the training. The first is an AHP hierarchy chart (see Figure 1). It shows the bus station commercial asset management hierarchy. While demonstrates the goal, criteria, sub-criteria, and alternatives, the hierarchy also reveals their elements and interrelationships that are shown by arrows.

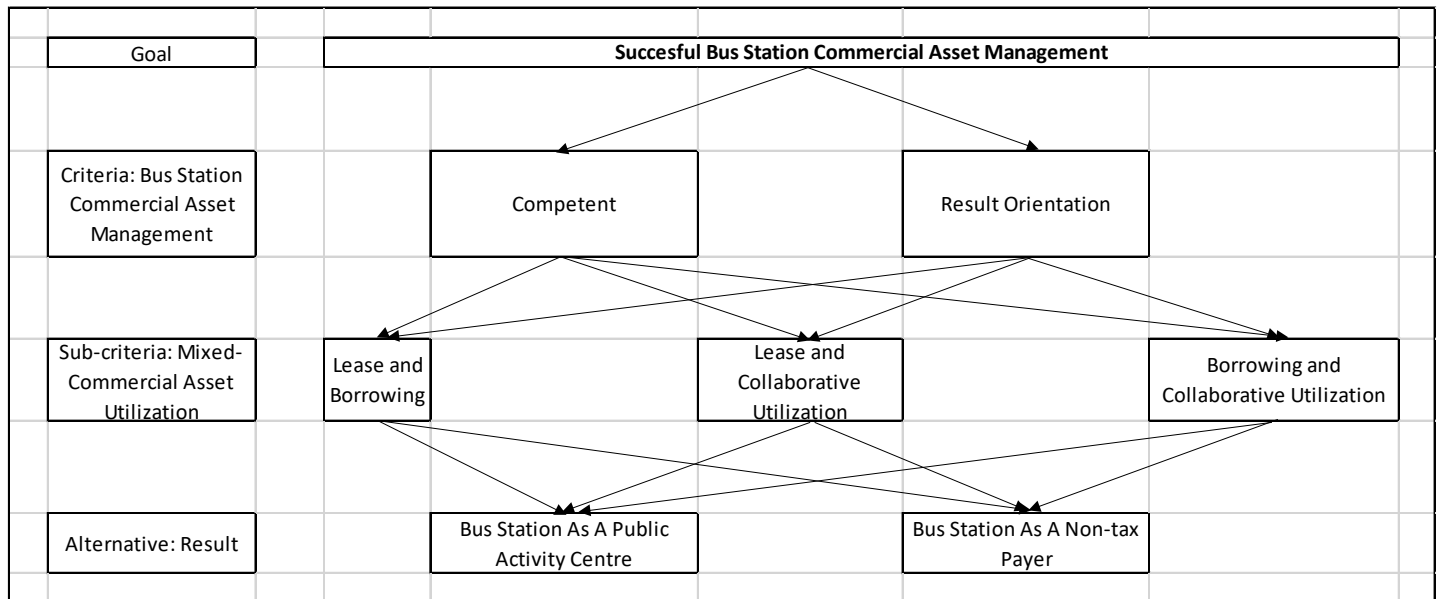


Figure 1. Successful Bus Station Commercial Asset Management AHP Hierarchy

The second is the bus station commercial asset management AHP questionnaire which consists of eight main questions asking the importance level between two or more elements in each hierarchy. This questionnaire has three characteristics: Firstly, double side questionnaire. The left side is for answers that select the main element, whilst the right side is

for answers that select the comparing element. Secondly, nine comparison answers. While, the lowest comparison answer is that a main element is as important as a comparing element, the highest is that a main element is extremely important than a comparing element. Thirdly, quantification of nine comparison answers by 1 to 9 (See Figure 2).

Compare the Relative Importance with Respect to: Goal: Succesfull Bus Station Commercial Asset Management																	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Bus Station Asset Management																	
CR:																	
Compare the Relative Importance with Respect to: Bus Station Asset Management																	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Competent Management																	
CR:																	
Compare the Relative Importance with Respect to: Competent Management																	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Bus Station As A Public Activity Centre																	
CR:																	
Compare the Relative Importance with Respect to: Output Oriented Management																	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Bus Station As A Public Activity Centre																	
CR:																	
Compare the Relative Importance with Respect to: Bus Station Asset Mixed-Utilization Scheme																	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Lease and Borrowing																	
Lease and Collaborative Utilization																	
Lease and Collaborative Utilization																	
CR:																	
Compare the Relative Importance with Respect to: Lease and Borrowing																	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Bus Station As A Public Activity Centre																	
CR:																	
Compare the Relative Importance with Respect to: Lease and Collaborative Utilization																	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Bus Station As A Public Activity Centre																	
CR:																	
Compare the Relative Importance with Respect to: Borrowing and Collaborative Utilization																	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Bus Station As A Public Activity Centre																	
CR:																	
1: Equal																	
3: Moderate																	
5: Strong																	
7: Very Strong																	
9: Extreme																	
2,4,6,8: Between Odd Values																	

Note: This AHP questionnaire is in line with the AHP hierarchy. It applies a pairwise comparison that allows participants to choose left or right choices. Fulfillment is conducted by ticking the box below the number.

Figure 2. AHP Questionnaire Display

The third is AHP Excel software. This software is similar to other AHP software programs but is simpler because it is created only for the training purpose. The software consists of several parts. The first part shows sheets of the bus station commercial asset management AHP hierarchy and questionnaires that will be answered by participants. The middle part practices data entry from the answered questionnaire, the priority and consistency level calculation and analysis, and the hierarchy summarizing. The last part contains tests and participant intention after training.

The fourth is the question sheets and assessment rubric. The question sheets consist of matching and sorting based on keywords in bold sheets. The matching sheet contains a test that participants should match correctly twenty-six randomized AHP words on the left to the words on the right sides. The sorting sheet contains an examination that asks participants to sort matched AHP sentences based on the keywords in bold. Participant answers will be scored based on the ratio of the percentage of correct answers to key answers (See Figure 3).

Correct Answers	
Training	AHP method to improve expertise and proper selection knowledge and skill in bus station commercial asset management
AHP	Analysis based on hierarchy for bus station commercial asset management
Expertise	The process and result knowledge and skill of the bus station commercial area management
Proper Selection	Knowledge and skills of importance level comparison that is consistent of bus station commercial asset management
Bus station commercial asset management	Competent and output-oriented management in the commercial asset Lease, borrowing, and cooperation utilization schemes that cause bus station as a public activity centre and a non-tax revenue contributor
Analysis	Study on the bus station commercial asset management data that obtained from AHP questionnaire
Hierarchy	Goal, process, and result levels on the bus station commercial asset management
Process	Criteria and Sub-criteria in the AHP hierarchy
Result	Alternative in the AHP hierarchy
Importance Level Comparison	Comparison on the importance between two elements
Consistent	If A is more important than B and B is more important than C, then A is more important than C
Competent	Able to manage bus station commercial area
Output-oriented	Manage bus station in order bus station as a public activity centre and non-tax revenue contributor
Lease	Bus station commercial asset utilization scheme: The user must pay lease money to the bus station management
Borrowing	Bus station commercial asset utilization scheme. The bus station permits user to utilize bus station commercial asset according to user need.
Collaborative Utilization	Bus station commercial asset utilization scheme: Bus station and user collaboration on asset utilization
Bus station as a public activity centre	Public activities can be held in the bus station
Bus station as a non-tax revenue contribution	Lease, Borrowing, and cooperation Utilization revenues are shared to central government
Questionnaire	A List of questions that an element is more importance than other importance that will be inputed and processed using AHP software
Goal	Obtained benefit from bus station commercial asset management
Criteria	Bus station commercial asset management should be competent and result-oriented
Sub-criteria	Commercial aset utilization based on Lease, Borrowing, and Cooperation Utilization mixed schemes
Alternative	Output of bus station commercial asset management: Bus station as a public activity centre and a non-tax revenue contributor
AHP Software	Software that is able to calculate priority and consistency ratio scores
Priority	The fact that one element is regarded than other element
Consistency Ratio (CR)	Ratio that reveals that a choice is a consistent choice

Note: This correct answers demonstrated twenty-six matched and sorted sentences. The correct matched sentences relate correctly left and right sides. The correct sorted sentences sort correctly sentences based on their keywords in bold.

Figure 3. AHP Matching and Shorting Correct Answer Display

The assessment rubric shows the score level and its grade. The score levels classify the score into four intervals based on the average matching and sorting of correct answer numbers. The grade interprets the score. A

higher score means higher knowledge and skill to manage bus station commercial assets based on expertise and proper selection (See Table 1).

Table 1. Assessment Rubric for Bus Station Commercial Asset Training

Score	Grade
Average of Correct Matching and Sorting Number $\leq 50\%$	Poor knowledge and skill to manage bus station commercial assets based on the expertise and proper selection
$50\% >$ Average of Correct Matching and Sorting $\geq 60\%$	Fair knowledge and skill to manage bus station commercial assets based on the expertise and proper selection
$60\% >$ Average of Correct Matching and Sorting $\geq 70\%$	Good knowledge and skill to manage bus station commercial assets based on the expertise and proper selection
Average of Correct Matching and Sorting $> 70\%$	Excellent knowledge and skill to manage bus station commercial assets based on the expertise and proper selection

This training offers interesting treatments. Usually, bus station chooses one among Lease, Borrowing, and Collaborative Utilization schemes (Achyani & Riyardi, 2023). However, this training offers mixed schemes: (1) Lease and Borrowing, (2) Lease and Collaborative Utilization, or (3) Borrowing and Collaborative Utilization. This treatment is interesting because it is useful for ensuring AHP hierarchy forming expertise and the importance level proper selection accuracy in all hierarchy levels. This training also offers group division: Male and female groups. This division is essential to support teamwork and

group comparison. The group division begins from the AHP Excel software practicing stage.

The training participants are personnel from the Indonesian Tirtonadi Surakarta bus station. They have prepared laptops that already have Excel files containing (1) AHP hierarchy and questionnaires, (2) AHP data entry, processing, and analysis, and (3) AHP test questions. The training instructors are from Economics and Business of Universitas Muhammadiyah Surakarta. They accompany participants during the Training. (See Figure 4).



Dr. Agung Riyardi, SE, MSi (Left Figure, standing) and Dr. Mahameru Rosy Rohmatullah, MSi (Right Figure, sitting in the left side before participants) as instructors at the bus station commercial asset management training.

Figure 4. Bus Station Commercial Asset Management Training Instructors and Participants

3. Training Result and Analysis

At the beginning of the Training, participants are ready to participate. They bring laptops that contain the installed AHP Excel files. From their laptops, participants can

access the AHP hierarchy, blank questionnaire, and sheets for data entering and processing.

In the expertise and proper selection development beginning stage, participants criticize the mixed schemes: Lease-Borrowing, Lease-Collaborative Utilization,

and Borrowing-Collaborative Utilization. Instructors explain that mixed schemes are a training treatment that is useful to challenge and encourage participants to think deeper about the proper management and optimal results obtained from mixed schemes. The

instructor also explains that the mixed schemes do not conflict with government regulation number 28/2020 and the 2022 Transportation Ministry Financial Report shows that some bus stations combine its asset utilization (See Table 2).

Table 2. Bus Station Asset Utilization

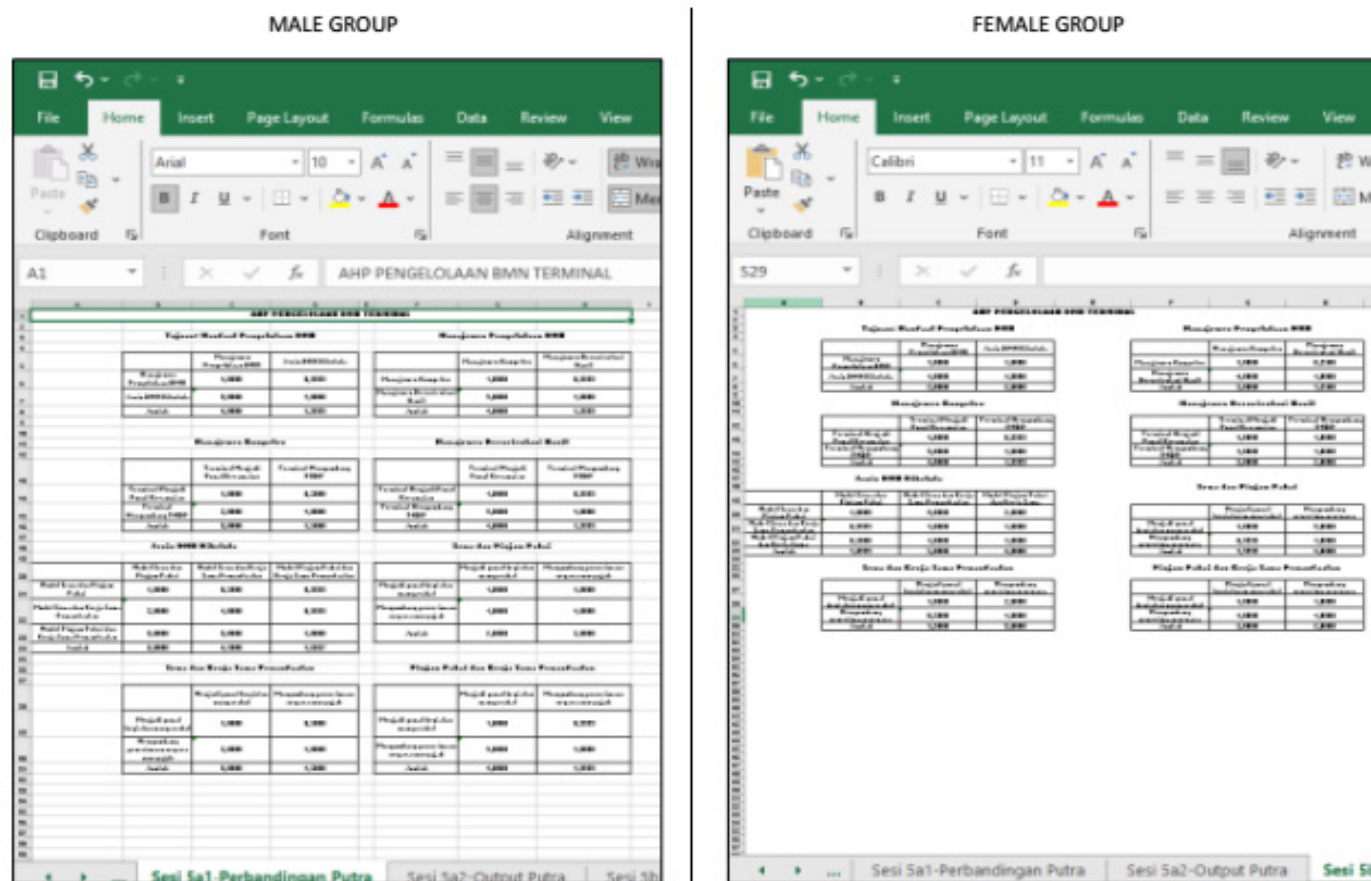
BUS STATION	ASSET UTILIZATION	BUS STATION	ASSET UTILIZATION	BUS STATION	ASSET UTILIZATION
1	Lease	14	Lease	28	Lease
2	Borrowing	15	Lease	29	Lease
3	Lease, Borrowing	16	Borrowing	30	Lease
4	Lease	17	Lease, Collaborative Utilization	31	Lease
5	Borrowing	18	Lease	32	Borrowing
6	Borrowing	19	Lease	33	Lease
7	Borrowing	20	Borrowing	34	Lease
8	Lease	21	Lease, Borrowing	35	Borrowing
9	Lease	22	Lease	36	Lease
10	Lease	23	Lease, Borrowing	37	Lease, Borrowing
11	Lease	24	Borrowing	38	Borrowing
12	Collaborative Utilization	25	Borrowing	39	Lease
13	Lease	26	Lease	40	Lease
		27	Lease	41	Lease

Source: Appendix F.8 of the 2022 Transportation Ministry Financial Report– Bus Station Status. Note: (1) Bus Station names are converted into numbers. (2) Several bus stations choose KPBU which means intergovernmental partnership. KPBU is involved in the Borrowing scheme.

Participants agree with the bus station commercial asset management AHP hierarchy and continue enthusiastically their work by the AHP importance level comparison. Initially, they tend to select “1” which indicates “as important as” between two elements in the questionnaire. After understanding that AHP provides nine different comparison values, they discuss all importance-level possibilities and judge their best choice. At the end of this stage, participants completely developed

the AHP hierarchy and filled out the AHP comparison questionnaire.

In the practicing stage, participants are divided into male and female groups. Each group starts to practice the AHP Excel software by data entering from the completed AHP questionnaire (See Figure 5). Data entering consists of data entering and checking to ensure that the inputted data is similar to the questionnaire data.



This display demonstrates the data entering at the practicing stage. There are eight titled tables. All tables are matched with and sequential to the questions in the questionnaire. They are originally blank tables without any data. Male and female groups enter the data from their completed questionnaires into the appropriate tables and check to ensure a correct entry.

Figure 5. Data Inputting Display Within The AHP Excel Software

The data inputting continues with the data processing, analysis, and summarizing. The data processing automatically calculates priority and consistency ratio scores from the entered data. The data processing also calculates automatically the priority related to obtained output score from the priority score. The data analysis enables the male and female groups to interpret the priority and consistency comparison. The priority interpretation is

by determining that a higher priority score element is better than other elements in the similar level. The consistency comparison interpretation is by checking that the CR ratio is below 0.1. The data summarizing enables male and female groups to create an AHP table (See Figure 6) based on the AHP Questionnaire, to fill in the table by priority and consistency scores, and to mark all interpretations.

level	Elements Comparison	CR	Priority	CR	Priority	Priority Relates to Obtained Output	CR	Priority	Priority Relates to Obtained Output
Goal: Successful Bus Station Commercial Asset Management	Commercial Asset Management	0,00	0,25	0,00	0,25		0,00	0,50	
	Commercial Asset Utilization Scheme		0,75		0,75			0,50	
Commercial Asset Management	Competent	0,00	0,25	0,00	0,88		0,00	0,20	
	Output Orientation		0,75		0,13			0,80	
Competent Management	Bus station as a public activity centre	0,00	0,25	0,00	0,33	0,07	0,00	0,25	0,03
	Bus station as a non tax revenue contributor		0,75		0,67	0,15		0,75	0,08
Output-Oriented Management	Bus station as a public activity centre	0,00	0,25	0,00	0,25	0,01	0,00	0,50	0,20
	Bus station as a non tax revenue contributor		0,75		0,75	0,02		0,50	0,20
Commercial Asset Utilization Scheme	Lease and Borrowing Scheme	0,10	0,61	0,06	0,16		0,02	0,55	
	Lease and Collaborative Utilization Scheme		0,29		0,25			0,21	
	Borrowing and Collaborative Utilization Scheme		0,10		0,59			0,24	
Lease and Borrowing Scheme	Bus station as a public activity centre	0,00	0,83	0,00	0,50	0,06	0,00	0,75	0,21
	Bus station as a non tax revenue contributor		0,17		0,50	0,06		0,25	0,07
Lease and Collaborative Utilization Scheme	Bus station as a public activity centre	0,00	0,83	0,00	0,33	0,06	0,00	0,67	0,04
	Bus station as a non tax revenue contributor		0,17		0,67	0,13		0,33	0,04
Borrowing and Collaborative Utilization Scheme	Bus station as a public activity centre	0,00	0,83	0,00	0,25	0,11	0,00	0,50	0,06
	Bus station as a non tax revenue contributor		0,17		0,75	0,33		0,50	0,06
						0,3		0,7	
								0,56	0,44

1. Level indicates the AHP hierarchy in the bus station's commercial asset management.
2. Elements comparison indicates that elements within similar level are compared.
3. Trial means that instructors and participants operate together the AHP Excel software. The CR and Priority Scores are filled in by instructors.
4. Priority and CR scores indicate that the data has been processed.
5. CR score below 0.1 and the priority score in the grey box indicate that the processed data has been analyzed.

Figure 6. AHP Conclusion on Bus Station Commercial Asset Management

The Training final stage is the training assessment and sustainability. The assessment reveals that the male group obtained a higher score on the sorting test whilst the female group obtained a higher score on the matching

test. On average, both groups obtained scores between 60 and 70 indicating that they have good knowledge of managing bus station commercial area based on the expertise and proper selection (See Table 3).

Table 3. Bus Station Commercial Area Management Training Assessment Score

Group	Score			Interpretation
	Matching	Sorting	Average	
Male Group	53,85%	76,92%	65,38%	Good knowledge and skill to manage bus station commercial area based on expertise and proper selection
Female Group	57,69%	69,23%	63,46%	Good knowledge and skill to manage bus station commercial area based on expertise and proper selection

At the end of the Training, participants discuss and list anything that can be done after the Training. They find two future possibilities:

Sustainability that relates to bus station commercial asset management analysis and the AHP method. From the first sustainability,

they intend to conduct a general analysis. Whereas relates to the second sustainability they intend to conduct training on the bus station commercial asset management based on the AHP method for students, researchers,

government, communities, and various other interested parties. Participants also intend to be respondents in the bus station studies that apply the AHP method (See Table 4).

Table 4. After Training Intention

Bus Station Commercial Area Management Analysis	Intention	AHP Implementation	Intention
General Analysis	Yes	AHP Method Development Study	No
Management Competency Analysis	No	AHP Method for Bus Station Management Socialization	No
Management Output Orientation Analysis	No	Conduct Training on Bus Station Commercial Area Management Based on AHP Method	Yes
Commercial Asset Utilization Scheme Analysis	No	Respondent for Bus Station Studies Based on the AHP Method	Yes
Commercial Asset Management Beneficiary Analysis	No		

4. Conclusion

AHP approach training is the best choice for improving knowledge and skills in managing commercial bus station assets. This is because this training implements three stages of activities and two treatments. These stages are the development stage, practice with software, and the assessment stage of knowledge, skills, expertise, and the right choice. Treatment must combine the use of assets and division into male and female groups. This training produces training participants who have good knowledge and skills in expertise and the right choice in managing commercial bus station assets. As a result, training participants are ready to analyze the management of commercial bus station assets, ready to organize training on

managing commercial bus station assets based on the AHP method, and ready to become key respondents for bus station research using the AHP method.

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