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Development of a Web-Based Sporting Event Management Information System for the East Java NPCI

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Abstract: *The participation of disabled athletes in sporting events faces barriers such as the lack of inclusive and efficient information system management. The East Java NPCI requires digital media to support the registration, validation, scheduling, and real-time reporting of competition results. This study aims to develop and evaluate a web-based championship information system for East Java NPCI using ADDIE development model. Research and Development with five ADDIE stages: Analysis, Design, Development, Implementation, and Evaluation were performed. The sample consisted of two experts and ninety-three East Java NPCI coaches. Data were collected through interviews, observations, documentation, and questionnaires. Analyses used descriptive statistics, validity and reliability tests (factor analysis), and gender-based t-tests. The feasibility test results indicated an average score of 89% for the experts (very feasible category). User evaluations obtained an average perception score of 4.12 out of 5 (excellent category). Four aspects of the system —usability, customisation, access speed, and content— were found to be valid and reliable. No substantial difference existed between male and female coaches in rating the quality of the system which indicates that the system can be utilised fairly and equally by all users, without gender bias. The web-based information system for East Java NPCI is considered effective and feasible for managing disability sports championship in East Java, with potential for replication in other regions.*
Keywords: *ADDIE, event information system, NPCI, disabled athletes, system evaluation*

Introduction

Despite sports participation being a fundamental human right, numerous disabled people experience restricted access to sporting activities (Kiuppis, 2018). They are less likely to participate than individuals without disabilities (Kamil-Rosenberg, Greaney, & Garber, 2021). While there are many reasons one might be motivated to engage in sport, disabled athletes face barriers such as cost, time constraints, and lack of opportunities in performance sport participation (McLoughlin, Fecske, Castaneda, Gwin, & Graber, 2017).

Despite promoting inclusion through sporting events has received significant attention in the literature, very little research exists regarding the development of disabled athletes (Dehghansai, Lemez, Wattie, & Baker, 2017). The paucity of research clearly indicates the need for attention to disability sport. Moreover, opportunities for participation of disabled athletes need to be increased; therefore, the provision of disability sports competitions is essential in terms of quantity and quality.

The National Paralympic Committee Indonesia (NPCI) exists in each regency and province. Nowadays, at least 12 sports have been organized at the XVI Papua National Paralympic Games (Peparnas) (Finaka, 2021) with the number of participants involved is 1,985 disabled athletes (Primus, 2021). Although Peparnas is the highest events for disability sports in Indonesia, the sporting event management organised by NPCI at the regional level is insufficiently effective regarding the utilisation of management information systems.Furthermore, participation at the provincial level is low, with 416 disabled athletes (NPCI Jatim, 2023). More crucially, the number of the regional level is followed by 156 disabled athletes (NPCI Kab Pasuruan, 2023). Therefore, publication through online media needs to be implemented strictly to increase the number of participants. Furthermore, sporting events management should be improved so that the participation of disabled athletes can be channelled. This study aims to develop and evaluate a web-based championship information system for East Java NPCI using ADDIE development model.

Methods

Design

Research and Development (R&D) approach with the ADDIE development model, which consists of five main stages: Analysis, Design, Development, Implementation, and Evaluation, was used. The ADDIE model provides a systematic and flexible framework in the development of information technology-based media (Nadiyah & Faaizah, 2015). The ADDIE model is commonly used in software development and web-based learning systems (Arnab, Petridis, Spatioti, Kazanidis, & Pange, 2022).

Participants

The subjects in this study consisted of two groups. The first group consisted of a media expert and content expert, who conducted the feasibility test of the product. Secondly, 93 coaches (Male= 77; Female= 15; mean age= 38.95; oldest participant= 62 years; and youngest participant= 16 years) from the East Java NPCI who became respondents in the evaluation stage. The sampling technique used was total sampling, which is the selection of the subjects based on the total number of individuals included in the research area (Maksum, 2018).

Data Collection

Data collection was conducted through three main methods; (1) interviews, observations, and documentation used at the needs analysis stage to identify problems in the management of previous events; (2) Product feasibility test questionnaires were used by experts to assess the quality of the web based on eight indicators; appearance, navigation, functionality, speed, content suitability, security, accessibility, and general feasibility; and (3) User perception questionnaires were used to assess the coaches' experiences of four main aspects of the system; ease of use, customisation, download delay, and content. Two instruments were used in the form of questionnaires (points 2 and 3) using a 5-point Likert Scale, ranging from strongly disagree (1) to strongly agree (5).

Data Analysis

Descriptive statistics were used to calculate the mean, standard deviation, skewness, and kurtosis to measure user perception of the system. Data distribution was considered normal if the skewness and kurtosis values were in the range of –1 to +1 (Demir, 2022). Validity and reliability tests were conducted on perception instruments using factor loading analysis (declared valid if > 0.6) and Cronbach's Alpha (declared reliable if > 0.7). Construct validity was conducted through Average Variance Extracted (AVE) and Construct Reliability (CR), where the instrument was considered valid if AVE> 0.5 and reliable if CR> 0.7 (Hair, Black, Babin, & Anderson, 2014). Independent t tests were used to determine differences in user perceptions based on gender, with a significance level of $p < 0.05$ as the limit of statistical significance. All analyses were conducted using statistical software such as the latest version of SPSS to ensure the accuracy of the results.

Results

Analisys

Data were collected through interviews, observations, and documentation studies on the management of previous events in the analysis stage. There were 22 errors in the input of participant data; therefore, as many as 66 participants had to be deleted. The most common errors were gender selection, race number, and classification. Moreover, the reporting of the competition results had constraints, resulting in prolonged delays that hindered the monitoring of the results. The main requirements determined through the needs analysis encompass an online registration system, race scheduling, participant validation, and real-time results reporting.

Design

The system design contains a user interface (UI/UX) design that is inclusive and easy to use by the East Java NPCI operators. A database design includes data on athletes, sports, fixtures, and results. The workflow diagram and navigation structure were determined to ensure ease of use. Figure 1 shows the design of the home page.

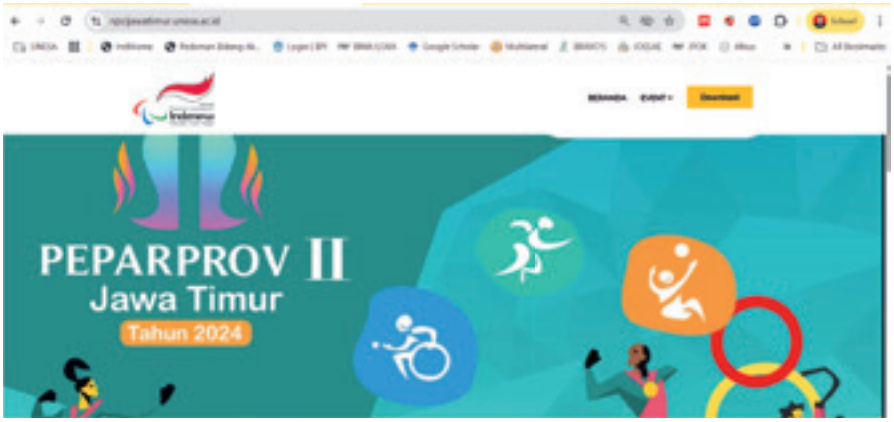

Figure 1. *Home page design (https://npcijawatimur.unesa.ac.id/)*

Development

The system was developed using the PHP framework and MySQL database. The main modules encompassed online registration of participants, validation of participants and real-time reporting of results, match scheduling, race results management, publication of event information. The prototype was tested internally with the support of the NPCI and input from potential users. Table 1 describes the results of the development which were tested by content experts and practitioners.

Table 1. *Results of product feasibility testing by experts*

No	Aspects	Statements	Score
1	Display	The web interface is attractive and easy to understand	90%
2	Navigation	Navigation between menus is easy to use	100%
3	Functionality	The athlete registration feature works well	80%
4	Speed	Web is responsive and fast to access	80%
5	Content suitability	Web content is in accordance with the needs of NPCI East Java	100%
6	Security	Secure login and validation system	80%
7	Accessibility	Web can be accessed on various devices (laptop and mobile phone)	90%
8	General feasibility	The web is feasible to use for competition management	90%

The feasibility test was conducted by experts on the website https://npcijawatimur.unesa.ac.id/ using eight assessment indicators including appearance aspects, navigation, functionality, speed, content suitability, security, accessibility, and general feasibility. The scores utilised on a Likert Scale of 1 – 5 which are then averaged and compared with the maximum value to obtain a percentage of feasibility.

The highest score (100%) was provided to the aspects of navigation and content suitability, indicating that the menu structure is easy to understand, and the website content meets the needs of the East Java NPCI. The lowest score (80%) was given to the aspects of functionality, speed, and security, which indicates that although functional, there is room for improvement in certain modules. Overall, the average score of the eight indicators is 89%, indicating that the product is in the "very feasible" category to be implemented as a web-based championship management system.

Implementation

The system was trialled at the regional competition of East Java NPCI and performed well. All participants successfully registered online, and match result data could be accessed in real time. Training was provided to NPCI operators to ensure their ability to operate the system independently.

Evaluation

Evaluation was conducted by measuring the coaches' perceptions of the East Java NPCI competition. They completed a perception questionnaire with the results in the descriptive statistics' form presented in Table 2.

Table 2. *Descriptive Statistics*

Descriptive Statistics	N	Min	Max	Mean (Categories)	SD	Skewness	Kurtosis
Ease of use	78	1.00	5.00	4.16 (Very good)	0.580	-0.933	0.412
Customization	78	1.60	5.00	4.09 (Very good)	0.622	-0.880	0.582
Download delay	78	1.50	5.00	4.08 (Very good)	0.643	-0.879	0.684
Content	78	2.00	5.00	4.16 (Very good)	0.566	-0.648	0.250
Total	78	1.47	5.00	4.12 (Very good)	0.549	-0.305	0.879

Based on the results of the analysis, 78 coaches completed the questionnaire with a value of aspects ease of use of 4.16 in the excellent category, a perception value of customization of 4.09 in the excellent category, a perception value of download delay of 4.08 in the excellent category, a perception value of content of 4.16 in the excellent category, and a total perception value of 4.12 in the excellent category. Each distribution is considered normal with skewness and kurtosis values in the range of skewness= -0.933 to -0.305, kurtosis= 250 to 0.879 (normal when in the range of 1 to -1). The measurement results are very feasible to be implemented to assess the quality of the East Java NPCI web. Evidenced by the validity and reliability of measurements depicted in Table 3.

Table 3. *Analysis of web feasibility evaluation measurement results based on coaches' perceptions*

Statement	Mean	SD	Loading Factor					Cronbach's Alpha
			A	B	C	D	Total	
A. Ease of use							0.905	0.883
Item-1	4.16	0.745	0.764					
Item-2	4.26	0.661	0.774					
Item-3	4.13	0.667	0.788					
Item-4	4.11	0.687	0.804					
Item-5	4.13	0.699	0.829					
Item-6	4.11	0.687	0.811					
B. Customization							0.904	0.864
Item-7	4.09	0.674		0.771				
Item-8	4.08	0.730		0.821				
Item-9	3.93	0.875		0.836				
Item-10	4.20	0.633		0.832				
Item-11	4.18	0.725		0.780				
C. Download delay							0.908	0.861
Item-12	4.17	0.656			0.793			
Item-13	4.13	0.744			0.918			
Item-14	4.03	0.702			0.889			
Item-15	4.04	0.837			0.774			
D. Content							0.932	0.772
Item-16	4.12	0.796				0.627		
Item-17	4.09	0.706				0.815		
Item-18	4.15	0.678				0.832		
Item-19	4.24	0.652				0.826		
Total (Item 1-19)								0.952

The results of the validity and reliability tests of the questionnaire used in measuring product quality based on the coaches' perceptions can be elucidated that in the aspect of ease of use the loading factor value range is 0.764-0.829>0.6; therefore, it is valid, the Cronbach's Alpha value is 0.883>0.7; therefore, the items in this aspect are reliable. The loading factor value in the customisation aspect is 0.771-0.836>0.6; so, it is valid, the Cronbach's Alpha value is 0.864>0.7, so the items in this aspect are declared reliable. In the aspect of download delay, the loading

factor value range is 0.774-0.918>0.6; therefore, it is valid, Cronbach's Alpha value is 0.861>0.7, so the items in this aspect are declared reliable. In the content aspect, the loading factor value range is 0.627-0.832>0.6, so it is valid, Cronbach's Alpha value is 0.931>0.7; therefore, the items are declared reliable.

The construct calculation of the 4 measurement aspects indicates that the eigenvalues formed by one significant measurement component are 3,331 with a cumulative percentage of 83.2%; therefore, the four aspects of product quality measurement can jointly explain 83.2% of the variance of the product quality measurement results. Four aspects of measurement in the form of ease of use, customisation, download delay, and content can be declared capable of forming a construct of total perceived value with construct validity and reliability results as shown in Table 4.

Table 4. *Construct validity and reliability of measurement results*

Aspects	λ	λ^2	$1-\lambda^2$	Construct Reliability (CR)	Average Variance Extract (AVE)
Ease of use	0.905	0.819	0.181	0.952	0.832
Customization	0.904	0.817	0.183		
Download delay	0.908	0.824	0.176		
Content	0.932	0.869	0.131		
Total	3.649	3.329	0.671		

According to Table 4, the loading factor of the ease-of-use aspect is 0.905, customisation is 0.904, download delay is 0.908, and content is 0.932; thus, aspects measured are declared valid. The ability of the four aspects is analysed based on the average variance extract (AVE) declared valid (AVE = 0.832>0.5) and based on Construct Reliability (CR) is reliable (CR = 0.952>0.7). The validity and reliability described above indicate that the data collected have qualified as research data. To determine the effect of gender on the perception of the assessment provided by the coaches, the differences in perception scores based on gender were analysed as shown in Table 5.

Table 5. *Differences in perception scores in terms of gender*

Aspect	Gender	N	Mean	SD	F	Sig.	t	Sig.
Ease of use	M	77	4.14	0.569	0.086	0.771	-0.560	0.577
	F	15	4.22	0.443				
Customization	M	77	4.11	0.625	1.897	0.172	0.398	0.691
	F	15	4.04	0.364				
Download delay	M	77	4.13	0.632	0.013	0.91	1.106	0.272
	F	15	3.93	0.547				
Content	M	77	4.16	0.572	1.279	0.261	0.381	0.704
	F	15	4.10	0.410				
Total	M	77	4.13	0.548	0.267	0.606	0.297	0.767
	F	15	4.09	0.385				

According to the analysis results presented in Table 4, there is no significant difference between the perceptions of male and female users on the five aspects assessed, such as ease of use, customisation, download delay, content, and total. In the ease-of-use aspect, the average score of men is 4.14 with a standard deviation of 0.569, while women have an average of 4.22 with a standard deviation of 0.443. The t-test results show a significance value of 0.577, which means there is no significant difference between the two groups.

The customisation aspect shows similar results, with an average score of 4.11 for men and 4.04 for women. The significance value of the t-test is 0.691, which indicates there is no significant difference. Similarly, in the download delay aspect, although men have a higher average score (4.13) than women (3.93), the t-test significance value of 0.272 indicates that the difference is not significant. The content aspect shows an average of 4.16 for males and 4.10 for females, with a significance of 0.704, again showing no significant difference.

Overall, the total value of men's perceptions is 4.13 and women's is 4.09, with the t-test results showing a significance value of 0.767. Hence, there is no statistically significant difference between men's and women's percep-

tions of all aspects measured. All significance values are well above the 0.05 threshold, indicating that gender does not substantially influence differences in perception.

Discussion

The findings indicated that the development of a web-based competition management information system for the East Java NPCI, utilising the ADDIE model, has been successfully executed and yielded results that are highly feasible to use. The high value of product feasibility (average 89%) from experts and positive responses from users (average perception score 4.12 out of 5.00) show that the system fulfills the needs of managing competitions efficiently and inclusively.

The ease-of-use aspect obtained an average score of 4.16, indicating that the system is easy to use by coaches, in accordance with system design principles that prioritise accessibility and ease of navigation. The findings are consistent with a previous study by (Arnab et al., 2022) which found that ADDIE-based systems are effective in designing user-friendly interfaces. On the customisation aspect, the score of 4.09 indicates that coaches experienced a flexible system to meet the specific needs of users. This is crucial since user perception of ease of use has a direct effect on acceptance of new systems (Venkatesh & Davis, 2000). The ease of use is very important for the product since the target users in the East Java NPCI are from various sports and disability classifications.

The download delay aspect scored 4.08, which indicates that the system access speed performance is in the excellent category; although, there is a room for improvement. The occurrence of small potential delays experienced by coaches, will affect user perceptions, increasing frustration and reducing satisfaction (Arapakis, Park, & Pielot, 2021). System delays can impede users' decision-making time and induce boredom, notwithstanding the system as a whole functions well (Harmon, 2022). In this context, system responsiveness is a key success factor in real-time match data management (Van Damme et al., 2024).

The content aspect obtained a score of 4.16, indicating that the content of the web is in accordance with the needs of the NPCI and the coaches in conveying competition information. This reinforces the opinion of (Nadiyah & Faaizah, 2015) that ADDIE-based systems are effective in accommodating content or information appropriately. Moreover, content quality is one of the main dimensions in the digital service quality model that affects user satisfaction and experience (Ighomereho, Ojo, Omoyele, & Olabode, 2022).

Assessing web usability through coaches, who are direct users of the generated product, is deemed appropriate to evaluate the development of a product, particularly in the context of information systems (Jordan, 2020). Therefore, it is very appropriate if the evaluation of web development is carried out using usability testing using coaches. Where usability tests are performed by testing from users, peers, pluralistic usability searches, visual searches, informal searches, contextual searches, and other usability testing modifications that offer a variety of methods to suit different purposes and contexts (Riihiaho, 2017).

The t-test results showed that there were no significant differences in perceptions between male and female coaches on the four aspects measured. This suggests that the system can be used fairly and equally by all users, without gender bias. This finding is consistent with the principle of inclusion in information technology design that digital services should accommodate equal access for all parties, including people with disabilities and various categories of users (Kiuppis, 2018).

The limitations of this study are the respondents were limited to one provincial area and the evaluation that was performed in the early stages of implementation. Further testing on a national scale and across competitions is needed so that the results are more generalisable. Furthermore, limited internet access in some areas may affect users' perceptions of the system's speed, even though the system is designed to be quite lightweight and responsive.

In general, the development of the web-based information system has a major contribution in supporting the management of disability sports competitions in Indonesia. This system can be used as an initial model to be implemented in other regional NPCIs, so that competition management can be executed more efficiently, transparently, and participatively. Future research is recommended to integrate this system with mobile devices and national databases to be more connected with central level reporting (Kemenpora or NPCI).

Conclusion

This study successfully developed a web-based competition management information system for the East Java NPCI using the ADDIE development model. This system is designed to answer the need for efficient, inclusive, and digital technology-based competition management, especially in the context of sports for disabled people. Validation results from experts indicated that the product was in the very feasible category with an average score of 89%. Moreover, a user evaluation involving 93 coaches showed an average perception score of 4.12 on a scale of 5.00, reflecting a very positive acceptance of the system.

The user perception instrument was valid and reliable. The four main aspects assessed, namely ease of use, customisation, access speed, and content quality, all obtained high scores, indicating that the system has met user expectations. There was no significant difference between male and female users' perceptions of the system.

Thus, this information system proved to be effective and feasible to be applied in competition management in the NPCI environment. The use of the ADDIE model is proven to be able to produce web-based products that are functional, responsive, and adaptive to user needs. In the future, this system has the potential to be replicated and further developed on a national scale, as well as integrated with a central database to increase transparency and efficiency in the management of disability sports competitions in Indonesia.

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