Decision Support System Using AHP to Determine Appropriate Television Shows for Children

Wirda Fitriani[1]*, Dedi Purwanto[2], Ananda Chairani[3]

[1]Department of Computer Engineering, University of Pembangunan Panca Budi, Indonesia
[2,3]Department of Computer System, University of Pembangunan Panca Budi, Indonesia

ABSTRACT

This study offers a Decision Support System (DSS) that uses the Analytical Hierarchy Process (AHP) to help youngsters choose appropriate television programs. The system is intended to provide parents with a simple and easy-to-implement option for controlling their children's television viewing habits. Its goal is to keep youngsters from imitating unwanted behaviors and to protect them from the detrimental effects of television material. The proposed DSS delivers critical information to allow interactive decision-making, ensuring that users have easy access to the information they require and can make well-informed decisions. The AHP methodology, a decision-making strategy that incorporates pairwise evaluations of selection criteria and available program options, is used in the system's implementation. AHP is particularly successful in solving multi-criteria problems, allowing for the prioritization and ranking of choices based on the research criteria. This study highlights the importance of the DSS in assisting parents in making educated decisions about their children's television programming, resulting in a safer and more educational viewing environment.
Keywords: AHP, Decision Support System, Television Shows

Corresponding Author:

Wirda Fitriani,
Department of Computer Engineering, University of Pembangunan Panca Budi,
St. Gatot Subroto Km. 4.5 Medan Sunggal, Medan, North Sumatera, Indonesia 20122
Email: wirda@pancabudi.ac.id

1. INTRODUCTION

This study offers a Decision Support System (DSS)[1] that uses the Analytical Hierarchy Process (AHP) to help youngsters choose appropriate television programs. The system is intended to provide parents with a simple and easy-to-implement option for controlling their children's television viewing habits. Its goal is to keep youngsters from imitating unwanted behaviors and to protect them from the detrimental effects of television material.

The impact of television on children's development and conduct is a major issue for both parents and educators[2]. While television can provide amusement and education for children, it can also expose them to content that is unsuitable or has a harmful impact on their emotional and cognitive development. As a result, there is an urgent need for a Decision Support System (DSS) to assist parents in making educated decisions about the television shows their children watch[3].

The Analytical Hierarchy Process (AHP) is used as a systematic and rational technique to choosing appropriate television programming for youngsters in this study[4], [5]. The system is intended to be user-friendly, simple to implement, and easily accessible to parents. It is a proactive tool that assists parents in controlling their children's television viewing habits and mitigating the risks connected with inappropriate content.

In this Introduction, we will present an overview of the significance of this research, define the DSS's aims and scope, and emphasize the necessity of employing AHP as the decision-making approach[6], [7]. By combining technology and responsible parenting, this approach aims to provide parents with the information and resources they need to effectively influence their children's television choices. This study indicates the DSS's ability to promote a safer and more instructive television environment for children, ultimately contributing to their general well-being and development[8].

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2. RESEARCH METHODOLOGY

The research methodology would normally comprise a combination of qualitative and quantitative approaches[9] when developing a Decision Support System (DSS) using the Analytical Hierarchy Process (AHP) to determine appropriate television programmes for youngsters. The following research approaches could be used for such a study:

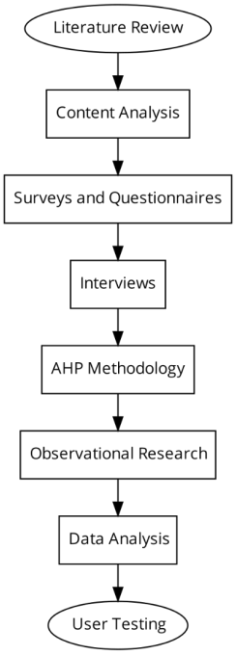

Figure 1. Research Metodhology

3. RESEARCH RESULTS

3.1. Criteria Determination

Criteria are essential in determining good television shows for children. Criteria are determined based on observations and the results of distributing questionnaires. After observing, there are five criteria that are considered vital in determining the results of determining television shows that are good for children. The following tables are the criteria used along with the weightings used to make the AHP method calculations simpler[10].

The criterion for the relevance of a story is to determine how connected or related it is to the values of ordinary life.

Table 1. Story Relevance Criteria

Story Relevance	Scale
Relating to everyday existence	5
There are religious values	4
Teaches discipline and honesty	3
Teaching environmental responsibility	2

Informative criteria determine how well the program provides information or teaches new things to children.

Table 1. Informative Scale

Informative	Scale
Teach good qualities	5
There are violent values and brutal expressions	1

This criterion really determines the values that can be adopted in ordinary life.

Table 2. Educative Scale

Educative	Scale
Very high	5
Higher	4
Tall	3
Currently	2
Low	1

These criteria significantly influence children's social and community life.

Table 3. Respect Social Values and Norms Scale

Respect Social Values and Norms	Scale
Very high	5
Higher	4
Tall	3
Currently	2
Low	1

Social empathy teaches children to be helpful, assist each other and look after each other.

Table 4. Social Empathy and Respect for people Scale

Social Empathy and Respect for people	Scale
Very high	5
Higher	4
Tall	3
Currently	2
Low	1

3.2. Case Study

When entering the weight value the user will input the value on each criterion:

Table 6. User Inputted Criteria Value

K001	3	Story
K002	4	Information
K003	3	Educational
K004	3	Norma
K005	4	Empathy

Previously there was a table of alternative values of children's television shows obtained from the source of the Television impact study conducted by KPI, can be seen in the following table:

Table 5. Table of Alternative Children's Television Shows

Broadcast alternatives	K001	K002	K003	K004	K005
News	3	1	1	4	3
Kids Sitcoms	3	5	4	3	2
Adult Sitcoms	5	3	2	3	2
Kids Animation	4	5	4	5	5
Reality Show	3	4	3	4	3

3.3. Matrix of Perceptual Comparison Criteria

Then calculations are carried out to get a comparison matrix, but to make a comparison matrix the value is converted into a 5 decimal number where:

Table 6. Weight Conversion Table

Criteria	Weight 1 decimal	Weight 5 decimal	Information
K001	3	30000	Story
K002	4	40000	Information
K003	3	30000	Educational
K004	3	30000	Norm
K005	4	40000	Empathy

Next, calculations are carried out to obtain the comparison matrix in the following way:

Row 1= (K001/K001),(K001/K002),(K001/K003),(Kot001/K004),(K001/K005)
Row 2= (K002/K001),(K002/K002),(K003/K003),(K004/K004),(K005/K005)
Row 3= (K003/K001),(K003/K002),(K003/K003),(K003/K004),(K003/K005)
Row 4= (K004/K001),(K004/K002),(K004/K003),(K004/K004),(K004/K005)
Row 5= (K005/K001),(K005/K002),(K005/K003),(K005/K004),(K005/K005)

Table 7. Matrix table of comparison of perceptual criteria

Criteria	K001	K002	K003	K004	K005
K001	1,00000	0,75000	1,00000	1,00000	0,75000
K002	1,33333	1,00000	1,33333	1,33333	1,00000
K003	1,00000	0,75000	1,00000	1,00000	0,75000
K004	1,00000	0,75000	1,00000	1,00000	0,75000
K005	1,33333	1,00000	1,33333	1,33333	1,00000
total	5,66667	4,25000	5,66667	5,66667	4,25000

3.4. Matrix of Each Criterion

To obtain the matrix of each criterion is obtained from dividing each column element in accordance with the total, example for K001:

1,0000/5,66667 = 0,17647

1,3333/5,66667 = 0,23529

1,0000/5,66667 = 0,17647

1,0000/5,66667 = 0,17647

1,3333/5,66667 = 0,23529

And so on for K002-K005

To find the value in the number column is done by adding each element in the column in each row, for example:

Row 1/K001: 0,17646+0,17646+0,17646+0,17646+0,17646 = 0,88235

To get the value in priority weight by dividing the value of the Sum column by the existing element, example: 0,88235 / 4 = 0,22059

Table 8. Matrix of Each Criterion

Criteria	K001	K002	K003	K004	K005	sum	Priority/ perception weights
K001	0,17647	0,17647	0,17647	0,17647	0,17647	0,88235	0,22059
K002	0,23529	0,23529	0,23529	0,23529	0,23529	1,17647	0,29412
K003	0,17647	0,17647	0,17647	0,17647	0,17647	0,88235	0,22059
K004	0,17647	0,17647	0,17647	0,17647	0,17647	0,88235	0,22059
K005	0,23529	0,23529	0,23529	0,23529	0,23529	1,17647	0,29412

3.5. Selection or Ranking Stage

At this stage, a comparison of each existing criterion will be carried out by multiplying the weight value of the priority.

1. News
   = (Weight K001 X Weight K001 Perception) + (Weight K002 X Weight K002 Perception) + (Weight K003 X Weight K003 Perception) + (Weight K004 X Weight K004 Perception) +(Weight K005 X Weight K005 Perception)
   = (3 x 0,22059) + (3 x 0,29412) + (5 x 0,22059) + (4 x 0,22059) + (3 x 0,29412)
   = 0,66177 + 0,88236 + 1,10295 + 0,88236 + 0,88236
   = 4,41180
2. Kids Sitcoms
   = (1 x 0,22059) + (5 x 0,29412) + (3 x 0,22059) + (5 x 0,22059) + (4 x 0,29412)
   = 0,22059 + 1,4706 + 0,66177 + 1,10295 + 1,17648
   = 4,63239
3. Adult Sitcoms
   = (1 x 0,22059) + (4 x 0,29412) + (2 x 0,22059) + (4 x 0,22059) + (3 x 0,29412)
   = 0,22059 + 1,17648 + 0,44118 + 0, 88236 + 0,88236
   = 3,60297
4. Kids Animations
   = (4 x 0,22059) + (3 x 0,29412) + (3 x 0,22059) + (5 x 0,22059) + (4 x 0,29412)
   = 0,88236 + 0,88236 + 0,66177 + 1,10295 + 1,17648
   = 4,70592
5. Reality Show
   = (3 x 0,22059) + (2 x 0,29412) + (2 x 0,22059) + (5 x 0,22059) + (3 x 0,29412)
   = 0,66177 + 0,51824 + 0,44118 + 1,10295 + 0,88236
   = 3,67650

So from the calculation above, the Global Priority Value of each alternative is obtained and conclusions can be drawn from the following ranking:

Table 9. Global Priority Value

Alternative	Priority	Ranking
News	4,41176	3
Kids Sitcoms	4,63235	2
Adult Sitcoms	3,60294	5
Kids Animations	4,70588	1
Reality Show	3,67647	4

3.6. Interface Implementation

The implementation of this decision support system interface has several menus that can perform different functions. This interface is created using PHP programming language.

1) Login Page

The login page will be displayed when the *website* is accessed. This page requires *a user name* and *password.* Figure 1 is a view of the login page.

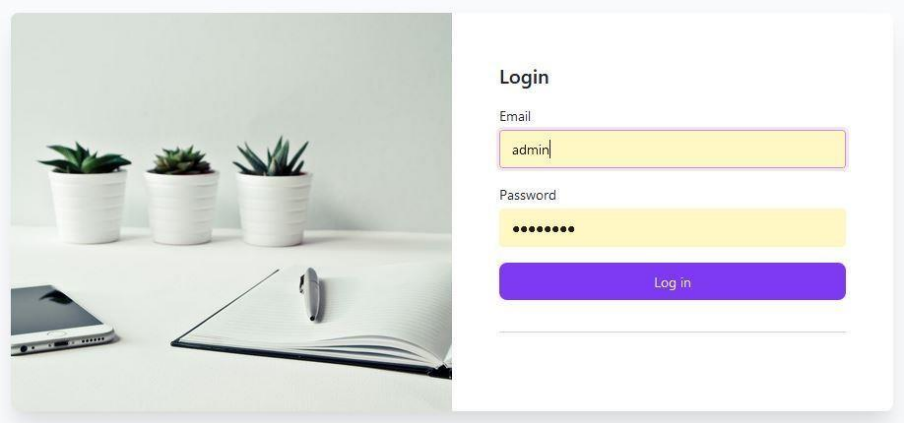

Figure 1. Login Page

2) Children's Television Type List Page

This page contains information and a list of children's television shows. Figure 3 is a view of the children's television list page.

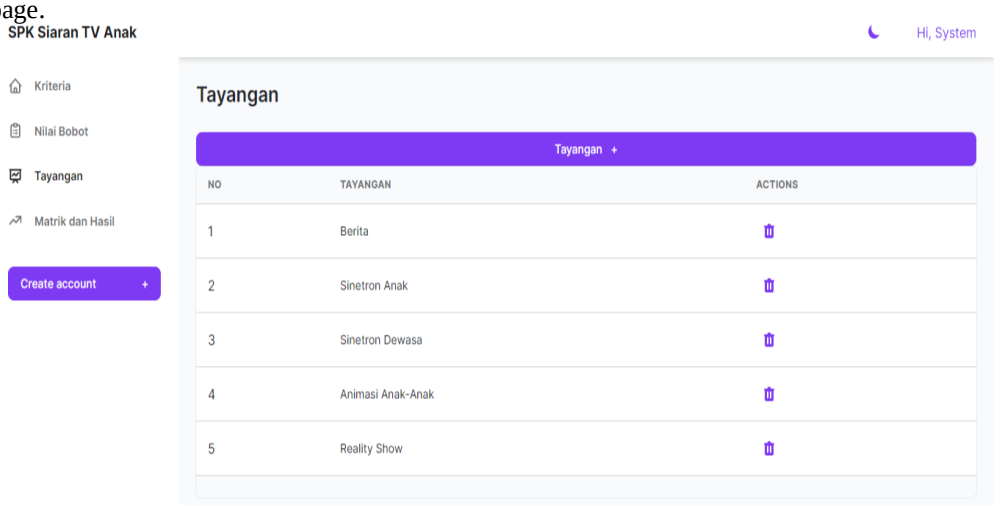

Figure 2. Children's Television Type List Page

A criteria data page is a page that informs the criteria used. On this page the process of modification of the criteria data can be done so that it can be adjusted to the needs. Figure 4 is a view of the criteria data page.

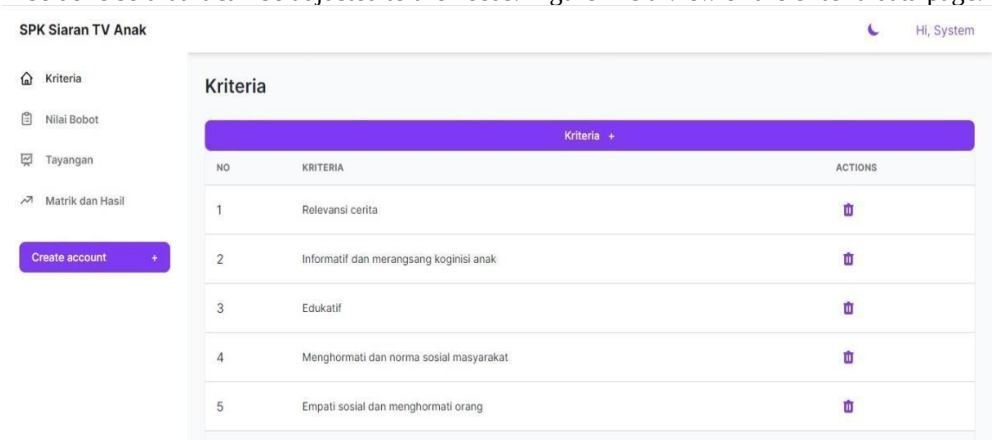

Figure 3. Criteria Data Page

3) Analysis Page

The analysis page is a page that displays the stages of the calculation process which can be seen in the following figures. There are several processes carried out on this page, including:

a) Comparison Matrix Table of Perceptual Criteria

This table explains the results of the comparison calculation of each matrix, to make the comparison matrix the value converted into the number 5 can be seen in the following figure:

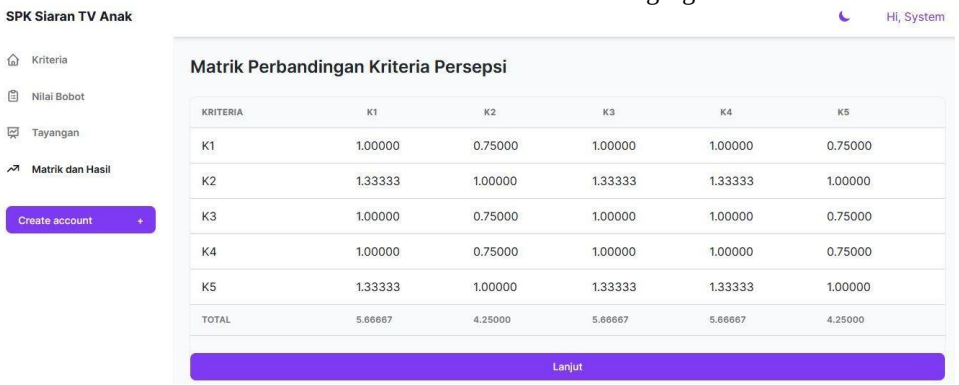

Figure 4. Comparison Matrix of Perceptual Criteria

b) Comparison Matrix Results Table of Perceptual Criteria

To get the matrix of each criterion is obtained from dividing each column element according to the total, and can be seen in the following table:

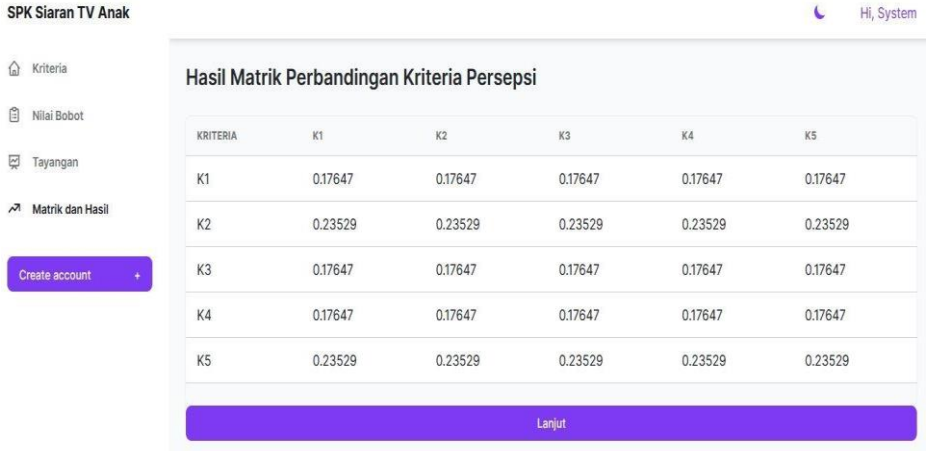

Figure 5. Perceptual Criteria

Value matrix table This criterion is an advanced table of the perception criteria matrix result table above, as shown in figure 7 below:

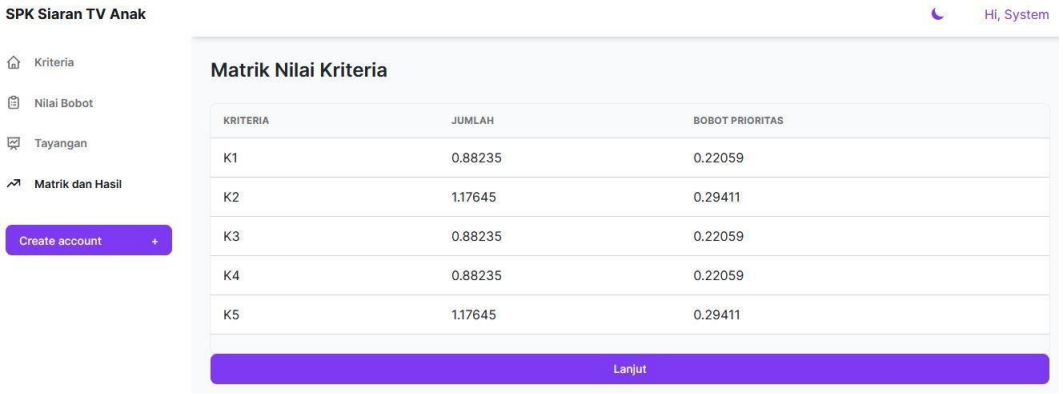

Figure 6. perception criteria matrix

3.7. AHP Analysis Results Table

For this AHP Analysis Table is a table of conclusions from all calculations made, then this analysis table appears as the final result, where we can choose and sort based on the final value, the highest value is the best value or the best show that can be watched by children, such as figure 8:

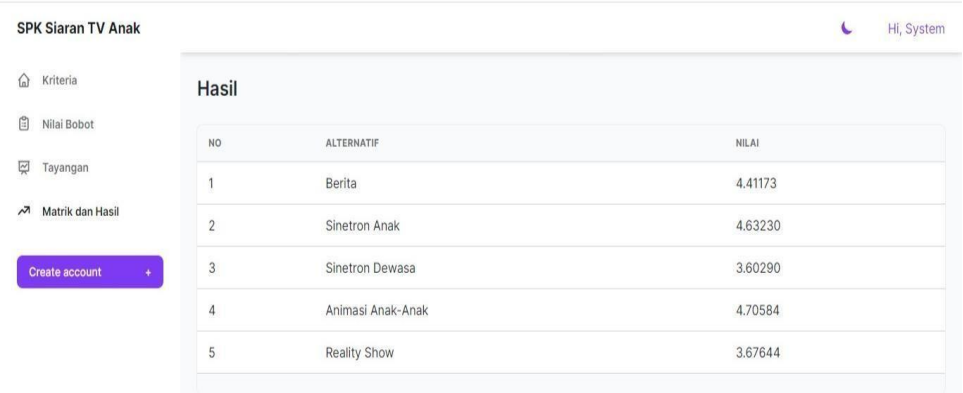

Figure 7. AHP Analysis Result (Ranking)

4. CONCLUSION

This study demonstrates the potential of using a decision support system (DSS) based on the analytical hierarchy process (AHP) method to assist parents in selecting appropriate television programs for children. The AHP allows for systematic analysis of multiple criteria, enabling informed decision-making.

The implementation results indicate the DSS can successfully determine television programs that align with defined criteria for story relevance, informativeness, educative values, social norms, and empathy. By weighting and prioritizing these criteria based on user preferences, the system ranks television programs to recommend the most suitable options.

The proposed DSS provides an effective approach for parents to evaluate children's programs against customizable criteria. It promotes active participation in children's media choices, balancing entertainment and educational values. Overall, this research highlights the benefits of harnessing DSS and AHP for value-driven decision-making on children's media consumption.

Further work could expand the criteria framework and options database to cover diverse program genres and age groups. Additional parental controls could also be incorporated for managing screen time and access. There is also scope to enhance the system's explanatory capabilities regarding the AHP computation process. Nonetheless, this study represents an important step toward purposeful integration of technology to guide children's development. The DSS methodology could be adapted for choosing other child-appropriate media and content.

REFERENCES

[1] J. Li, J. Dai, A. Issakhov, S. F. Almojil, and A. Souri, “Towards decision support systems for energy management in the smart industry and Internet of Things,” Comput Ind Eng, vol. 161, p. 107671, Nov. 2021, doi: 10.1016/j.cie.2021.107671.
[2] C. Pieper, “Television Programming and Violence,” in Encyclopedia of Violence, Peace, & Conflict, Elsevier, 2022, pp. 259–267. doi: 10.1016/B978-0-12-820195-4.00034-0.
[3] D. Hajializadeh and M. Imani, “RV-DSS: Towards a resilience and vulnerability- informed decision support system framework for interdependent infrastructure systems,” Comput Ind Eng, vol. 156, p. 107276, Jun. 2021, doi: 10.1016/j.cie.2021.107276.
[4] S. Mekouar, “Classifiers selection based on analytic hierarchy process and similarity score for spam identification,” Appl Soft Comput, vol. 113, p. 108022, Dec. 2021, doi: 10.1016/j.asoc.2021.108022.
[5] F. Kutlu Gündoğdu and C. Kahraman, “A novel spherical fuzzy analytic hierarchy process and its renewable energy application,” Soft comput, vol. 24, pp. 4607–4621, 2020.
[6] F. Wadly, “Perbandingan Metode AHP dan SMART Pada Performance Appraisal Dosen untuk Pemberian Insentif Kinerja (Studi Kasus: Universitas Pembangunan Panca Budi),” Jurnal Teknik Dan Informatika, vol. 6, no. 1, pp. 1–5, 2019.
[7] S. Batubara, “Decision Support System of Beneficiaries for Poor Students Using Weighted Product Method”.
[8] P. H. Dos Santos, S. M. Neves, D. O. Sant’Anna, C. H. De Oliveira, and H. D. Carvalho, “The analytic hierarchy process supporting decision making for sustainable development: An overview of applications,” J Clean Prod, vol. 212, pp. 119–138, 2019.

[9] D. Katarina, A. Nurrohman, and A. S. Putra, “Decision Support System For The Best Student Selection Recommendation Using Ahp (Analytic Hierarchy Process) Method,” International Journal of Educational Research and Social Sciences (IJERSC), vol. 2, no. 5, pp. 1210–1217, 2021.
[10] M. Aziz and M. Aman, “Decision support system for selection of expertise using analytical hierarchy process method,” IAIC Transactions on Sustainable Digital Innovation (ITSDI), vol. 1, no. 1, pp. 49–65, 2019.