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Development of a Digital Model for an Android-Based Pencak Silat Match Scoring Application

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ABSTRACT

This study aims to develop a digital model of an Android-based pencak silat match scoring application and to test its feasibility and effectiveness in improving the speed and accuracy of judges' assessments in South Sulawesi. This study uses a research and development method. The subjects included material experts, media experts, and pencak silat judges as application users. Data collection techniques were carried out through needs analysis, expert validation, usability assessment questionnaires, and pretests and posttests to measure the speed and accuracy of the scoring application in small-scale and large-scale trials. Data analysis was conducted descriptively quantitatively by comparing the results before and after use of the application. The results showed that the digital model of the Android-based scoring application was declared very feasible based on expert and user assessments. The results of the small-scale and large-scale trials showed that the application had levels of usefulness, ease of use, ease of learning, and satisfaction that were in the very good category. In addition, the pretest and posttest results showed a significant increase in the speed of the scoring application and a decrease in the rate of judges' assessment errors after using the application. The digital model of the Android-based pencak silat match scoring application was proven to be feasible and effective in improving the speed and accuracy of match assessments.

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INTRODUCTION

Sport is a term derived from two words: "olah," meaning the process of training oneself or a group to become skilled and competent, and "raga," meaning body (Arga & Fitri, 2025). Thus, sport can be understood as a form of education aimed at training individuals and groups to optimize body function through regular and planned movement activities (Arga, 2025).

In Indonesia, the scope of sport is clearly regulated in Law of the Republic of Indonesia Number 3 of 2005 concerning the National Sports System. Article 17 explains that the scope of sport includes educational sports, recreational sports, and competitive sports. Furthermore, Article 19 paragraph (3) states that recreational sport aims to

improve physical fitness, health, and a sense of joy, as well as build social relationships while preserving and empowering regional and national cultural heritage (Suwardi & Badaru, 2021). Sport is universal because it can be practiced by all levels of society regardless of religion, ethnicity, race, gender, education level, or economic status. It is undeniable that sports have made a significant contribution to human happiness, as this physical activity can bring pleasure and satisfaction to those involved (Sahabuddin, 2019; Sahabuddin et al., 2021).

Continuous development of high-performance sports is carried out by various parties, both sports organizations and the government. Therefore, the development of each sport needs to be systematically directed to improve athlete performance so that they can bring honor to the nation (Yasriuddin et al., 2023). One sport with significant potential is pencak silat. Pencak silat is a martial art that pits two athletes from opposite sides against each other, employing offensive and defensive techniques, such as parrying, dodging, attacking legitimate targets, and taking down opponents through strategy and technique. Pencak silat matches generally consist of several rounds of a specific duration, for example, three rounds of two minutes each for youth and adult categories, with a rest period between rounds. Movements in pencak silat require a combination of speed, explosive power, and high intensity, supported by physical, technical, tactical, and mental aspects to achieve victory (Prasetio & Reva Apriana Sanga Dwi, 2020; Rosmawati et al., 2019).

In pencak silat, the most dominant attacking technique is the kick. Kicks come in various variations, such as front, side, crescent, and back kicks. The effectiveness of kicking techniques depends heavily on good coordination between the footwork, hands, and overall body position. Scoring in pencak silat matches is based on points earned from well-targeted attacks that comply with the rules. Victory can be determined by point accumulation, absolute technical victory, disqualification, or other conditions that occur during the match (Mega et al., 2019).

With the rapid development of pencak silat, real contributions are needed to improve the quality of coaching. This includes designing new, superior training models oriented toward developing the athlete's technique, strategy or tactics, physical condition, and mental state. With this approach, any emerging issues can be addressed sustainably through a process of evaluation and development across all supporting sectors, while simultaneously seeking more efficient and effective training methods and techniques to produce high-potential athletes and high-achieving teams (Kusuma et al., 2021).

Pencak Silat athletes' technical mastery is highly dependent on mastery of basic techniques from the beginning, making this aspect a crucial factor for athletes. One of the main problems in pencak silat is the low quality of technical skills in scoring applications, particularly in manual scoring systems. Technical assessments given by judges tend to be subjective because they are only known internally, potentially leading to bias in favor of one athlete. Therefore, mastery of scoring techniques in pencak silat competitions requires serious attention as part of efforts to improve the quality and objectivity of assessments (Hudain et al., 2024).

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In today's era, the development of science and technology (IPTEK) is inseparable from everyday life, including in the field of sports. The use of technology allows various activities to be carried out more easily, quickly, and accurately. Based on this, researchers plan to develop an Android-based e-learning product for the sport of pencak silat. This application is expected to assist judges in scoring more accurately and efficiently, thus positively impacting the quality and development of pencak silat competitions, particularly in South Sulawesi (Mustafa & Alatas, 2023; Suyudi et al., 2020).

Based on initial observations, the researchers focused their study on the scoring application technique. Survey results indicated that pencak silat judges still experience difficulties in scoring during matches. This difficulty is caused by overly complex features and numerous unnecessary options, leading to confusion and delays in scoring. The naming of the developed model aims to provide identity and distinctiveness to the product. Therefore, it is necessary to develop a scoring application with a different approach, namely a digital model of an Android-based scoring application for pencak silat competitions.

This Android-based digital model of the scoring application is designed to improve the technical capabilities of pencak silat judges in South Sulawesi. Prior to product development, a needs analysis was conducted to ensure scientifically sound results. The results of the analysis showed that 100% of the judges stated that there was no digital model of the Android-based pencak silat scoring application technique, 75% of the judges experienced difficulties in using the scoring application, and 100% of the judges stated that they needed the application. Based on these findings, the researcher was interested in conducting a study entitled "Development of a Digital Model of the Android-Based Pencak Silat Match Scoring Application."

METHODS

This research employed a research and development (R&D) approach to produce a digital model for an Android-based pencak silat competition scoring application and to test its feasibility and usability in assisting judges in scoring. This research design was deemed appropriate for addressing the research problem, namely the need for a more effective, efficient, and objective scoring system in pencak silat competitions.

The development model used was the ADDIE model, which encompasses five stages: analysis, design, development, implementation, and evaluation. This model was selected based on its systematic, flexible, and easily replicable development process. In the analysis phase, researchers conducted a needs analysis through field observations and distributed questionnaires to pencak silat judges to identify issues with the scoring application techniques currently used. The design phase involved developing an initial application design, including the user interface, user interface, and key features required by judges during matches. The development phase involved creating an Android-based scoring application according to the established design. Next, in the implementation phase, the application was tested on a limited basis with pencak silat judges. The final

phase, evaluation, was conducted to assess the application's feasibility and effectiveness based on the test results and user feedback.

The subjects of this study were 20 pencak silat judges in South Sulawesi Province, as well as trainers and validators who were subject matter experts, media experts, and product experts. Total sampling was used as the sampling technique, as the number of judges involved was relatively limited and all relevant to the research objectives. This technique was deemed appropriate for obtaining a comprehensive picture of needs and problems. Based on the needs analysis, all judges stated that a digital model for an Android-based scoring application was not yet available and that they needed one to assist in the match scoring process.

Data collection techniques included observation, questionnaires, and documentation. Observations were used to directly observe the manual scoring process for pencak silat matches. Questionnaires were used to collect data on needs, the judges' level of difficulty in using the scoring application, and the judges' responses to the product being developed. The questionnaire was structured as a closed-ended statement using a rating scale that was easy for respondents to understand. Documentation was used to corroborate the research data, such as data on the number of judges, the trial implementation, and screenshots of application usage.

The research instrument was developed based on indicators of the need for a scoring application technique in pencak silat competitions. Before use, the instrument was validated by experts to ensure appropriateness of content, clarity of language, and accuracy of indicators. The equipment and materials used in this research included an Android-based smartphone, the developed scoring application, and supporting devices such as a laptop for data processing.

The data collected consisted of both quantitative and qualitative data. Quantitative data were obtained from the needs questionnaire and the application's feasibility assessment, while qualitative data were obtained from the judges' suggestions and input during the trial phase. The collected data were deemed to accurately reflect the level of need, ease of use, and effectiveness of the application in assisting the scoring process.

Data analysis techniques used were descriptive quantitative and qualitative. Quantitative data were analyzed by calculating percentages to illustrate the level of need and the judges' response to the developed application. Qualitative data were analyzed by summarizing, categorizing, and interpreting respondent input and suggestions as a basis for product improvements. The results of the analysis were used to draw conclusions regarding the feasibility and benefits of a digital model for an Android-based pencak silat match scoring application.

RESULTS AND DISCUSSION

Result

The questionnaire given to subject matter experts consisted of an assessment containing score data on a scale of 1-2. The assessment sheet also included suggestions

and criticisms, which served as input for researchers to revise the developed product. The following is a table showing the conversion of the aspects assessed:

Table 1.
Conversion of Expert Assessment Aspects of Material

Category Guide	Score
Visible Aspect	Fulfills 8
Interesting Aspect	Fulfills 8
Simple Aspect	Fulfills 8
Useful Aspect	Fulfills 6
Accurate Aspect	Fulfills 8
Legitimate Aspect	Fulfills 6
Structured Aspect	Fulfills 6
Total Score	**50**

Based on the results of the material expert assessment presented in Table 1, the digital model of the Android-based pencak silat match scoring application received a total score of 50, indicating that the developed product met most of the eligibility criteria in terms of both material substance and assessment functionality.

For the "visible" aspect, the application was rated "satisfactory" with a score of 8. This indicates that the application's visual appearance is clear, easy to read, and supports the scoring process during matches. A good appearance is crucial because pencak silat judges require speed and accuracy in scoring, as identified in the needs analysis phase of the research paper.

The "interesting" aspect also received a score of 8, categorized as "satisfactory." This assessment indicates that the application is sufficiently attractive to users, both in terms of interface design and feature presentation. This appeal has the potential to increase judges' interest and comfort in using the application during matches.

Furthermore, the "simple" aspect received a score of 8, categorized as "satisfactory." This result indicates that the application is designed with a simple and unambiguous user interface. This finding aligns with the application's development objective, which was to address the problem of the previous scoring system, which had an overly complex feature display and made it difficult for judges to record scores. For the usefulness aspect, the application received a score of 6, categorized as satisfactory. This indicates that the application is generally useful in assisting judges in scoring, although there are still several areas that could be improved to optimize the application's functionality for pencak silat competitions.

The accuracy aspect received a score of 8, categorized as satisfactory, meaning the material and scoring system implemented in the application comply with pencak silat judging rules and regulations. This aspect is crucial considering that one of the main goals of developing the application is to improve objectivity and accuracy in judges' decision-making.

For the legitimacy aspect, the application received a score of 6, categorized as satisfactory. This assessment indicates that the application is substantially suitable for use, but still requires improvement, particularly regarding compliance with official regulations or more widely applicable pencak silat competition standards.

Finally, the structured aspect also received a score of 6, categorized as satisfactory. This indicates that the material presentation structure and scoring flow in the application are sufficiently systematic, although there is still room for development to make the application more integrated and consistent.

These findings support the research objective, which is to provide a more effective, simple, and accurate digital solution to assist pencak silat judges in scoring during matches.

Table 2.
Conversion of Media Expert Assessment Results

Category Guide	Score
Visible Aspect	Fulfills 12
Interesting Aspect	Fulfills 8
Simple Aspect	Fulfills 6
Useful Aspect	Fulfills 6
Accurate Aspect	Fulfills 6
Legitimate Aspect	Fulfills 6
Structured Aspect	Fulfills 6
Total Score	**50**

Based on the media expert assessment results presented in Table 2, the digital model of the Android-based pencak silat match scoring application received a total score of 50, indicating that the application met the eligibility criteria in terms of media and overall system appearance.

In the "visible" aspect, the application received the highest score of 12, categorized as "satisfactory." This indicates that the application's visual appearance, including the clarity of icons, text, colors, and interface layout, was deemed excellent and facilitated judges' ease of scoring during matches. This visual clarity is a crucial factor considering that the scoring process demands accuracy and speed in dynamic match conditions.

In the "interesting" aspect, the "satisfactory" aspect received a score of 8, indicating that the application has a fairly good level of appeal in terms of interface design and feature presentation, thus increasing judges' interest and comfort in continued use.

In the "simple" aspect, the application received a score of 6, categorized as "satisfactory." This assessment indicates that the application has been generally designed with a simple and easy-to-understand user interface. However, there is still room for further simplification to make the application faster and more intuitive to use, especially during matches.

Furthermore, the usefulness aspect received a score of 6 and was categorized as satisfactory. This indicates that the application was deemed useful in assisting judges in digital scoring, in line with the primary objective of the study, which was to replace the manual scoring system, which was deemed inefficient.

In the accuracy aspect, the application also received a score of 6, categorized as satisfactory. This assessment indicates that the developed system is capable of displaying and processing scoring data accurately according to judges' input, although it still has room for improvement to be more accurate and responsive under various match conditions.

The legitimate aspect received a score of 6 and was categorized as satisfactory, meaning the application generally complies with the rules for using digital media in pencak silat competitions. However, this aspect still requires strengthening, particularly regarding alignment with official standards or applicable regulations.

Finally, the structured aspect received a score of 6, categorized as satisfactory. This result indicates that the menu structure, navigation flow, and operating system of the application are structured quite systematically, although there is still room for development to make the user interface more integrated and consistent.

The media expert assessment results indicate that the digital model of the Android-based pencak silat match scoring application is deemed suitable for use from a media perspective, with several improvements noted in terms of simplicity, accuracy,

and application structure. These findings strengthen the results of the material expert's assessment and support the product's suitability for use in the next trial stage.

Table 3.
Results and Analysis of Small-Scale Trials

No	Aspects Assessed	Category	Score
1	Usefulness Aspect	Good	36.08.00
2	Ease of Use Aspect	Very Good	51.02.00
3	Ease of Learning Aspect	Very Good	21.08
4	Satisfaction Aspect	Very Good	33.09.00
Total Score			**143.07.00**
Ideal Maximum Score			**143.89**

Based on Table 3, the results of the small-scale trial indicate that the developed product has a very high level of feasibility. For the usefulness aspect, the product received a Good rating with a score of 36.08, indicating that the product provided real and relevant benefits to users in supporting the learning process. Although not yet in the Very Good category, this score still indicates that the product's main functions were functioning optimally.

Furthermore, the ease of use aspect received a Very Good rating with a score of 51.02. This result confirms that the product is easy for users to use without experiencing significant technical difficulties. Ease of use is an important indicator of product acceptance, particularly in a learning context, as it can minimize barriers and increase implementation effectiveness.

For the ease of learning aspect, the product also received a Very Good rating with a score of 21.08. This indicates that users can quickly understand how to use the product without requiring a long adaptation period. The ease of learning to use the product is an added value that supports the product's continued use in learning environments.

Meanwhile, the satisfaction aspect received a Very Good rating with a score of 33.09, indicating that users are satisfied with the product's quality, appearance, and overall user experience. A high level of satisfaction indicates that the product has met user expectations.

The total score of 143.07 out of an ideal maximum score of 143.89 indicates that the product is highly suitable for use and can proceed to large-scale trials or broader implementation with minor improvements if necessary.

Table 4.
Results and Analysis of Large-Scale Trials

No	Aspects Assessed	Category	Score
1	Usefulness Aspect	Excellent	39.92
2	Ease of Use Aspect	Excellent	61.18.00
3	Ease of Learning Aspect	Excellent	0,93541667
4	Satisfaction Aspect	Excellent	36.12.00
Total Score			**159.09.00**
Ideal Maximum Score			**159.09.00**

Based on Table 4, the results of the large-scale trial indicate that the developed product received a Very Good rating across all assessment aspects, indicating a very high level of product acceptance and feasibility. For the usefulness aspect, the product

received a score of 39.92, categorized as Very Good, indicating that the product is highly beneficial and optimally supports user needs in a learning context.

Furthermore, the ease of use aspect received a score of 61.18, categorized as Very Good. These results indicate that the product is very easy to use by users on a wider scale. This ease of use reflects that the interface design and user flow are aligned with user characteristics, thus preventing technical obstacles during implementation.

For the ease of learning aspect, the product received a score of 0.9354, categorized as Very Good. This score confirms that users can quickly understand how to use the product without requiring intensive guidance. Ease of learning is an important indicator that the product is user-friendly and adaptable to various user backgrounds.

Meanwhile, the satisfaction aspect received a score of 36.12, categorized as Very Good. This indicates that users are highly satisfied with the product's quality, both in terms of function, appearance, and overall user experience. The high level of user satisfaction reflects that the product has met or even exceeded user expectations during the large-scale testing phase.

The total score of 159.09, which is equal to the ideal maximum score of 159.09, indicates that the product falls into the very feasible category with no need for substantial revision. Therefore, the product can be recommended for widespread use and is ready for implementation in real-world learning situations.

Table 5.
Differences in Small-Scale Speed Scoring Test Results (in seconds) Before Using the Application (Pretest) and After Using the Application (Posttest)

No	Pretest	Posttest
1	185	95
2	192	88
3	178	92
4	195	90
5	188	85
6	182	94
7	198	96
8	175	87
9	190	91
10	186	89
11	193	93
12	180	86
13	187	90
14	191	92
15	184	88

Based on Table 5, there is a clear difference between the pretest and posttest results in the scoring speed test after using the application. In the pretest, the time required for participants to complete the scoring of one match (3 rounds) ranged from 175 to 198 seconds, indicating that the scoring process still required a relatively long time. This reflects the limited efficiency of the scoring process before using the developed application.

After using the application, the posttest results showed a significant decrease in time, with a range of 85 to 96 seconds. This decrease indicates that the application was

able to consistently speed up the scoring process across all participants. Nearly all subjects experienced a reduction in time of more than half compared to the initial condition, indicating a significant increase in work efficiency.

The time difference between the pretest and posttest indicates that the use of the application has a positive impact on the speed and effectiveness of match scoring. The application helps minimize manual processes, reduces the potential for recording errors, and accelerates decision-making during matches. This is especially important in the context of sporting events that demand both accuracy and speed. Thus, the results of this small-scale trial demonstrate that the developed application is effective in increasing match scoring speed, making it worthy of further large-scale trials or broader implementation. These findings also reinforce the idea that utilizing app-based technology can be an innovative solution to support the performance of referees and scorekeepers more efficiently and professionally.

Table 6.
Differences in Large-Scale Scoring Accuracy Test Results (Error Rate) Before Using the Application (Pretest) and After Using the Application (Posttest)

No	Pretest	Posttest
1	8	1
2	9	2
3	7	1
4	10	2
5	8	1
6	9	2
7	7	1
8	11	3
9	8	2
10	9	1
11	7	2
12	10	2
13	8	1
14	9	2
15	8	1
16	10	2
17	7	1
18	9	2
19	8	1
20	10	3
21	9	2
22	7	1
23	8	2
24	9	1
25	8	2

Based on Table 6, the results of the large-scale trial show a very significant reduction in the scoring error rate between the pretest and posttest conditions. In the pretest phase, the number of input errors in a single simulated match ranged from 7 to 11, indicating that the manual scoring process, or the process without the application, still has a significant potential for error.

After using the application, the posttest results showed a drastic reduction in errors, with the number of errors falling between 1 and 3. This reduction occurred

consistently across all trial participants, indicating that the application is able to assist users in recording scores with a higher level of accuracy and a lower risk of error.

The striking difference between the pretest and posttest results indicates that the developed application is highly effective in improving match scoring accuracy. The features within the application are believed to minimize input errors, such as incorrect score recording, input delays, and errors in determining match results.

Thus, the results of this large-scale trial demonstrate that the use of the application not only increases scoring speed but also significantly improves the accuracy and reliability of the match scoring process. These findings reinforce that the application is worthy of widespread implementation as an efficient, accurate, and professional scoring tool in organizing sports matches.

Discussion

The research results in Tables 1 and 6 indicate that the developed scoring application has a very high level of feasibility and effectiveness in supporting the match scorekeeping process. In general, the findings of this study demonstrate that the use of digital technology can significantly contribute to improving the performance of referees or scoring officials, both in terms of usability, ease of use, and accuracy of recording results.

Based on the validation test results in Tables 1 and 2, the application received a very good rating from the experts. High content and construct validity indicate that the application's features align with user needs and the context of actual matches. This aligns with Sugiyono's (2021) opinion, which states that expert validation is a crucial stage in development research and development to ensure product suitability before field testing.

The product's feasibility aspect is also reinforced by the results of the small-scale trial in Table 3. All usability aspects—usefulness, ease of use, ease of learning, and satisfaction—ranked in the good to very good category. These findings indicate that the application not only functions well but is also positively received by initial users. According to Nielsen (2012), a high level of usability is a key indicator of an application's success in real-world use.

Specifically, the usability aspect in small-scale trials demonstrated that the application was deemed capable of providing tangible benefits in speeding up and simplifying the match scoring process. This indicates that the application successfully addressed key issues frequently encountered in manual scoring, such as delays in recording and inconsistent results. A similar study by Pratama et al. (2022) also found that a digital scoring application was able to improve the effectiveness of match officials.

The ease of use and ease of learning aspects, which were categorized as "very good," indicate that the application has a simple and easy-to-understand interface. Users do not need a long adaptation period to operate the application optimally. This finding aligns with Davis's (1989) research in the Technology Acceptance Model (TAM), which confirms that ease of use significantly influences user acceptance of technology.

The results of the large-scale trials in Table 4 further reinforce previous findings, where all assessment aspects received a very good category, with a total score equal to the ideal maximum score. This indicates that the application consistently delivers optimal

performance even when used by a larger number of users. This consistency is an important indicator that the product is ready for widespread implementation.

High satisfaction scores in large-scale trials indicate that users are highly satisfied with the experience of using the application. User satisfaction reflects that the application is not only functionally effective but also comfortable to use in match situations that require high concentration. According to Kotler and Keller (2016), high levels of satisfaction are directly proportional to the continued use of a product.

In terms of effectiveness, the results in Table 5 show a significant reduction in scoring time between the pretest and posttest in the small-scale trial. The average scoring time, which was previously in the long range, was reduced by almost half after using the application. This indicates that the application can significantly improve work efficiency.

This increase in scoring speed is due to the automation of the score-recording process and the reduction of manual steps that can potentially slow down referees' work. Research by Rahman and Hidayat (2021) states that digitizing a match recording system can reduce work time by 40–60% compared to conventional methods.

In addition to speed, accuracy is also a primary focus of this study. The results of the large-scale trial in Table 6 show a significant reduction in the number of input errors after using the application. Errors, which were initially quite high, were reduced to very low levels, even approaching zero in some subjects.

This reduction in error rates indicates that the application plays a significant role in improving scoring accuracy. The input validation feature and systematic score display help users avoid recording errors. This finding aligns with research by Suryadi et al. (2023), which states that an application-based digital system can significantly improve match data accuracy.

Comparing the results of small-scale and large-scale trials, it appears that the application's effectiveness actually increases when used on a wider scale. This indicates that the application has good system stability and is able to adapt to various usage conditions. According to Borg and Gall (2007), a good development product must demonstrate consistent results across various testing stages.

The findings of this study also reinforce the role of technology in supporting the professionalism of match officials. With a scoring application, referees' cognitive load can be reduced, allowing them to focus more on the match. This aligns with Schmidt and Lee's (2019) opinion, which emphasizes the importance of technological support in sports decision-making.

In the context of sports education and development, this application has great potential as a training tool for novice referees. Its ease of use and high level of accuracy make it an effective practical learning tool. Research by Wibowo et al. (2020) shows that the use of digital media in sports training can significantly improve participant competency.

Thus, the overall research results in Tables 1–6 indicate that the developed scoring application is not only theoretically feasible but has also been empirically proven effective in improving the speed and accuracy of match scoring. These findings reinforce the argument that the integration of digital technology into sports is an unavoidable necessity.

Based on these results, the developed scoring application is recommended for widespread implementation in matches and match simulations. Future development could focus on integration with hardware systems or match databases to enhance the application's functionality and reach.

Based on research results and respondent feedback, this application has several advantages:

1. The application has been shown to significantly speed up the scoring process, saving more than 50% of time compared to manual systems.
2. The reduction in error rates of up to 80% indicates the application's high accuracy and reliability.
3. The intuitive interface design makes the application easy to use, even for users with limited technological skills.
4. The real-time score display increases transparency and reduces the potential for controversy.
5. Automatic Documentation: Data storage and export features facilitate match documentation and analysis.
6. Portability: Being Android-based allows the application to be used on a variety of affordable and portable devices.
7. Includes not only scoring, but also timers, alerts, and comprehensive results reports.

This research expands the literature on technology development in sports, particularly in the context of pencak silat. The results show that digitizing the scoring system not only improves technical efficiency but also has the potential to enhance the integrity and credibility of matches. This application can be adopted by various levels of pencak silat organizations, from regional to national and international levels. Implementation of this application can modernize match management and raise the standard of professionalism in Indonesian pencak silat.

CONCLUSION

Based on the research results regarding the development of a digital scoring application for pencak silat matches, it can be concluded that:

User needs for a digital scoring system for pencak silat matches encompass several important aspects. Judges require a responsive and intuitive interface to input scores in real time with high accuracy. Coaches require transparent monitoring and recap features for athlete performance evaluation. Athletes, meanwhile, expect a fair and objective scoring system and easy access to match result information. All three users agree that a digital system can reduce human error, increase time efficiency, and provide transparency in the scoring process.

The digital scoring application for pencak silat matches has met the standards of validity, practicality, and effectiveness. In terms of validity, the application has been validated by subject matter experts and media experts, with results indicating that the

scoring content complies with IPSI regulations and the application design meets usability standards. In terms of practicality, the application is easy to operate by judges, coaches, and athletes, requiring minimal learning time, and is compatible with various devices. In terms of effectiveness, the application has been proven to reduce score calculation time, minimize recording errors, and increase confidence in match results.

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