INVOTEK

Jurnal Inovasi Vokasional dan Teknologi

http://invotek.ppj.unp.ac.id/index.php/invotek

Vol. 24, No. 3, Oct 2024

ISSN: 1411 – 3411 (p)
ISSN: 2549 – 9815 (e)

Implementation of the Borda Method for Selecting Winners in the Tahfeez Tahmeed and Prayer Competition by DPD Recital Alhidayah

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Doi: https://doi.org/10.24036/invotek.v24i3.1266

Abstract

Tahfeez, tahmeed, and prayer competitions that are routinely held by DPD Recital Alhidayah often experience obstacles in the assessment process due to the lack of a structured and computerized system, thereby reducing the efficiency and accuracy of assessment. This problem has become increasingly complex with a large number of participants and the absence of standard procedures in awarding scores. This research was conducted to develop a decision support system that can assist the judges in determining the winner of the competition objectively, efficiently, and transparently. The method used is the Borda Method, which is a rank-based decision-making method that is effective in accommodating the assessment of many judges and criteria. The system was built using the PHP programming language and MySQL database, and was designed with a quantitative approach through the processing of participant scores based on three main criteria: tajweed, fluency, and rhythm. The implementation of this system allows judges to conduct assessments digitally, where the grades given are automatically processed and ranked using the Borda Method. The results of the study show that this system can speed up the assessment process and announcement of the winner from the previous 4–5 days to instant after the input of the score is completed. This system also increases transparency, reduces subjectivity, and ensures consistency in scoring. Thus, this system becomes a relevant and applicable solution to support professionalism in religious competitions.

Keywords: Borda Method, Decision Support System, Competition Assessment, PHP, MySQL.

1. Introduction

In the era of increasingly rapid technological development, information has experienced significant progress. The development of science and technology has brought many changes, both for the present and the future. One of the important aspects of a religious organization is the information system, especially in the management of administration, worship activities, and the distribution of funds and social assistance that require structured data management. In this modern era, information systems are the main need in technology, playing a role in collecting and processing data effectively to support the smooth operation of religious organizations [1].

The application of structured information systems in religious organizations can increase efficiency in data management and decision-making. Decision support systems are the right solution in helping religious organizations manage various aspects. With this system, data can be processed automatically and accurately, reducing the risk of human error and speeding up the decision-making process. In addition, the information system also allows for a more in-depth analysis of organizational development, so that the strategies applied can be more effective in achieving the goals of objectivity and transparency in the selection of the winner of the tahfeez tahmeed and prayer competition of the DPD Recital Alhidayah.

The implementation of tahfeez, tahmeed and prayer competitions was found to be problematic in the assessment due to the large number of participants from Alhidayah members. So that it causes ineffectiveness and efficiency in calculating the scores of many participants. This caused the competition participants to have to wait for a long time for the results of the competition. In the process of calculating

Received date 17/06/2025, Revised date 12/07/2025, Accepted date 16/07/2025

the scores of the competition participants, the judges faced quite significant challenges. This is due to the large number of participants, while the assessment system is still implemented without clear and systematic technical guidance. The absence of standard procedures in the assessment process has the potential to cause inconsistencies in scoring and increase the chance of errors during the recording and recapitulation of results. This condition also affects the level of objectivity and transparency of the final assessment results, which risks lowering participants' confidence in the credibility of the competition. Therefore, a more structured and technology-based assessment system is needed to improve efficiency, accuracy, and ensure objectivity in the judging process.

A competition involving more than 50 teams and each team has 3 to 5 team members, the judging process based on various criteria can be a challenge for the judges. DPD Alhidayah is committed to ensuring that every participant receives a fair, transparent, and objective assessment. Therefore, the application of the Borda method is the right solution in optimizing the assessment process, so that the results obtained are more systematic, accurate, and reflect the overall performance of the participants as a whole. Therefore, it is hoped that the judges from DPD Alhidayah can use this system to shorten the time in calculating assessments and be more systematic and transparent.

Decision Support System (DSS) is a computer-based system designed to assist decision-makers in solving semi-structured to unstructured problems, by combining data, analytical models, and interactive user interfaces [2]. DSS is applied in various fields, such as education, student organizations, to the determination of athlete achievements, with various methods such as Profile Matching, Weighted Product, COMET, and Borda Method. The implementation of DSS has proven to be effective in increasing the efficiency of the selection process, reducing subjectivity, and accelerating the decision-making process through more systematic data processing and criterion analysis. With a multi-criteria approach applied, DSS is able to provide more objective, measurable, and accountable decision recommendations, making this system an important tool in supporting better quality decision-making [3]–[7]. On this research Borda Method applied to this study.

The Borda Method is one of the effective group decision-making methods and has been widely applied in various contexts, such as the selection of new employees, the determination of color guard members, to the performance assessment of parking attendants. This method works by combining the assessments of several decision-makers, where each alternative will obtain a score based on the rating given by each assessor. The score is then added up to determine the best alternative. The application of the bora method has been proven to be able to reduce the subjectivity of assessments, increase the transparency of the selection process, and accelerate the decision-making that was previously made. With these advantages, the Borda Method is very suitable for use in the assessment process that involves several criteria and involves several decision makers, so that the final result is more fair and objective [7]–[9].

Judging from the participants' performance, there are 3 criteria that have been determined, namely tajwid, fluency, rhythm. From the 3 criteria, it will be assessed by 3 judges simultaneously while the participants are performing. Therefore, if calculating the score without a system that has not been structured and has not been computerized, it will not be time efficient and will also reduce the objectivity of the assessment results.

The novelty of this study is the application of a decision support system with the embroidery method which is implemented in a web-based application. So, the competition committee does not need to do manual calculations. Because the calculation has been automatically calculated after the judges input all the scores from the competition participants. So that the time needed becomes shorter and the calculation process also becomes more effective, efficient and also objective.

Therefore, based on the background of the problem, this research will make a system that is computed as a tool for the judges from DPD Alhidayah.so the author raises the title "Implementation of the Borda Method for Selecting Winners in the Tahfeez Tahmeed and Prayer Competition by DPD Recital Alhidayah".

1.1 Unified Modeling Language (UML)

UML (Unified Modeling Language) is a visual modeling language used to model the structure, processes, and behavior of a software based system. UML was developed as a tool in designing object-oriented systems, where UML is able to describe the relationships between objects, process flows, and interactions between users and systems. With its intuitive graphical notation, UML is an important tool

for system developers to document, design, visualize, and communicate system concepts to all parties involved in software development [10].

1.2 MySQL

MySQL is a relational database management system (RDBMS) that is popularly used in web development. MySQL is open source, free, supports a wide range of operating systems, and is compatible with SQL commands. In addition to being easy to use, MySQL is also known to be fast, secure, and supports data access *Real-time* by many users. Thanks to these advantages, MySQL is the top choice for data-driven application developers [11].

1.3 PHP Programming Language

PHP (Hypertext Preprocessor) is a programming language script that are run on the server side (Server-side) and is designed specifically for web development. In addition to the web, PHP can also be used as a general programming language [12].

2. Method

This study aims to find out the champion of several alternatives or the most deserving participants with the best qualifications, in accordance with the initial purpose of the research. This research uses a quantitative method, and the results and procedures are in the form of calculations and results of numbers or mathematical nominals [13]. The following are the methods used in this study.

2.1 Research Stage

Figure 1 show the step by step process carried out this research, beginning with initial stages and ending with the final stages.

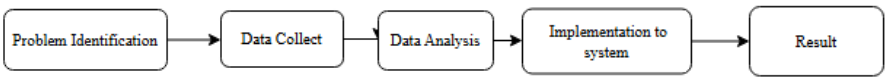

Figure 1. Research Stages

Description of Figure 1:

- Problem identification, the researcher identifies problems that occur in the competition process held by the DPD Recital Alhidayah.
- Data collect, researchers collect the data needed to get the expected research results. The techniques used in data collection are observation, interviews and collecting important documents.
- Data analysis, after the data is collected, then the researcher conducts an analysis and determines the appropriate method for the data.
- Implementation to System, after the data is processed, then a web-based application is built that is in accordance with the needs to accommodate existing data and later can be used by DPD Recital Alhidyah at the next competition event.
- The result of this research is a web-based application that can support a more effective, efficient and objective competition process

2.2 Decision Support System

Decision Support System (DSS) is a computer-based system designed to assist decision makers in solving semi-structured and unstructured problems. DSS combines data, analytical models, and an interactive user interface to present more objective, measurable, and accountable decision recommendations. DSS has proven to be effective in increasing the efficiency of the selection process, reducing the subjectivity of assessments, speeding up the decision making process, and enabling more in depth multicriteria analysis [14].

Figure 2 is some of the stages that must be done to get the best result decision. Here's an Explanation of Figure 2 [2]:

- Intelligence stage: this stage is an initial process that aims to trace and map the level of problems faced, as well as identify problems that arise. The data obtained will be processed and tested as part of efforts to support the problem identification process.

- Design stage, at this stage, the development process is carried out by looking for various alternative solutions that can be applied. This process also requires verification and validation to ensure the accuracy of the resulting model.
- Choice stage, the selection stage aims to determine the best solution from the available alternatives. The chosen solution is adjusted to the main goal to be achieved, paying attention to the criteria that have been set beforehand.
- Implementation stage, the implementation stage is the process of implementing a system that has been designed, where the system is adjusted to the results of the design and analysis that have been carried out in the previous stages

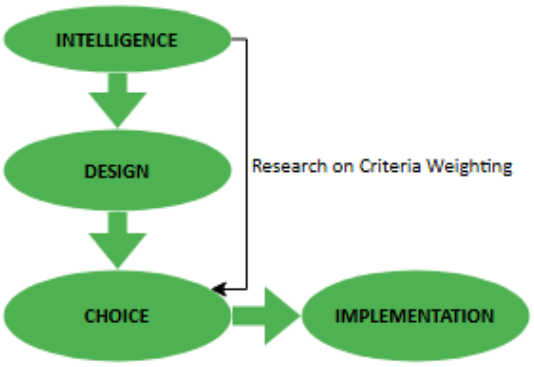

Figure 2. Phases of Decision Making Systems

2.3 Borda Method

Borda Method is one of the voting methods used to complete the decision-making process in groups. In this method, each decision maker is asked to rate all available alternatives. In the process, each voter (Vote) gives the order of choice according to their preference. The alternative that obtains the highest total points will be considered the best choice and will be used as the main consideration in decision-making [15].

$$b_i = \sum_k N - r_{ik} \quad (1)$$

Information:

b_i = Points each alternative receives
N = Number of alternatives
r_{ik} = Alternative ranking

2.4 Embroidery Calculation Stage

This research will calculate the scores given by the judges to 60 competition participants. But later the sample will only be displayed in Table 1.

2.4.1 Assessment Criteria

Table 1 is the research criteria that have been agreed upon by the competition committee and the weight of each assessment criteria.

Table 1. Assessment Criteria

Criteria Code	Criteria Name	Weight
C1	Tajweed	0.4
C2	Fluent	0.4
C3	Rhythm	0.2

2.4.2 Average Score of Each Criterion

In Table 2 is the data that has been averaged from the judges given to the competition participants.

Table 2. Average Participant Score for Each Criterion

Alternative	Name of the Participant Group	Tajweed	Fluent	Rhythm
A1	Alhikmah Islamic Learning Assembly	75	70.6	79.3
A2	Nurul Iman Group	78	83.6	66.6
A3	Ukhuwah Datuk Bandar	85.6	81.3	75.3
A4	Cahaya Ilahi	77.6	77.6	77
A5	Al-Hidayah Muslimah	85.6	75.6	73.6
….	….	….	….	….
A60	Bunda Rahmah Group	73.6	80.6	88.3

2.4.3 Borda Point Calculation

After the average of each criterion is obtained, the next step is to calculate the embroidery points of each participant. In Table 3. The process that occurs is to multiply the score of each participant in Table 2 according to the weight of the assessment criteria in Table 1. Then the results of the multiplication are added from each participant, so you can get embroidery points that can be seen in Table 3.

Table 3. Borda Point Calculation

Alternative	Name of the Participant Group	Tajweed	Fluent	Rhythm	Borda Points
A1	Alhikmah Islamic Learning Assembly	30.00	28.26	15.86	74.26
A2	Nurul Iman Group	31.20	33.46	13.30	78.00
A3	Ukhuwah Datuk Bandar	34.26	32.53	15.06	81.86
A4	Cahaya Ilahi	31.06	31.06	15.40	77.53
A5	Al-Hidayah Muslimah	34.26	30.26	14.73	79.26
….	….	….	….	….	
A60	Bunda Rahmah Group	29.46	32.26	17.60	78.93
	Total Value				4736.60

2.4.4 Calculating the Value of the Embroidery

After getting embroidery points from each participant and also the total number of embroidery points. So, the next step is to find the embroidery value whose results can be seen in Table 4. In Table 4, the process that occurs is the embroidery points of each participant in Table 3, divided by the total number of embroidery points in Table 3. So the embroidery score is obtained from each participant of the competition.

Table 4. Borda Value

Alternative	Alternative Names	Borda Value
A1	Alhikmah Islamic Learning Assembly	0.015318
A2	Nurul Iman Group	0.016117
A3	Ukhuwah Datuk Bandar	0.016915
A4	Cahaya Ilahi	0.016020
A5	Al-Hidayah Muslimah	0.016378
…..	…..	….
A60	Bunda Rahmah Group	0.016406

2.4.5 Ranking of Competition Participants

After the embroidery points and also embroidery scores are obtained, the last step is to compile the ranking or ranking of participants from 1-60. Table 5 show Borda Calculation Results.

Table 5. Borda Calculation Results

Alternative	Alternative Names	Borda Points	Borda Value	Rank
A34	Muslimah An-Najwa	84.40	0.0178187	1
A52	Al-Firdaus	83.46	0.0176216	2
A9	Al-Mu'minah	83.46	0.0176216	3
A54	As-Sakinah	83.33	0.0175935	4
A8	Baitussalam Islamic Learning Assembly	83.26	0.0175794	5
A43	Asy-Syifa	83.13	0.0175513	6
A17	Baiturrahman Group	83.00	0.0175231	7
A42	Darul Qur'an Group	83.00	0.0175231	8
A55	Cahaya Mukminah	82.53	0.0174246	9
A23	Al-Khairat	82.40	0.0173964	10
….	….	….	….	….
A36	Cahaya Al-Muttaqin	69.73	0.0147222	60

Based on Table 5, after compiling from the highest to the lowest embroidery value, Muslimah An-Najwa participants with an embroidery value of 0.0171817 were obtained 1st place, 2nd place Al-Firdaus with embroidery value 0.0176216 and 3rd place Al-Mu'Minah with a embroidery value of 0.0176216. To see the comparison of embroidery values in the form of a graph, see Figure 3.

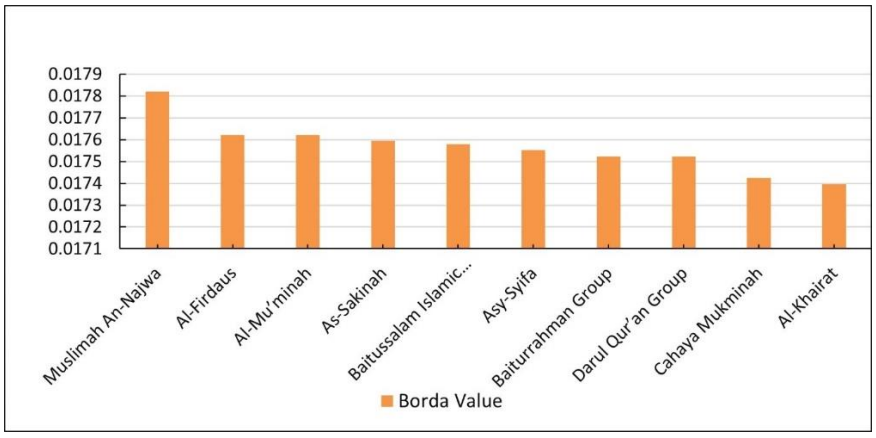

Figure 3. Ranking Chart

3. Results and Discussion

3.1 Results

3.1.1 System Login View

The system is designed using a web-based platform. Figure 4 below shows an initial view of the system that has been developed, which shows the login page as the first step to accessing the system.

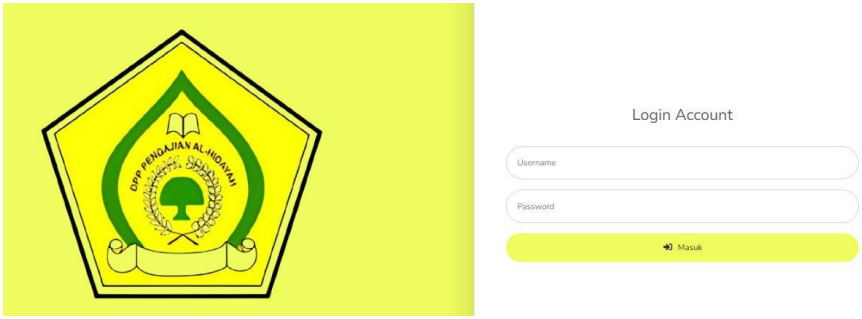

Figure 4. Login Page View

P-ISSN: 1411-3414
E-ISSN: 2549-9815

After successfully logging in, users will be redirected to the system dashboard page. The dashboard displays various features, such as alternatives, criteria, sub-criteria, assessments, calculations, and the best results of the competition. This competition was carried out based on the result data given by the judges to all participants. An illustration of the dashboard can be seen in Figure 5 below:

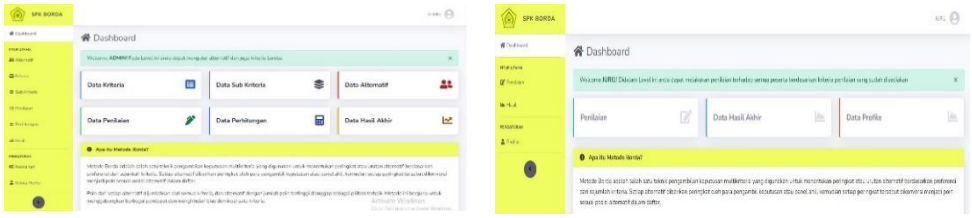

Figure 5. The Various Dashboard Page Views from Users: a) Admin Dashboard Page, b) Judges Dashboard Page

3.1.2 Judges Rating Page

The assessment page is a section that focuses on testing the results of the competition assessment using the embroidery method. Figure 6 shows 3 input columns of the assessment: the first column of C1 tajweed, the second column of C2 fluent, the third column of C3 rhythm. For the judges to give a score to each participant after performing a performance. The judges can input the corresponding value in the column that has been provided and then click the save button. The view of the assessment page can be seen in Figure 6.

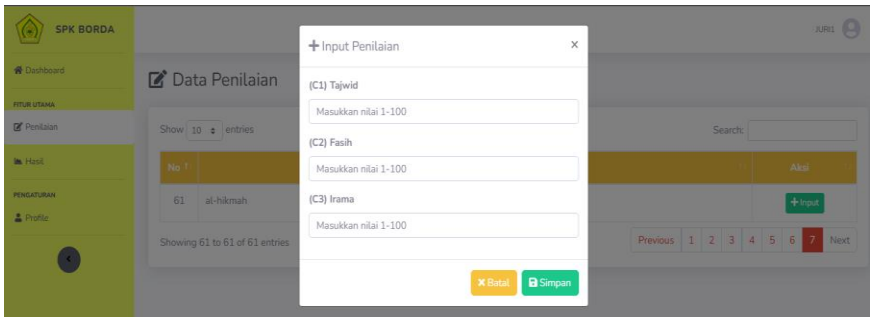

Figure 6. Rating Page View

3.1.3 Results Page

Results to see the winner of the competition. After the judges input the scores of all participants, then the admin in this case is part of the competition committee looking at the final results page to see the winner of the competition. The view of the final results page can be seen in Figure 7.

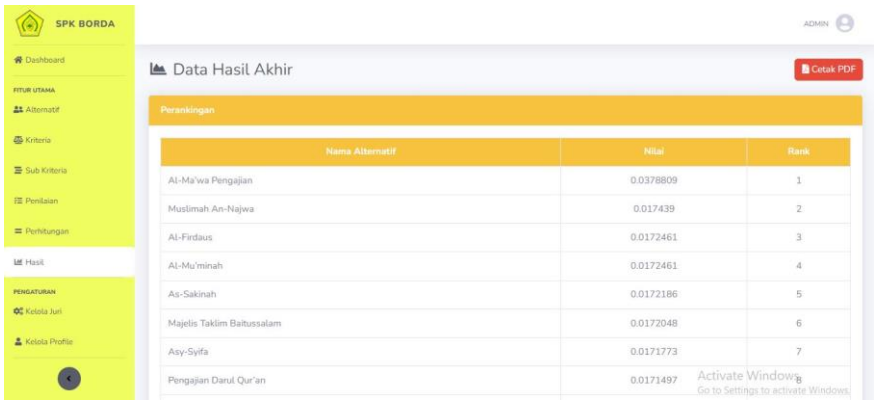

Figure 7. Results Page view

3.1.4 Print Results Page

The data displayed in the print of the competition results is in the form of a table called the competition results detail page. An admin can print a report on the results of the competition and then

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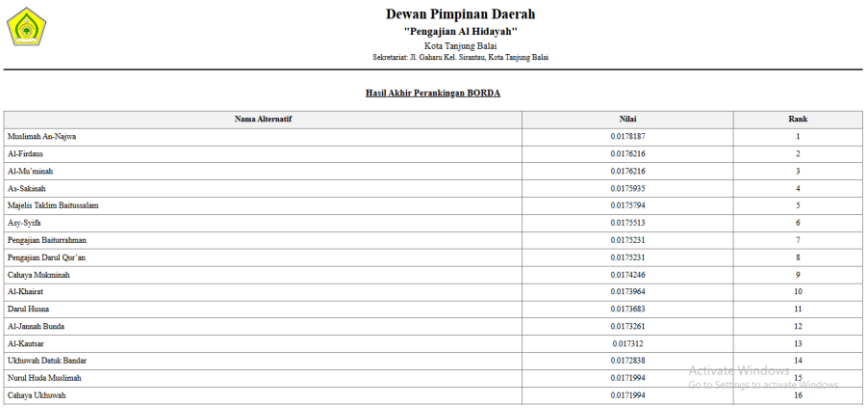
E-ISSN: 2549-9815

the results of the report are given to the chairman of the committee to be announced to all participants. Figure 8 show print results page view.



Dewan Pimpinan Daerah
"Pengajian Al Hidayah"
Kota Tanjung Balai
Sekretariat: Jl. Gaharu Kel. Sirantau, Kota Tanjung Balai

Hasil Akhir Perankingan BORDA

Nama Alternatif	Nilai	Rank
Muslimah An-Najwa	0.0178187	1
Al-Firdaus	0.0176216	2
Al-Mu'minah	0.0176216	3
As-Sakinah	0.0175935	4
Majelis Taklim Baitussalam	0.0175794	5
Asy-Syifa	0.0175513	6
Pengajian Baiturrahman	0.0175231	7
Pengajian Darul Qur'an	0.0175231	8
Cahaya Muktminah	0.0174246	9
Al-Khairat	0.0173964	10
Darul Husna	0.0173683	11
Al-Jannah Bunda	0.0173261	12
Al-Kautsar	0.017312	13
Ukhuwah Datuk Bandar	0.0172838	14
Nurul Huda Muslimah	0.0171994	15
Cahaya Ukhuwah	0.0171994	16

Figure 8. Print Results Page View

3.2 Discussion

This web-based application testing is carried out using the Blackbox Testing approach, which focuses on examining the functions of the application from the user side, without paying attention to the program code behind it. The main goal is to make sure the app delivers the correct output and all the features run as expected. Here's testing using Blackbox Testing [16].

The results obtained from the login page test in Figure 4 for users worked well as expected. In Table 6, the test carried out is that the appropriate data input in the database will successfully enter the system. If the data is incorrect, a message will appear and re-enter the username and password data.

Table 6. Login Page Test Results

Input Data	Expected Process	Observation	Conclusion
	True Data		
Username and Password inputs according to those in the database	Successfully enter the system	The expected process is appropriate	Work
	Wrong Data		
Username and Password inputs do not match in the database.	A notification appears to repeat the Wrong Username and Password.	The expected process is appropriate	Work

The next test is, testing the dashboard page of the users. On the dashboard page Figure 5a will be tested on all existing menus, carried out one by one whether they can be crossed or not. The results of the test can be seen in Table 7.

Table 7. Admin Dashboard Page Test Results

Input Data	Expected Process	Observation	Conclusion
Alternate Menu	Successfully Display All Alternatives that have been input and can access alternative CRUD	The expected process is appropriate	Work
The Criteria Menu	Successfully display all criteria that have been entered and can access CRUD criteria	The expected process is appropriate	Work
The Assessment Menu	Successfully Display all participant scores that have been input by the judges	The expected process is appropriate	Work

The Calculation Menu	Successfully displayed the value calculation process that had been input by the jury	The expected process is appropriate	Work
Result Menu	Successfully display the results of the calculation and also the ranking of the competition participants	The expected process is appropriate	Work

The same test was also done on the Figure 5b judges' dashbord page to see if it went as expected or not. In Table 8, the test was carried out on all menus on the judges' dashboard page and confirmed whether the participant value input menu was running or not. Here are the test results of the judges' dashboard page

Table 8. Results of the Judging Dashborad Page

Input Data	Expected Process	Observation	Conclusion
The Assessment Menu	Successfully display all alternatives or participants that have been input by the admin and can input the value	The expected process is appropriate	Work
Result Menu	Successfully display the results of the calculation and also the ranking of the competition participants	The expected process is appropriate	Work

4. Conclusion

This research has succeeded in achieving the goal that has been set, namely developing a decision support system based on the Borda method to support the assessment process in the Tahfeez, Tahmeed, and Prayer competitions organized by DPD Recital Alhidayah. This system has been proven to increase effectiveness, efficiency, and objectivity in the assessment of competition participants. With automatic calculation of scores, this system is able to reduce the potential for manual errors, speed up the recapitulation process of results, and increase transparency and accountability in the selection of winners. Although this system has been proven to be effective in the context of the competitions studied, its use is still limited to the scope of the DPD Recital Alhidayah. Therefore, for wider application, it is necessary to carry out further development so that the system can be adjusted to the characteristics of other competitions that have different criteria and assessment mechanisms.

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