



## Development of Test Results and Physical Condition Measurement Methods Using Fitness Applications in Performance Sports

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### History Article

Received November 2023  
Approved November 2023  
Published vol 10 no 2 2023

### Keywords

Development Method; Physical Test Results; Fitness Apps

### Abstract

The research entitled Development of Application-Based Physical Condition Test Results and Measurements in Short Distance Running Athletics, 1) Wants to Make an Application for Processing Test Results and Physical Condition Measurements of Athletes in Athletics Distance Running Numbers. 2) Can find out the results of physical test data processing, which is valid, practical and effective manually or using digital applications on athletic athletes short distance running numbers. The method used in this study is R&D, which is a study that describes products in the form of fitness test applications and physical test component instruments applied to athletic athletes in short-distance running numbers. The results of the research conducted were material validation resulting in validity of 85%, language validation of 83% and media validation of 90%. In small-scale trials it produced practicality of 78% and in large-scale trials the level of practicality produced 84.9% and the effectiveness of test results from media applications in the "effective" category with a percentage of 84.9%. From the results of the study, it can be concluded that the development of application-based physical condition test results and measurements in athletic athletes short distance running numbers is valid, practical, and effective. And can be used by coaches, to process data on the results of the physical condition of athletic athletes short distance running numbers, in order to speed up processing test result data.

### How to Cite

Farit, A., Hartati., & Iyakrus. (2023). Development of Test Results and Physical Condition Measurement Methods Using Fitness Applications in Performance Sports. *Journal of Physical Education, Health and Sport*, 10 (2), 127-133.

## INTRODUCTION

The current era of globalization, which is full of technological advances, can be utilized and utilized optimally. With the advancement of technology can facilitate and accelerate all activities of human needs, this is inseparable from the role of the world of education, especially sports education. Technological advances in the field of sports are also useful to provide information about the measurement of strength, endurance, and speed produced by athletes. According to the law of the Republic of Indonesia Number 3. In 2005 article 1 paragraph 4 which reads national sports is to improve health, fitness, achievement, and human quality, as well as instilling moral values and noble morals, sportsmanship, discipline, strengthening and fostering national unity and unity, strengthening national resilience, and lifting the dignity, dignity, and honor of the nation. There are many sports, one of which is athletics, sprints.

Athletics is a sport that has existed since ancient Greece, the term athletics comes from the Greek language, namely Athlon or alum which means match, race of struggle and struggle. Athletics is also referred to as the «Mother sport», i.e. athletics is the basis of a wide variety of sports, because athletics is all the basic motion of all sports including running, jumping, and throwing. In general, athletics in running numbers are divided into three parts; namely from short distance (sprint), medium distance, and long distance. In the long jump there are long jump, long jump, high jump, and pole vault. In the throwing numbers there are hammer throw, shot put, discus throw, and javelin throw. Athletic numbers that have always been a point of more attention in the world of sports nationally and internationally are short distance running or Sprint numbers. (Yuwono, 2019)

The sprint numbers contested include the 100 meters, 200 distance numbers. meters, 400 meters and 60 meters are reserved for certain age groups. The winner of the short-distance race is the runner who is the first to pass the finish line and takes the shortest time. According to Beck & Grabowski, «sports that compete in «time», where runners called sprinters try to cover the distance with time terpendek.com. The definition of a sprint is sprinting, as speed is the dominant factor for runners. That is, athletes must run from the beginning to the finish line without having to reduce speed in a short time. According to (Irawan et al, 202:2) run as fast as possible to reach a short time with a specified distance.

Short distance running is always contested for athletes from an early age, teenagers, juniors and senior athletes. To support the achievements of an athlete, physical condition is the main factor as a support. In addition to good physical performance of athletes, physical conditions that must be paid more attention to also to achieve maximum achievement success. To have a good physical condition, of course, obtained from the training program that has been run and given by the coach for the athlete himself and prepared long enough to form an athlete with good performance and supported by excellent physical condition who is ready to compete and compete in the world of sports. The physical needs of each sport are certainly different, so different tests and measurements are needed in each sport. Tests and Measurements become a means in helping coaches, athletes and sports organizations to analyze the level of physical condition (Iyakrus, 2019).

Structured and regular measurement tests will greatly help trainers, to know the results of valid test data, reliable test equipment needed, and competent examiners. According to Tests and Measurements is one of the most important ways to support Indonesia's sports achievements, especially in every city and district. The lack of results and analysis of athletes in the sports lab is a problem that often occurs in several districts or cities. There needs to be a change to that problem. To obtain reliable data requires measurement test equipment that has a reliable level of validity. Based on field observations at Sriwijaya State High School Sports and athletic trainers in short-distance running numbers, it was found that so far the process of calculating the results of tests and measuring physical condition still using manually in this way is considered less effective to be used on test results and physical condition measurements, as evidenced by test results that are less valid and time-consuming during the calculation process. This is realized by the coach that it feels less effective and efficient, especially if the athlete test takers are many of the possible causes are lack of understanding and socialization of technological advances and science and technology updates to the world of sports.(Pradana Saputro et al., 2020)

The problems faced in the implementation of calculating test results and measuring physical condition above need to be overcome, if not immediately overcome then coaches and athletes will find it difficult to adapt to the rapid technological advances in today's times. And if these problems are not immediately addressed,

it will affect the development of soft skills of trainers.

The development of measuring physical test results using this application has never been carried out and researched, but socialization has been carried out on the introduction of physical test measurement results applications by (Hartati, 2019) entitled «Training on the Use of Physical Test Applications for Eight Sports for Teachers and Coaches in Alang-Alang Lebar District, Palembang City» The results of socialization show that tests are one of the indispensable processes in seeing the development of athletes. The development of physical test applications for eight sports in the Palembang area is expected to improve the quality of coaching because tests are an integral part of all coaching processes The existence of UPPM FKIP Unsri, the Physical Education Study Program, ISORI South Sumatra, is supported by qualified and professional human resources in accordance with their fields, as well as complete and adequate infrastructure facilities to support training activities in the context of implementing science and technology, while the potential possessed by teaching teachers and sports coaches in the Palembang region is a strong willingness and ability to get training and coaching on the development of physical test applications for eight sports. The success of a community service activity is evaluated based on the results of the test implementation and conclusions drawn through the data obtained, and the PPM 6 Team evaluates by observing and the results of physical tests conducted by health teachers and sports coaches during training. The criteria for assessing the usefulness of this training activity are revealed with the instruments that have been prepared. This training activity is a form of coaching teaching teachers and sports coaches to carry out physical tests using the physical test application of eight sports. Thus, it can be concluded that tests and measurements using applications developed are feasible and practical to be used in the process of calculating physical test data results.

## METHOD

This research uses R&D (Research and Development) method. Research methods According to Richey and Nelshon in Samsu (2021: 174), development research is divided into two, namely: 1) The first type is focused on the design and evaluation of certain products or programs with the aim of getting an overview of the development process and studying the conditions that support the implementation of the program.

2) The second type is focused on reviewing the development program carried out previously. The purpose of this second type is to obtain an overview of effective design and evaluation procedures. It can be used to design new products or new procedures, which will be systematically tested, evaluated, and refined until they meet specific criteria in terms of effectiveness, quality. This research and development aims to research test application products and physical condition measurements as part of a practical and valid test and measurement process implementation strategy. Tests and measurements of physical condition based on digital applications referred to in this study are calculating test results using software technology based on the WINDOWS operating system that can be accessed by personal computers / laptops.

The researcher adjusted the research step according to Bord and Gall with ten steps because in this study the researcher adjusted according to Sugiyono's opinion (2019: 4 04) which showed that the research and development methodology at the third level is research and development up to the product testing stage. This research makes the product design which is then validated internally (expert and practitioner opinions) and external tests are carried out on the research subjects. Therefore, researchers will only carry out ten steps of research and development in the study that can be seen in the picture. development in this research to be carried out. The steps that will be implemented in this study. 1. Research and information collection. 2. Planning. 3. Initial product development. 4. Early stage testing. 5. Major revisions. 6. Main trial. 7. Product revision. 8. Operational test. 9. Final product revision. 10. Product implementation. This research was conducted in the Jakabaring Sport City Palembang area and Sriwijaya State Sports High School with a total sample of 25 consisting of 10 male and female athletes, 15 assistants and core trainers of Athletic Physical Athletics Palembang Short Distance Running numbers, under the auspices of Koni South Sumatra. Validity test data. 2. Practicality test data. 3. Effectiveness test data. Types of instruments needed to measure validity, practicality and effectiveness The method of test results and measurements using fitness application media and applications that are being developed is calculated from data from validation sheet results, respondent questionnaires and test results and measurements of athletes' physical condition.

The data obtained from the trial activities are classified into two, namely quantitative data and qualitative data. Qualitative data in the form

of criticism suggestions put forward by linguists, media and material experts, athletes and coaches are then collected for the improvement of instrument components of test results and measurements of this fitness application. Quantitative data analysis techniques in this study used descriptive statistical analysis obtained through questionnaires given to linguists, media, materials, athletes and coaches. The language questionnaire sheet consists of aspects and indicators of spelling and grammatical accuracy, by media experts consists of aspects of appearance and aspects of use. The questionnaire sheet by the material expert consists of the component aspects of the physical test to be measured. The questionnaire sheet by the trainer consists of aspects of application use and physical test components. While the questionnaire sheet by athletes is an aspect of the results of physical tests that have been carried out.

The expert validation questionnaire uses a Likert scale that has 5 answer choices according to the content of the question (Arikunto, in Pahlevi & Hartati 20, 21). Each answer choice has a different score, namely strongly agree = 5, agree = 4, disagree = 3, disagree = 2, strongly disagree = 1. The steps in data analysis include: collecting rough data, scoring scores, the scores obtained are then converted into scores with 5 scales.

**Table 1.** Validation Validity Level

Achievement Percentage	Interpretation
81 – 100 %	Sis very Valid
61 – 80 %	Valid
41 – 60 %	Quite Valid
21 – 40 %	Highly Invalid
0 – 20 %	Invalid

**Table 2.** Percentage of Respondents' Achievement

Achievement Percentage	Criterion
81 – 100 %	Very Practical
61 – 80 %	Practical
41 – 60 %	Quite Practical
21 – 40 %	Impractical
0 – 20 %	Very impractical

**Table 3.** Effectiveness Rate

Percentage	Interpretation
$0 \leq TPhp < 40$	Very low
$40 \leq TPhp < 60$	Low
$60 \leq TPhp < 75$	Keep
$75 \leq TPhp < 90$	Tall
$90 \leq TPhp \leq 100$	Very High

## RESULTS AND DISCUSSION

At this stage after the test results and application-based measurement of athletes' physical condition in athletics, short-distance running numbers are declared suitable for use and can be used as data processing of physical test results by coaches, assistants, sports testers and others. But for researchers, it can be said that this application also cannot be widely distributed, in general because it is still in the process of development and it would be even better to be developed again until it becomes very perfect and valid in processing test results and measurement data. This research was conducted in the early stages, namely observing and interviewing coaches in the Jakabaring Sport City Palembang area and Sriwijaya State Sports High School, South Sumatra, especially physical trainers in athletics in short-distance running. As for the place where I often coordinate and always ask, (Bezodis et al., 2019) in the field around tests and measurements of athletes' physical condition what form of test components are usually given and how in processing data the test results and measurements are carried out, he is named Mr. Dwi Amirul Mukminin Sueko, S.Pd. Jas.

Researchers then took data, athlete names that will be needed to be used as research samples on July 27, 2023 (Agung Prabowo, 2020) based on the results of interviews and observations in the field, researchers analyzed the problems found and obtained to find solutions to the problems that arise. (Iyakrus, 2021) Furthermore, researchers also conduct an analysis and survey of any needs for coaches and athletes for problems that arise, then in the need for a digital or web fitness test calculation application that can be used by coaches as a medium and tool for processing physical test results data that is very practical and easy to use even for athletes can also see test results quickly and efficiently

time without having to wait long for the results (Hartati, 2019).

The next stage is for researchers to take physical condition test data on athletes in athletics with short-distance running numbers, and researchers also analyze the components of physical tests that are usually given to athletes by coaches in order to adjust the tests and measurements to be given by researchers, (Yuwono, 2019) steps

This is also the guideline for making fitness test calculation applications for athletes and coaches.

Then the researcher coordinated again with the supervisor, namely Prof. Dr. Hartati M,

Kes to create an initial product, which is in the form of a fitness test calculation application that will be adjusted to the norms and test instruments applicable to athletes in athletics short distance running numbers by looking for various references about test and measurement methods (Rahmat et al., 2016). After the application product is completed, researchers carry out product development, namely entering the physical condition test component instrument into the fitness test calculation application that has been obtained from references, interviews, and observations of survey results.

Researchers discussed making a Group Discussion Forum with several experts, namely Dwi Amirul Mukminin Sueko, S.Pd. Experts in the field of athletics, namely coaches in short-distance running, and Dr. Wahyu Indra Bayu M.Pd as experts in the field of tests and measurements of sports physical conditions while validating the contents of the test and measurement instruments. The result is that the physical condition test used is not entirely used, but there is a reduced test item, namely the Leg dynamometer because basically to measure leg muscle power in a simple way, easier and practical in time efficiency without having to bring the tool from the laboratory.

The test components that have been made and discussed are then applied to tests and measurements of 10 athletes to be sampled research materials, consisting of 5 boys and 5 girls who are athletes fostered under the auspices of Koni South Sumatra Province combined from the Student Sports Education and Training Center (PPLP) according to the level of achievement that has been achieved while studying at Sriwijaya State Sports High School both junior and senior, As a forum for breeding student sportsmen supported by a quality coaching process.

Based on the test results and measurements of 10 male and female athletes, all of them can be categorized as getting scores in the Good category which can be seen in the sample sample table data below and made in the form of a diagram to see the percentage. In the table data, grouping data is rounded into categories from very good, good, medium, less, less categories. From where the results of the category can be, the results of the category are obtained from processing data on test results and measurements that have been carried out on 10 athletes and have been inputted into the physical test application, the results of the category can be. The scores that have been obtained are also classified into categories based on scientific instruments, tests and measurements, Dr. Oce Wiriawan S.Pd., M.Kes.

The results of interviews with athletes and coaches found that there was a problem that arose during training and the process of processing test results data and measuring athletes' conditions that so far, the process was always done manually and during the process of doing training also the form of training instrument test conditions that were always given were always the same, so that athletes also felt bored and bored felt from these problems A physical condition test application is needed as a practicality for coaches in sports besides that it also provides physical condition test instruments that are always varied and up-to-date so that athletes do not feel bored and to overcome these problems. Trainers and athletes say they agree on the need for physical condition test applications and the test instruments given are always varied and up-to-date. Products that are successfully made will be validated by several experts. The expert validation process is to assess and provide input on the initial product until it reaches a certain set value limit (Kresnapati et al., 2020). At this stage, it can show that the initial product is valid and then the next stage of expert validation is carried out development trials.

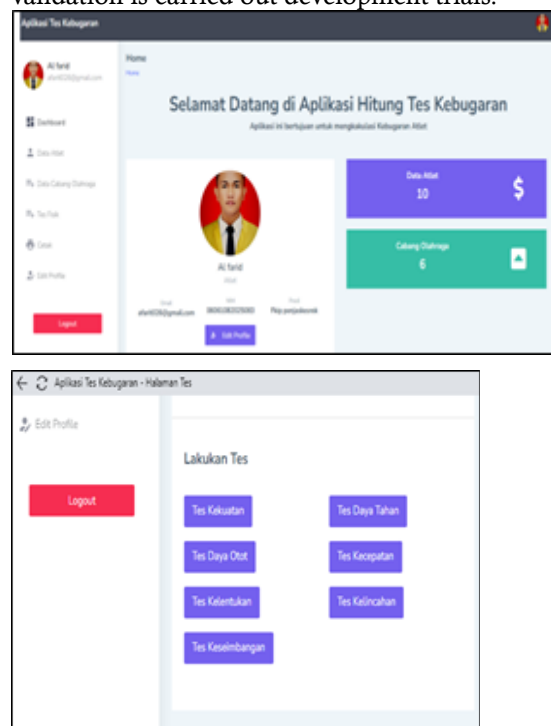


Figure 1. Application Display

The first validation is language validation, namely to Mrs. Ernalida, S.Pd., M.Hum., Ph.D. Linguist validation based on assessment aspects, namely: content feasibility, language, and presentation. The results obtained from the validation of linguists amounted to 83%, obtained the per-

centage of the validity category of the fitness test calculation application, which is valid for testing. The next validation as well as the second stage is the validation of the material validated by Dr. Wahyu Indra Bayu, M.Pd. Based on aspects of assessment and small discussions, the test component material provided is in accordance with the sources and references obtained. The validity validation rate is obtained at 85%, through the results of the percentage of validity categories, test instrument materials and measurements can be included in the fitness test calculation application, are valid and ready to be tested.

The third validation is a media validation validated by Mrs. Silvi Aryanti, M.Pd. Media validated by experts consists of assessment aspects, namely: display, operation and input output loading balance. The value obtained from media validation is 90%, the results are based on calculating the percentage included in the category of very valid validity, then tested in the implementation and practice of the application (Pahlepi et al., 2021).

**Table 4.** Validation Results

Validation	Chores	Percentage	Category
Language Validation	46	83%	Very valid
Material Validation	34	85%	Highly Valid
Media Validation	45	90%	Highly Valid
Sum	125	86%	Highly Valid

In order to understand whether it is feasible and appropriate for the physical test component instruments to be given to athletes whose results will be processed data in the fitness test calculation application on the product to be developed to find their shortcomings and weaknesses (Nuryadin, 2021). Furthermore, in the initial draft preparation step of the physical test instrument component, tests and measurements were carried out on athletic athletes numbering short distance running consisting of men and women as an initial sample of tests and measurements where these athletes consisted of senior and junior levels whose flight hours had participated in national championships or championships (Hartati, 2019).

Furthermore, research at this stage has entered the stage of small and large-scale tests in operational activities for product use to review the level of practicality consisting of 10 small-

scale test respondents and 15 people in large-scale tests, with limited respondents consisting of athletes and coaches in large-scale trials (Sugiono, 2019). Then given in the form of questions and feedback criticisms and suggestions on the application products and test component instruments that have been given. Where the average percentage of questionnaire scores obtained from small-scale trials through respondent questionnaires obtained 78% percentage results included in the practical category while in large-scale trials there was progress by getting a percentage value of 84.9% which was in the range of 80%-100% category which was included in the statement category that the media used in processing physical test result data using applications can be said to be very practical (Pahlepi et al., 2021).

After the value of the level of practicality has been known and obtained, then at this stage is a test to determine how much the effectiveness of the application of calculating fitness tests in the process of processing physical data, the results of the effectiveness test measured from the results of the athlete's physical condition test data through 6 (six) components of the test instrument given the average athlete's physical condition is in the overall percentage category both men and women are at 88.8% included in the very category effective (Pradana Saputro et al., 2020).

10 people consisting of men and women who obtained test results and physical condition measurements were almost perfect, namely 5 people with existing test norm criteria standards to be used in determining the category of physical condition level of an athlete from a total of 10 athletes as a whole. For athletes who obtain criteria in the category of physical fitness level, it can be said that the position is not too perfect even not in a state of not prime physical freshness of an athlete totaling 5 people.

In the category of individual comparison of male and female athletes, the level of influence of measurement results (TPhp) The percentage of test results and physical condition measurements of athletes who obtained the highest score of 85% and the lowest obtained 75% with the average value of the overall athlete's physical fitness level of 80.3%, was in the high category.

The process in development that has been discussed in product studies does not escape the name of shortcomings, at this stage the shortcomings of the products found, namely shortcomings, one of which is that applications like to occur in the process of printing test results. Methods applied and developed in understanding test results and measuring physical test data proces-

sing must always be disseminated to coaches, if necessary KONI conducts or makes open seminar programs for training in the use of science and technology in the implementation and application in the field of sports.

## CONCLUSION

Based on the analysis of research data, as well as the previous discussion, the results of this study can be concluded on the Results of Application-based Athlete Physical Condition Tests and Measurements in Athletics Short Distance Running Numbers are said to be very valid as seen from the results of the study by obtaining a percentage of 83% of language validators with very valid categories, 85% of material validators with very valid categories, and 90% of media validators with very valid categories.

Furthermore, from the results of filling out questionnaires of respondents athletes and coaches from small-scale trials 78%, large-scale tests of use in the level of practicality of 84.9% with Very Practical classification. Meanwhile, based on the results of the athlete's physical condition test, through tests and measurements that have been carried out according to the components of the test instrument given to athletes in athletics, short distance running numbers are said to be effective. Based on the level of influence of measurement results (TPph) of physical condition test results, a percentage of 80.3% was obtained and entered the high category.

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