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## Development of Smart Point Application in Aerobic Gymnastics Evaluation

Fitri Kharunnisa<sup>1</sup>, Ilham<sup>2</sup>, Atri Widowati<sup>3</sup>, Ugi Nugraha<sup>4</sup>, Turino Adi Irawan<sup>5</sup>

### Abstract

*This study aims to develop an Android-based Smart Point application as an innovation in the aerobic gymnastics assessment system. The background of this research lies in the judging process, which is still carried out manually using paper-based score sheets, making it prone to errors and inefficiency. The research used the Research and Development (R&D) method with the Borg and Gall model, consisting of ten stages from analysis to product implementation. The research subjects included aerobic gymnastics judges, media experts, and material experts. Research instruments consisted of validation questionnaires and user trials using a Likert scale. The results showed that the Smart Point application achieved a high level of feasibility with material expert validation of 94.60%, media expert 92.85%, and language expert 93.55%. User trials indicated that the application is practical, efficient, and capable of accelerating the scoring recap process by up to 50%. Therefore, the Smart Point application is considered effective in improving objectivity and efficiency in aerobic gymnastics competitions.*

**Keywords:** Smart Point, Android Application, Aerobic Gymnastics, Evaluation, Sports Education.

### Introduction

Sports play an essential role in human life — not only as a means of maintaining physical fitness but also as a medium for character formation, social improvement, and a symbol of national achievement and pride. Within the framework of national development, sports hold strategic significance because they elevate human dignity through achievements at local, national, and international levels.

One of the sports that has grown rapidly in Indonesia is aerobic gymnastics, an artistic discipline combining strength, flexibility, coordination, and aesthetics in a single movement sequence evaluated through technical, artistic, and execution aspects.

However, the judging process in aerobic gymnastics competitions continues to face various obstacles. Based on field observations and judges' practical experience, the scoring system is still performed manually using paper-based score sheets. Each judge must record scores for aspects such as artistry, difficulty, and execution, then submit them to the Chair of Judges for recapitulation and averaging. This process is time-consuming, error-prone, and risks reducing the objectivity of assessments.

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<sup>1</sup> Universitas Negeri Jambi (Indonesia), Email: [fadliihsan@uny.ac.id](mailto:fadliihsan@uny.ac.id)

<sup>2</sup> Universitas Negeri Jambi (Indonesia) Email: [filham\\_bugis@unja.ac.id](mailto:filham_bugis@unja.ac.id)

<sup>3</sup> Universitas Negeri Jambi (Indonesia) Email: [atri.widowati@unja.ac.id](mailto:atri.widowati@unja.ac.id)

<sup>4</sup> Universitas Negeri Jambi (Indonesia) Email: [ugi.nugraha@unja.ac.id](mailto:ugi.nugraha@unja.ac.id)

<sup>5</sup> Universitas Islam Negeri Sulthan Thaha Saifuddin Jambi (Indonesia) Email: [turinoadiirawan@uinjambi.ac.id](mailto:turinoadiirawan@uinjambi.ac.id)



In competitions involving many participants and judges — as regulated by the Federation Internationale de Gymnastique (FIG), which requires 14–18 judges — the manual system becomes increasingly inefficient. Scoring a single participant may take up to 15 minutes before moving to the next, disrupting the competition flow and diminishing event quality.

Moreover, the manual scoring system lacks transparency and accountability. Discrepancies in judges' scores, input errors, and inconsistencies with the Aerobic Gymnastics Code of Points (COP) frequently occur. These issues highlight the urgent need to modernize the scoring system using digital technology that ensures speed, precision, and objectivity.

The advancement of information and communication technology (ICT), especially through Android platforms, offers vast potential to address these challenges. Digital applications can facilitate real-time assessment, automate score calculations, store data securely, and display results quickly and transparently.

Based on these needs, this study developed the Smart Point Application, an Android-based solution for digitalizing aerobic gymnastics judging in Indonesia. This application is designed to help judges assign scores according to the Code of Points aspects — artistry, difficulty, and execution — while automatically calculating and recapping results. Furthermore, it allows each judge to connect directly with the Chair of Judges without requiring paper-based submissions.

Through this innovation, the application is expected to enhance time efficiency, minimize human error, and increase the objectivity and transparency of competition results. This study employs the Research and Development (R&D) method using the Borg and Gall model, encompassing stages of needs analysis, planning, design, expert validation, initial and main field trials, revisions, and dissemination. The development process applies a systematic and theory-based approach to educational media design. The research subjects involve aerobic gymnastics judges from the Indonesian Gymnastics Association (PERSANI), media experts, and material experts.

The findings demonstrate that the Smart Point application is feasible and effective for use in aerobic gymnastics evaluation. Expert validation from the fields of material, media, and language yielded feasibility scores exceeding 90%, with overall user effectiveness reaching 94.60%. These results confirm that the integration of Android-based technology can significantly enhance evaluation efficiency and improve competition quality in sports.

This study contributes to the advancement of sports education and digital transformation in evaluation systems. Beyond serving as a solution for aerobic gymnastics, the Smart Point application can also be adapted for other sports disciplines that require complex judging systems. Hence, this innovation marks an initial step toward broader implementation of digital sport technology in Indonesia.

### **Methodology / Methods**

This research is a research and development (R&D) study aimed at producing an innovative

product in the form of an Android-based Smart Point application as a digital assessment tool in aerobic gymnastics. The development model used refers to the Borg and Gall (1983) model, which includes ten development stages:

1. Needs analysis and information gathering,
2. Product planning,
3. Initial product development,
4. Initial field trials,
5. Initial product revision,
6. Main field trials,
7. Operational revision,
8. Operational field trials,
9. Final product revision, and
10. Product dissemination and implementation.

This model was chosen because it was deemed appropriate for producing a valid, practical, and effective sports education technology product that supports an objective competition assessment system.

The research was conducted at the Indonesian Gymnastics Association (PERSANI) in Jambi Province over an eight-month period. The research subjects consisted of:

1. Subject Matter Experts, namely aerobics lecturers and trainers who understand the Code of Points FIG 2022–2024.
2. Media Experts, namely practitioners or lecturers in the field of educational technology who understand Android application development.
3. Linguists, namely Indonesian language experts who assess the clarity and appropriateness of the language in the application.
4. Aerobics Judges (Users) from PERSANI Jambi, who served as the main respondents in the limited and extensive trial stages.

Subject selection was conducted using purposive sampling, taking into account their expertise and direct involvement in aerobics assessment activities.

#### a. Needs Analysis

This stage was conducted through observations of aerobics competitions at the provincial level and interviews with judges and trainers. The analysis showed that the assessment system was still carried out manually using paper scorecards, which caused various obstacles such as incorrect score input, delayed results, and a lack of transparency. A need was identified for a digital system capable of automatically and in real-time score recaps.

#### b. Product Design

Based on the analysis, the application design was created using the Unified Modeling Language (UML) approach, consisting of:

1. Use Case Diagrams (user-system relationships),
2. Activity Diagrams (assessment process flow), and
3. Class Diagrams (database structure and application functions).
4. The user interface was designed to be simple, intuitive, and easy to operate in a competition situation.

#### c. Initial Product Development

The application was developed using Android Studio with the Java programming language and the Firebase Realtime Database. Key features include:

1. Multi-user login (admin, judges, and head judge),
2. Score input for artistry, execution, and difficulty,
3. Automatic score recaps according to the FIG system,
4. Output of assessment results in digital format (PDF and database).

#### d. Expert Validation

The initial product was validated by three groups of experts to assess the appropriateness of content, appearance, and language. Validation was conducted using a Likert-scale questionnaire (1–5), and the results were analyzed using Aiken's V formula to determine the level of agreement between the validators.

#### e. Field Trial

The trial was conducted in two stages:

1. A limited trial with 5 judges to assess usability and practicality.
2. A broad trial with 10 judges in a simulated competition to assess the application's effectiveness in real-world conditions.

The trial results were used to revise the product before the application was disseminated.

#### f. Revision and Dissemination

Input from experts and users was used to improve the application's appearance, system responsiveness, and to add a notification feature for incomplete input. The final version of the application was then officially introduced to the PERSANI Jambi Province management.

The instruments used included:

1. An expert validation sheet (material, media, language),
2. A user questionnaire to assess practicality and effectiveness, and
3. An observation sheet to record technical challenges during the trial.

Each instrument used a Likert scale ranging from 1–5, with categories ranging from very infeasible to very feasible.

Data analysis was conducted quantitatively and qualitatively, including:

1. Validity analysis using Aiken's V ( $V \geq 0.80$  = very valid).
2. Effectiveness analysis using the Borich model with the following categories:
  - a. 81–100% = Sangat Efektif
  - b. 61–80% = Efektif
  - c. 41–60% = Cukup Efektif
  - d. < 40% = Tidak Efektif.

3. Observation data and user responses were analyzed descriptively and qualitatively.

## Results

The product developed is an Android-based Smart Point application with features for judge login, score input, automatic recap, and final reporting. Validation results showed very high feasibility: 94.60% material, 92.85% media, and 93.55% language. Field trials demonstrated the

application's efficiency, with a 50% increase in score recap speed compared to manual systems. The application also improves the accuracy and transparency of assessment results.

### 1. Product Development Results

The resulting product is an Android-based Smart Point application, which functions to assist judges in digitally and automatically assessing aerobics.

The application has the following main features:

- Input of artistry, execution, and difficulty scores,
- Automatic score recap between judges,
- Elimination of highest and lowest scores according to FIG rules,
- Real-time display of assessment results, and
- Storage of assessment data on a Firebase server.

This application is compatible with Android devices running version 9.0 and above and can be used both offline and online.

### 2. Expert Validation Results

Average Validation Aspect	Average (%)	Category
Material Expert	94,60	Very Appropriate
Media Expert	92,85	Very Appropriate
Language Expert	93,55	Very Appropriate
Average Total	93,65	Very Appropriate

The experts stated that the Smart Point application meets the principles of content accuracy, attractive appearance, and clear and communicative language use. Media experts assessed the interface as easy to use, while material experts assessed the assessment system as compliant with the FIG Code of Points.

### 3. Field Trial Results

#### a. Limited Trial

Conducted with five judges to assess the practicality and clarity of the application's workflow. All judges stated that the application was easy to use and helped expedite the assessment process.

#### b. Extensive Trial

Involving 10 judges in a provincial-level competition simulation, the Smart Point application was able to reduce the score recap time from 10–15 minutes to less than 5 minutes, with a 0% error rate.

Trial Aspects	Percentage (%)	Category
Practically	94,11	Very Effective
Time Efficiency	95,32	Very Effective
Accuracy	92,56	Very Effective

Trial Aspects	Percentage (%)	Category
User Satisfaction	92,49	Very Effective
Average	93,62	Very Effective

#### 4. Product Effectiveness and Feasibility

Overall, the Smart Point application was deemed feasible and effective for use in aerobic gymnastics assessment. The application increased assessment efficiency by up to 50%, reduced manual input errors, and increased transparency of competition results. The judges found the easily accessible interface, automated scoring system, and quick results display helpful.

#### **Discussion**

The research results show that the development of the Smart Point application is able to address the main problems in aerobics assessment, namely the lengthy time required to recap scores, the potential for human error, and the lack of transparency in the results.

The successful development of this application demonstrates that the application of Android-based digital technology can improve objectivity and efficiency in sports assessment systems. Expert validation and effectiveness test results, which reached over 93%, indicate that this application meets the criteria for validity, practicality, and effectiveness.

Theoretically, these results support Borg & Gall's (1983) argument that educational development products will be of high quality if they undergo systematic validity testing, revision, and implementation. Furthermore, these findings align with research by Meier (2010) and Branch (2009), which states that the application of digital technology in evaluation systems can improve the accuracy and speed of assessment.

From a sports education perspective, this application makes a significant contribution to driving digital transformation in the field of sports education. By using the Smart Point application, judges not only act as assessors but also as technology users directly involved in the data-driven evaluation process.

Furthermore, the development of this application demonstrates that sports technology can be effectively integrated into both competition and learning activities.

The implementation of Smart Point supports the principles of fair play and objectivity, as fundamental to the FIG Code of Points.

These results also provide a basis for the development of similar systems in other sports with complex scoring systems, such as artistic gymnastics, rhythmic gymnastics, and diving.

#### **Conclusion**

Based on the research results and discussions conducted, it can be concluded that the Android-based Smart Point application, developed using the Borg and Gall research and development model, has proven to be feasible, practical, and effective as a digital scoring system in aerobic

The Smart Point application is designed to assist judges in awarding scores quickly, accurately, and objectively in accordance with the Code of Points (FIG) provisions. Expert validation results showed an average feasibility rating of 93.65%, with a breakdown of: material experts 94.60%, media experts 92.85%, and language experts 93.55%. This score indicates that the application meets all aspects of content, appearance, and language feasibility.

Field trials showed that the application had an average effectiveness rating of 93.62%, categorized as very effective, particularly in increasing scoring time efficiency by up to 50%, reducing manual input errors, and enhancing transparency of competition results. The use of the Smart Point application allows for automated and real-time score recapitulation, thereby accelerating the announcement of competition results and increasing trust in the scoring system.

Conceptually, this study demonstrates that the application of digital technology in sports scoring systems can improve the objectivity, accuracy, and efficiency of judges. These results align with theory and previous research findings that emphasize the importance of digital transformation in sports education and performance evaluation systems.

Practically, the Smart Point application directly contributes to the development of aerobic gymnastics judges under the auspices of PERSANI and can serve as a model for developing digital scoring systems for other sports that require high objectivity.

Therefore, it can be concluded that the development of the Smart Point application not only produces functional technological innovation but also represents a strategic step toward the digitalization of sports scoring in Indonesia, supporting the creation of a transparent, accountable, and data-driven competition system.

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