Determining the Main Priority in the Assessment of Hollywood Horror Films by Applying the AHP and SAW Methods

Muhammad Siddik Hasibuan[1*], Muhammad Dedi Irawan[2], Dian Agus Pratama[2], Yudhistira Yudhistira[2]

[1]Department of Computer Sciens, Universitas Islam Negeri Sumatera Utara
[2,3,4]Department of Information System, Universitas Islam Negeri Sumatera Utara

A B S T R A C T

Film is one of the many modern communication media that is very effective to be used as a medium of entertainment as well as a place to convey moral messages that can influence the audience both from the aspect of attitude, point of view of thought and also insight. For this reason, the production house is required to continue to create a film of the highest quality. Because the proliferation of these types of horror films makes it difficult for viewers to determine which Hollywood horror film is the best version, this is also one of our goals in designing a web-based system. In this case study, the Analytical Hierarchy Process (AHP) and Simple Additive Weighting (SAW) methods are used to determine the best priority for each alternative assessment. The assessment procedure is based on predetermined criteria. The criteria used as assessment provisions are budget, film duration, audience rating, film rating, film awards and film revenues. The method used is to compare the AHP and SAW methods as well as the results of calculations from the system. The results of the discussion include the stages of assessment and comparison of each method used and are able to appoint the best alternative in the selection of Hollywood horror films.

Keywords:

Decision Support System, Horror Films, AHP and SAW

Corresponding Author:

Muhammad Siddik Hasibuan,
Department of Computer Sciens, Universitas Islam Negeri Sumatera Utara
Email: muhammadsiddik@uinsu.ac.id

1. INTRODUCTION

Along with its development, in the world of cinema, more and more types of films are produced or produced. There are several groupings of films based on the story, making and genre of the film itself. One of the most loved film genres today is the horror film genre.

Speaking of Hollywood horror films with the best quality, in the current era there are many horror films with the best versions, such as *Parasite* , *IT* , *Insidious* and many more. Each production house competes to create this work of art, making horror films with their creative ideas. Apart from being a source of livelihood, it is also dedicated as a *Masterpiece* . To be recognized for the film, of course, the director recommends the film to take part in various film competitions.

In fact, to determine a good quality film is not easy. Not just choose a horror film to get the best film title. Of course there are several aspects that must be considered and considered. Not a few viewers are also curious about a film that deserves to be given the status of the best Hollywood Horror film.

Talking about the competition in the world of cinema, the decision makers are not arbitrary in determining which films are dedicated as films with the best quality. There are several aspects or requirements that must be met by a film in order to be able to enter the competition. In this study, the author describes several criteria that must exist in every film, namely budget, film duration, audience rating, film rating, awards and film income.

The criteria used as provisions will be calculated using either the *Analytical Hierarchy Process model* or the *Simple Additive Weighting* model, both of which are used in this study.

From the description above, the writer concludes that there is a need for tools from the problems above in determining the best Hollywood Horror Film. Decision support system is one of the effective alternatives to determine which option is the most appropriate and best.

Based on this, the authors implement the *Analytical Hierarchy Process* (AHP) and *Simple Additive Weighting* (SAW) methods to assist in making the best decisions[1].

It is hoped that the existence of a decision support system for selecting Hollywood horror films using the AHP and SAW methods is able to make some people even some film competition events to sort out good quality films according to predetermined criteria.

Decision Support System

A decision support system (DSS) is a tool that is a computer-based system consisting of 3 interrelated elements, a language system, a knowledge system and a problem processing system[2].

A decision support system is a computer-based information system, which displays certain decision-making solutions aimed at assisting several parties in dealing with problems that are compiled from data and models. The decision support system only provides a decision solution, while the final result will still be determined by the decision maker. Decision support systems integrate individual thinking energy resources and the ability of computers to make decisions[3].

In the decision support system in this case the selection of the AHP and SAW methods is very appropriate, because basically the AHP method is designed as a determinant of the relative importance of a series of events in a multi-criteria decision selection problem. While the basic concept of the SAW method is to find the weighted sum of the calculations for each alternative. AHP is used because of the large number of criteria data from alternatives by considering the selection of decisions and minimizing the complexity of a decision by comparing one of the selected criteria. Because it is necessary to classify criteria to limit the criteria that are quite a lot, making it easier to calculate comparisons between criteria and the consistency of the criteria paired comparison matrix. Meanwhile, in the SAW method, it is known as the sum of the decision weights for each alternative. So that the end result only shows the greatest value which will be used as a top priority in determining the best Hollywood horror film[4].

Characteristics of Decision Support Systems

The characteristics of decision support systems are as follows[5]:

1. Supports decision-making to address sequential, semi-sequential and non-sequential issues.
2. Outcomes are aimed at organizational members at all levels.
3. Supports all phases of decision making.
4. The existence of a human-machine interface, where humans (*users*) still control the decision-making process.
5. Includes mathematical and statistical models that are suitable for research.
6. Have communication skills to obtain information as needed.
7. Have a structured sub-system in such a way.
8. Requires comprehensive data as information needs.
9. An effective decision support system is easy to use and the freedom to be used to choose or be able to develop new models in the problem at hand.
10. The ability of the system to adapt well, where solution makers can face new problems and at the same time can be resolved.

Decision Making Stages

The stages in decision making are as follows[6]:

1. Identify the problem
2. Choice of decision method
3. Finding the data needed to carry out the decision method
4. Implementing the decision model
5. Reassess the pros and cons of each of the listed alternatives
6. Taking solutions as top priority.

Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) is a method of analysis and synthesis that can be used to assist the decision-making process. AHP is an effective and accurate media or tool because the scale or weight has been determined previously and uses a hierarchy of 3 arrangements, namely the intent of the goal, criteria and alternatives[7].

Analytical Hierarchy Process (AHP) is a model in decision making proposed by Thomas L. Saaty. This model describes a multi-problem that is complex and organized into a unified hierarchy. By compiling a hierarchy, even a complex problem can be unraveled so that a problem will appear structured and systematic[8].

Stages of the AHP Method

In this method there are several stages to conduct an assessment, namely:

1. Define a problem and choose a solution as expected.
2. Create a hierarchical structure starting with the main goal.

3. Create and calculate a pairwise comparison matrix that describes the relative contribution or influence of each element on the goals and criteria at the level above.
4. Defines pairwise comparisons so that the total number of assessments is n * [(n-1)/2]. Where n is the number of criteria being compared.
   The pairwise comparison scale between criteria and alternatives and their meanings described by Saaty can be seen as follows.
   Interest entity:
   a. 1 means that both elements have the same value.
   b. 3 means that one element is slightly more important than the other elements.
   c. 5 means that one element is more important than the other elements.
   d. 7 means that one of the elements is clearly more absolutely important when compared to the other elements.
   e. 9 means absolutely important, if one of the elements being compared has a greater influence.
   f. 2, 4, 6, 8 means that the values of them are still under consideration because one element with another has almost the same effect.
5. Calculating the eigenvalues and testing their consistency.
6. If the test is inconsistent then repeat steps 3, 4, and 5 for all hierarchies.
7. Calculates the eigenvector values of each paired matrix.
8. The last step is to check the consistency value of the hierarchy.

***Simple Additive Weighting* (SAW)**

The SAW method or *Simple Additive Weighting* is also known as the weighted addition calculation. The main concept of the SAW method is to find the weighted sum calculation of the working rating of each alternative. This decision support system model requires the process of normalizing the decision matrix (X) into a scale that can be compared with all available alternatives.

The *Simple Addiitive Weighting method* is mostly used to deal with a situation called MADM (multiple attribute decision making). This decision-making model requires to determine the weight of each attribute. The total results for an alternative are obtained from the sum of the overall multiplication results between ratings [9].

SAW Method Stages

1. Determine the criteria that will be referred to as an assessment of decision making.
2. Rating the suitability of each alternative based on the available criteria.
3. Make a decision matrix of all criteria and then perform the matrix normalization process.
4. The final result of the ranking process is obtained from the addition and multiplication of the normalized matrix R with the weight vector. The largest value from the calculation will be designated as the top priority in the decision support system.

2. RESEARCH METHODOLOGY

Problem analysis

Analyzing a problem is carried out with the aim of obtaining detailed instructions regarding the problems in the selection of Hollywood films with the horror genre. In choosing the best option and decision makers use the criteria that have been previously set.

Identification of problems

In identifying problems, it is necessary to openly find out the needs of consumers for a decision support system that will be built in an effective assessment of the best Hollywood horror films, in accordance with applicable regulations.

System Implementation

At this stage, it is necessary to build a system to be able to produce a process that is in accordance with the design that has been designed to suit consumer needs [10]

AHP and SAW Method Research Flow

The following below is an image of the research flow using the AHP and SAW methods in selecting the main priorities for Hollywood horror films:

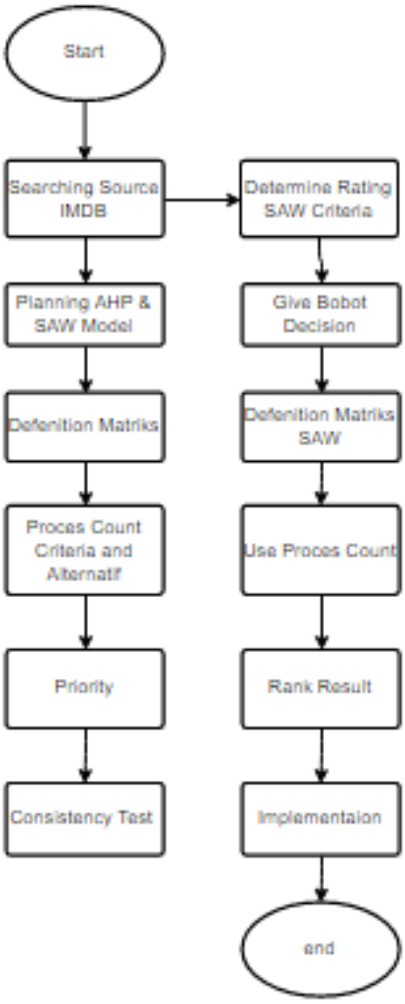

Figure 1. Structure of AHP and SAW Model Design

The design of the AHP model begins with the preparation of a hierarchy to predetermined criteria and to alternatives. In the case of the selection of Hollywood horror films, the hierarchy is arranged to make it easier for decision makers to determine the level of importance of each criterion. After that do the calculation process. In this case, the calculation presented is to create a pairwise comparison matrix and normalize it into a matrix form. Then calculate the average of each row of the comparison matrix which will produce the decision weight (W). The last step is to do a consistency test.

In the process, the SAW model begins by determining the weight of the decision for each criterion. In the case of the decision making of the best Hollywood horror films, each weight has been determined according to the provisions. Furthermore, by making a compatibility rating and then doing the calculation process with the SAW modeling. The calculation includes making comparison matrix followed by normalization of comparison matrix. The final stage is closed by calculating the ranking of each alternative.

3. RESEARCH RESULT

Output and discussion will be presented on the next page. Where the discussion contains a decision support system method using the AHP and SAW models [11].

In designing this decision-making system, the main key to a logical decision includes criteria and alternatives that lead to the specified initial goal. In the decision-making system there are several stages, namely *Intelligent* , *Modeling* , *Choice* .

1. *Intelligent* Stage

The *Intelligent stage* is the activity of collecting and compiling selection criteria and alternatives that will be used as priority materials.

2. *Modeling* Stage

The *Modeling stage* is modeling that is described with a decision structure. There are several things that need to be considered at this stage and here the author has done the modeling, namely:

a. Describe the hierarchical structure in the AHP method.
   In this decision hierarchy there are objects that will be discussed in this study, namely the goal is to select the best Hollywood horror films, then the criteria are budget, film duration, audience rating, film ratings, awards, and film revenues. And the last one is alternative (Hollywood horror film titles).
b. Determine the weight of the criteria in the AHP model and the weight of the decision criteria in the SAW.
   In the AHP model of this research, the author will explain the determination of the weight of the criteria in which each criterion will be assigned a scale value based on the level of importance. Then in the SAW model the author also describes the percent weight of the decision.
c. Create a pairwise comparison matrix.
   Each method used in this study, the author will also explain how to make a pairwise comparison matrix according to each method.

3. *Choice* stage

choice stage , each method will be calculated. If in the AHP model by multiplying the priority weight value of the voter's perception with the priority weight of each alternative film, then in the SAW model by multiplying the weight of the decision criteria multiplied by the priority value and the results are added.

AHP Process Design

1. Define Criteria Element

There are several criteria in selecting the best Hollywood horror films in accordance with the previous provisions, namely:

a. Budget (K1)
b. Movie duration (K2)
c. Audience Rating (K3)
d. Film Rating (K4)
e. Award (K5)
f. Movie revenue (K6)

2. Performing Criteria Comparison Matrix Process

Each criterion element is compared by entering the scale value previously described.

TABLE 1
Criteria Paired Comparison Matrix

Criteria	K1	K2	K3	K4	K5	K6
K1	1	1	0.2	0.33	0.2	1
K2	1	1	0.2	0.33	0.2	1
K3	5	5	1	3	1	5
K4	3	3	0.33	1	0.33	3
K5	5	5	1	3	1	5
K6	1	1	0.2	0.33	0.2	1
Amount	16	16	2.93	7.99	2.93	16

Viewed from table 1, it can be concluded that a value with a scale of 1 means that the two elements compared to each other have an equally important effect and a scale of 3 means that one of the elements has a slightly more important influence. Then a scale of 5 means that one element is more important than the other elements (Siregar et al., 2020).

TABLE 2
Pairwise Comparison Matrix Normalization Value

K1	K2	K3	K4	K5	K6	Amount
0.06	0.06	0.06	0.04	0.06	0.06	0.0609
0,06	0,06	0,06	0,04	0,06	0,06	0,0609
0,31	0,31	0,34	0,37	0,34	0,31	0,3326
0,18	0,18	0,11	0,12	0,11	0,18	0,1522
0,31	0,31	0,34	0,37	0,34	0,31	0,3326
0,06	0,06	0,06	0,04	0.06	0.06	0.0609

3. Calculating EigenVector values

To get the priority value, we first perform the process of adding each column and dividing by the number of criteria.

TABLE 3
Eigenvector Value Result Hasil

Pairwise Comparison Matrix						Average	Results
1	1	0.2	0.33	0.2	1	0.0609	0.3660
1	1	0.2	0.33	0.2	1	0.0609	0.3660
5	5	1	3	1	5	0.3326	2.0353
3	3	0.33	1	0.33	3	0.1522	0.9199
5	5	1	3	1	5	0.3326	2.0353
1	1	0.2	0.33	0.2	1	0.0609	0.3660

4. Calculating Consistency Value

In calculating the consistency value, the maximum lamda value is reduced by the number of criteria and divided by the number of criteria minus one.

$$t = \frac{1}{6}\left(\frac{0{,}3660}{0{,}0609} + \frac{0{,}3660}{0{,}0609} + \frac{2{,}0353}{0{,}3326} + \frac{0{,}9199}{0{,}1522} + \frac{2{,}0353}{0{,}3326} + \frac{0{,}3660}{0{,}0609}\right) = 6{,}0585$$

$$CI = \frac{6{,}0585 - 6}{5} = 0{,}0117$$

5. *Ratio Consistency* Calculations

The final stage of calculating the AHP method is to calculate the value of the consistency ratio, previously to carry out this process we must refer to the *random index table* which has become a provision in the AHP model. With a random value of the 6th index is 1.24. There is a note in calculating the CR that if the results of the *consistency ratio* > 0.01 then it is declared inconsistent. So if the results of the *consistency ratio* < 0.01 then it is considered consistent.

$$CR = \frac{0{,}012}{1{,}24} = 0{,}009$$

AHP Process Design Implementation

a. Admin Login Page

The page on this system displays a form that must be filled out by an admin or user. By filling in the username and password first before later accessing the system.

b. AHP System Alternative Page

Entering this page, we are emphasized to provide the system with what alternatives will be used as decision-making solutions. Admin or a user can input alternatives into the system.

Figure 2. AHP system alternative page

c. Criteria Weighted Scores Page

Giving the value of the weight scale to the criteria is done in order to know the ratio of the level of importance between the criteria. The weighting scale is given based on Saaty's terms.

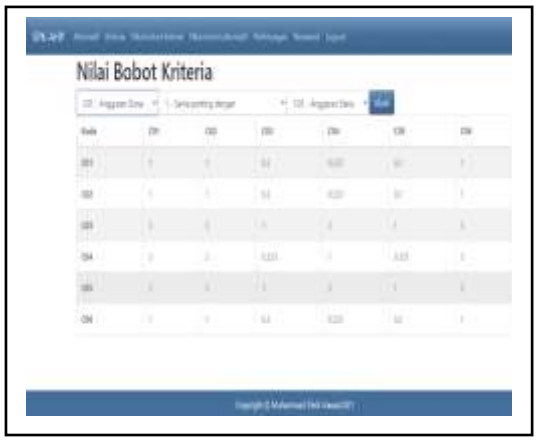

Figure 3. Criteria Weighting Page

d. Criteria Consistency Matrix

In this system page, the consistency matrix has been done automatically, previously the user has input the weight of the criteria, alternative data and calculates the normalization of the comparison matrix.

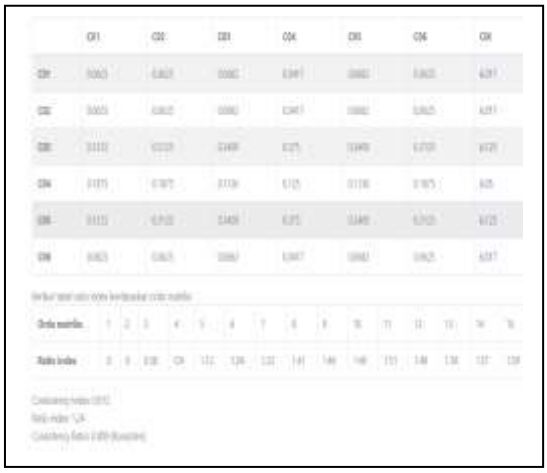

Figure 4. Criteria consistency system page

e. The final result

After determining the weight of each criterion and alternative, the next step is to multiply the weight of each criterion with the weight of each location, then add up the rows.

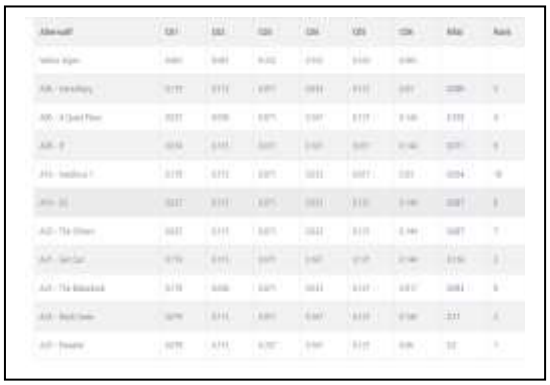

Figure 5. The final result of the calculation in the system

f. Final Result Chart

The graph is made to make it easier for the user or users to read the system ranking results.

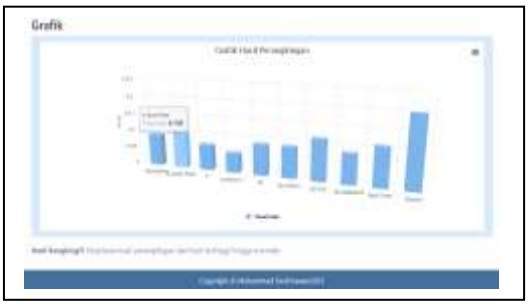

Figure 6. Final Result Graph

SAW Process Design

1. Determining the Vector Weight of each Criterion

The decision-making system has selected and determined the vector weight value for each criterion. This stage is carried out so that it becomes a consideration for taking the final results of the SAW method assessment.

TABLE 4
Vector Weight Value (W)

Criteria	Code	Criteria	Nature	W
Criterion 1	K1	Fund Budget	Cost	10%
Criterion 2	K2	Movie Duration	Benefits	10%
Criterion 3	K3	Movie Rating	Benefits	25%
Criterion 4	K4	Audience Rating	Benefits	20%
Criterion 5	K5	award	Benefits	25%
Criterion 6	K6	Income	Benefits	10%

2. List of Research Alternatives

At this stage the author describes several alternatives that will later be tested using this SAW method.

TABLE 5
Hollywood Horror Movie Alternative List

Alternative	Code	Alternative Movie
Alternative 1	A1	The Babadook
Alternative 2	A2	US
Alternative 3	A3	Parasite
Alternative 4	A4	Get Out
Alternative 5	A5	Black Swan
Alternative 6	A6	IT
Alternative 7	A7	A Quiet Place
Alternative 8	A8	Hereditary
Alternative 9	A9	The Others
Alternative 10	A10	Insidious 1

3. Criteria Weight Value

Furthermore, the factual data from the alternatives is classified according to the weight of this criterion, along with the weighting table.

TABLE 6
Criteria Weighting Value

Fund Budget ($)	Weight	Description
1 – 10 Million	5	Inexpensive
11 – 15 Million	4	Currently
16 – 20 Million	3	Expensive
21 – 30 Million	2	Quite expensive
>30 Million	1	Very expensive
Movie Duration	**Weight**	**Description**
<60 Minutes	1	Low
70 – 100 Minutes	2	Currently
110 – 150 Minutes	3	Good
160 – 180 Minutes	4	Long
>180 Minutes	5	Very long
Movie Rating	**Weight**	**Description**
< 5	1	Pretty good
5 - 8	3	Good
>8	5	Very good
Audience Rating	**Weight**	**Description**
< 5	1	Pretty good
5 - 8	3	Good
>8	5	Very good
award	**Weight**	**Description**
0	1	Not good
1 - 10	2	Not good
11 - 15	3	Pretty good
16 - 20	4	Good
>20	5	Very good
Revenue ($)	**Weight**	**Description**
<20 Million	1	Not good
30 – 50 Million	2	Not good
60 – 100 Million	3	Pretty good
110 – 200 Million	4	Good
>200 Million	5	Very good

4. Pairwise Comparison Matrix

Before performing a pairwise comparison matrix, we first list the data for each alternative and then assign a weighted value with an example of weight assessment as shown in table 6.

TABLE 7

Alternative Pairwise Comparison Matrix

Alternative	Criteria					
	K1	K2	K3	K4	K5	K6
A1	5	2	3	3	5	1
A2	3	3	3	3	5	5
A3	4	3	5	5	5	4
A4	5	2	3	5	5	5
A5	4	2	3	5	5	5
A6	1	3	3	5	2	5
A7	3	2	3	5	5	5
A8	5	3	3	3	5	3
A9	3	3	3	3	5	5
A10	5	3	3	3	2	3

5. Normalization of Alternative Pairwise Comparison Matrix Values
   After weighting each alternative attribute and forming it into a matrix, the next step is to normalize (R). Here is the formula for normalizing it:

$$r_{ij} = \frac{x_{ij}}{(x_{ij})} = jika\ j\ adalah\ atribut\ keuntungan\ (Benefit)$$

$$r_{ij} = \frac{(x_{ij})}{x_{ij}} = \ jika\ j\ adalah\ atribut\ biaya\ (cost)$$

6. Top Priority Calculation (Rank)

The final stage of designing the SAW calculation process is to map the rankings formed from the multiplication of W and R and add them up. The result with the highest score will be designated as the top priority.

$$V_i = \sum_{J=1} \quad w_j r_{ij}$$

Where :
Vi is the $_{final}$ result of the alternative ranking calculation.
Wi $_{is}$ the weight that has been determined in each criterion.
Rij is the normalized matrix value .

TABLE 9
Alternative Ranking

No	Alternative	Mark	Rank
1	Hereditary	0.52	10
2	A Quiet Place	0.55	7
3	IT	0.61	6
4	Insidious 1	0.53	9
5	The Others	0.53	8
6	The Babadook	0.67	5
7	US	0.82	4
8	Parasite	0.84	1
9	Get Out	0.83	3
10	Black Swan	0.84	2

From the results of calculations using the AHP method from beginning to end, the decision-making system states that the alternative designated as the top priority is Parasite with the highest score of 0.84.

SAW . Method System Design Implementation

a. System Admin Login Page

The page on this system displays a form that must be filled out by an admin or user. By filling in the username and password first before later accessing the system.

b. Criteria System Page

On this page, a user or admin can set the criteria that will be used as provisions in the decision-making system of a problem. It also describes the attributes of the criteria, both *costs* and *benefits* .

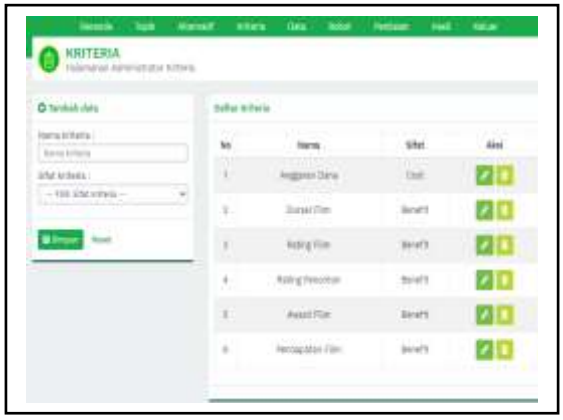

Figure 7. System display on criteria

c. Alternative Data Page

This system page is used as a place to input raw data from previously reset alternatives. This is a condition for the system to perform calculations.

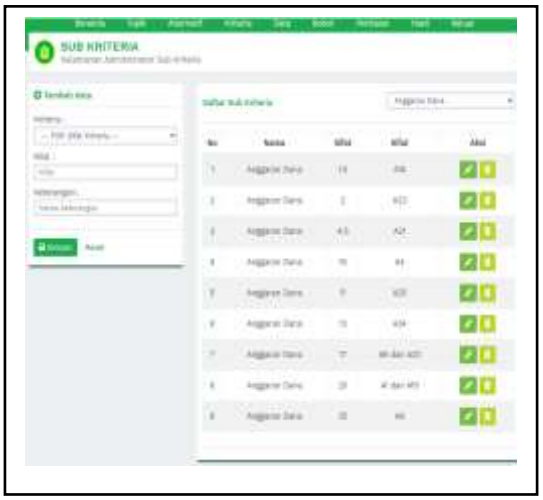

Figure 8. Alternative Data Page Display

d. Calculation Results Page

After performing input to the system consisting of alternatives, criteria, data, and weights. Then the system will automatically perform the calculation process as well as determine which alternative will be used as the main priority.

Figure 9. Display of Calculation Results Page

Figure 9. System ranking results

4. CONCLUSION

Decision support system (DSS) is a system that can solve a problem as well as expertise in communication tools for several problem conditions, both structured and unstructured.

Decision support system is a computerized-based information system, which displays certain decision-making solutions aimed at helping several parties in dealing with their problems which are compiled from data and models. The decision support system only provides a decision solution, while the final result will still be determined by the decision maker. A decision support system integrates the energy resources of an individual's thinking and the ability of a computer to make decisions

Analytical Hierarchy Process (AHP) is a model in decision making. This method emphasizes the decomposition of a problem in the form of a hierarchy. Usually this problem is complex and the *Analytical Hierarchy Process* is the best way to handle it.

The SAW method or *Simple Additive Weighting* is also known as the weighted addition calculation. The main concept of the SAW method is to find the weighted sum calculation of the working rating of each alternative. This decision support system model requires the process of normalizing the decision matrix (X) into a scale that can be compared with all available alternatives.

In the case of selecting the best Hollywood horror films using two methods of decision support system. The AHP model can describe the criteria and alternatives into a hierarchical form so that decision makers can choose the alternative to be taken in detail. While the SAW model, this model emphasizes how to work by giving a weight value for each criterion and then calculating alternative attributes with the final result getting an alternative ranking.

5. REFERENCES

[1] M. D. Irawan, "Sistem Pendukung Keputusan Menentukan Matakuliah Pilihan pada Kurikulum Berbasis KKNI Menggunakan Metode Fuzzy Sugeno," *J. n.a Infotama*, vol. 13, no. 1, Jan. 2017, doi: 10.37676/jmi.v13i1.435.

[2] S. M. Sumarno and J. M. Harahap, "SISTEM PENDUKUNG KEPUTUSAN DALAM MENENTUKAN PEMILIHAN POSISI KEPALA UNIT (KANIT) PPA DENGAN METODE WEIGHT PRODUCT," *JUST IT: Jurnal Sistem Informasi, Teknologi Informasi dan Komputer*, vol. 11, no. 1, pp. 37–44, 2020.

[3] J. Putri Lestari and D. Agushinta R, "Decision Support System to Majoring High School Student Using Simple Additive Weighting Method," *IJCTT*, vol. 10, no. 3, pp. 153–159, Apr. 2014, doi: 10.14445/22312803/IJCTT-V10P126.

[4] C. A. Josaputri, E. Sugiharti, and R. Arifudin, "Decision Support Systems for The Determination of Cattle with Superior Seeds using AHP and SAW Method," *Scientific Journal of Informatics*, vol. 3, no. 2, p. 2016.

[5] F. Nugraha, B. Surarso, and B. Noranita, "Sistem Pendukung Keputusan Evaluasi Pemilihan Pemenang Pengadaan Aset dengan Metode Simple Additive Weighting (SAW)," *J. Sistem Info. Bisnis*, vol. 2, no. 2, pp. 067–072, Jun. 2012, doi: 10.21456/vol2iss2pp067-072.

[6] N. Aminudin *et al.*, "Higher Education Selection using Simple Additive Weighting," *IJET*, vol. 7, no. 2.27, p. 211, Aug. 2018, doi: 10.14419/ijet.v7i2.27.11731.

[7] R. E. Sari, A. Meizar, D. H. Tanjung, and A. Y. Nugroho, "Decision making with AHP for selection of employee," in *2017 5th International Conference on Cyber and IT Service Management (CITSM)*, Denpasar, Bali, Indonesia, Aug. 2017, pp. 1–5. doi: 10.1109/CITSM.2017.8089285.

[8] S. H. Saragih, "PENERAPAN METODE ANALITYCAL HIERARCHY PROCESS (AHP) PADA SISTEM PENDUKUNG KEPUTUSAN PEMILIHAN LAPTOP," vol. 4, pp. 82–88, 2013.

[9] A. Mukhlasin, "PROSIDING SEMINAR NASIONAL SISFOTEK (Sistem Informasi dan Teknologi) Sistem Pendukung Keputusan Pemilihan Smartphone Menggunakan Metode Simple Additive Weighting (SAW) Berbasis Web," *Prosiding Seminar Nasional Sisfotek*, no. September, pp. 4–5, 2018.

[10] F. Nugraha, B. Surarso, and B. Noranita, "Sistem Pendukung Keputusan Evaluasi Pemilihan Pemenang Pengadaan Aset dengan Metode Simple Additive Weighting (SAW)," *Jurnal Sistem Informasi Bisnis*, vol. 2, no. 2, pp. 67–72, 2012, doi: 10.21456/vol2iss2pp067-072.

[11] Y. H. Siregar, M. D. Irawan, and A. H. A. Chaniago, "Penerapan Metode Analytical Hierarchy Process (AHP) dalam Perekrutan Petugas Keamanan," *Jurnal Informatika Universitas Pamulang*, vol. 5, no. 3, pp. 371–378, 2020.