



Development of Test and Measurement Tools Standing Stork Test Android Based

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Abstract

The purpose of this research is to produce a test tool and measurement of standing stork test based on Android. The type of research used in this research is development research with Research & Development (R&D) research design from Borg and Gall. This research was conducted with 9 research stages namely, (1) Research and information collecting, (2) Planning, (3) Develop preliminary form of product, (4) Preliminary field testing, (5) Main product revision, (6) Main field testing, (7) Operational product revision, (8) Operational field testing, (9) Final product revision. The population in this study used Sports Science Faculty Students and Aceh-North Sumatra PON Pelatda Athletes. The sampling technique used purposive sampling with Phase I trials of 20 FIK students and Phase II trials of 30 athletes of Pelatda Taekwondo Sumut. Furthermore, from the Phase I trial, totaling 20 people showed a figure of 89% with Very Eligible criteria, then from the Phase II trial, totaling 30 Aceh-North Sumatra PON Pelatda athletes showed a figure of 91% with the Very Eligible category. From the results of the research/feasibility test carried out by test and measurement experts, IT experts and sports academic experts, it shows a score of 96% in the Very Eligible category, so it can be used. On the basis of the data obtained, the development of an Android-based standing stork test and measurement tool was declared feasible to be developed as a test and measurement tool for balance.



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INTRODUCTION

Sport is one activity that is favored by all people, both young and old. (Akhmad & Mesnan, 2019), explains that sport is a physical activity that has the nature of a game and contains struggles with oneself or struggles with others as well as confrontation with natural elements. Sports activities have become a necessity for every individual, because sports activities that are good and correct and sustainable can improve physical fitness. Several factors that can affect sports are technology in the field of sports (Supriadi & Mesnan, 2022) (Liskustyawati et al., 2019). Recent advances in technological innovation in field sports are urgently needed for facilities and infrastructure in the field of sports (Rizal et al., 2018) (Gumantan & Mahfud, 2020). Technological innovation in sports is expected to increase effectiveness, efficiency, and accuracy so that it can help in terms of more valid tests and measurements (Supriadi & November Haloho, 2022). The new technology in this study is the standing stork test and measurement technology test based on android which functions to measure the balance level of athletes designed using digital technology (Sari et al., 2019) (Nugraha et al., 2021). The importance of this research is carried out because it is to help sports coaches and educators in training young athletes to develop abilities in balance.

In general, balance biomotor measurement tools already exist and are being developed to become more sophisticated (Zega et al., 2022). The measuring instrument refers to the static balance with the test methods' digital based stands. However, researchers found facts in the field of test kits stork The existing digital-based stands are difficult to apply because the tool must be carried out in a closed room and the tool uses an electric medium to transmit power, so the tool is difficult to carry anywhere, besides that when the electric current goes out, the tool is unable to

operate, this is really a problem that must be solved, let alone was today's all-modern use of tools should be able to efficiency and streamline human work as a tester. Apart from those tools, storks stand impersonally portable and it's hard to carry anywhere so it requires extra energy to move it. Stock standing measuring tool is a measure of balance that is able to measure the extent to which a person is capable maintain self so as not to fall, balance is where when an ability to maintain the neuromuscular system in a position or in an attitude that is efficient while moving (Mesnan & Supriadi, 2022).

Balance is one of the factors that the body needs in carrying out effective and efficient movement activities apart from flexibility, coordination, strength, speed and endurance (Risangdiptya & Ambarwati, 2016). Balance can be stated as good when individuals are able to carry out effective and efficient movement activities with minimal risk of falling (Yeni, 2020). Balance can be divided into two types, namely static balance and dynamic balance: (1) static balance is the possibility of very little space for movement, for example when standing on a narrow pedestal (balance beam, or railroad tracks), when doing handstand, being able to maintain balance after rotating around the place, while dynamic balance is a person's ability to start when carrying out motion activities from one point to another with stability to maintain body balance, for example when dancing, parallel bars training, or stance training, skating training, roller skating and so on.

Standing stork test is one test which is used to determine a person's balance with units of seconds. So far, the problem that is of concern to athletes and other sports practitioners is how to find out the size of the balance that a person, especially an athlete, has. So far, a person's balance is only measured based on a person's ability to defend himself so as not to shake. Measurements can be made through two stages, the first is the manual method and the

standing stork tool test. Both tools have advantages and disadvantages that have been described in previous studies. To support the explanation that the researcher has described, the researcher made observations of the standing stork test kit test, it turns out that from the results of the observations that the researchers made through direct observation during the physical test of Koni North Sumatra towards Pon 2022 in North Sumatra-Aceh in the Multipurpose Building Jl. test still using the manual method and seeming conventional, this can be seen from the results of the test equipment to measure the athlete's balance still using the manual method, meaning that the athlete's position is in a state of readiness with his hands on his waist, and one leg rests on the inside of the knee and one leg again is a concentration, at the sign of "yes" with the feet athlete tiptoe and rests on the lower forelegs, Then tester calculate time using stopwatch, time is stopped when the fulcrum shifts and the entire foot is flat on the floor. Then to strengthen the researcher's suspicions, the researcher conducted a preliminary study by looking for the development of a similar tool through observation in the physical laboratory for measurement tests in the building FIK Floor I, from these results found test and measurement tools standing stork test by using the current digital application it is difficult to do because the tool must be carried out in a closed room and the tool uses an electric medium to transmit power, so the tool is difficult to carry anywhere, besides that when the electric current goes out, the tool is not able to operate, this is really a problem that must be solved, let alone was today's all-modern use of tools should be able to efficiency and streamline human work as tester. Apart from those tools, storks stand impersonally portable and it's hard to carry anywhere so it requires extra energy to move it. Measuring instruments standing stock a measure of balance that is able to measure the extent to which a person is capable of maintaining

himself so as not to fall, balance is where an ability to maintain the system neuromuscular in a position or in an efficient manner while moving.

To support the description that the researcher describes, researchers conducted literacy studies on previous research. From previous research, researchers looked at the types of balance tests that have been done so far used to measure a person's balance, there are at least four (4) tests that are often used to measure a person's balance, while the first type of test is (1) Measuring instrument standing stork test namely a test that is carried out in a way that seems conventional, this test serves to assess a person's ability to balance with only one leg. The method of implementation is as follows: The test stands on one leg, on the dominant leg. The other leg is placed on the inside knee of the supporting leg. Both hands are placed on the waist. On the signal "Yes" the test raises the heel of the fulcrum, so that it only rests on the ball of the foot (tiptoe). Maintain the position for 60 seconds, without shifting the position of the fulcrum and the heel does not touch the floor. Time recording starts when the student starts to lift the heel of the pedestal (tiptoe) until he loses his balance. (2) Measuring tools flamingo balance test is a measure of balance by way of implementation tester standing on a block with one leg, then the other leg is bent close to the knee, the weakness of the flamingo balance test is that the timer still uses a stopwatch so that it is not uncommon when athletes fail to do a slow test in pressing the stopwatch. (3) One leg stand is a static balance test by means of the strongest one leg test as concentration, then the other leg is bent to the front, the weakness of this test tool is that in terms of measuring results there are still frequent errors from the person recording the results, because they still use stopwatch so it's not rare when tester failed to perform the unaligned logger test on pressing the stop button on stopwatch. (4) Standing stand test is a measure of balance with one foot rests and one leg bent close to

the knee, then the eye closed, the weakness of this test tool is that it still uses the manual method with calculations still using a stopwatch. Research tools that researchers designed are efficient and effective. The effective meaning is that the tool that the researcher designed does not change the tests and measurements of the standing stork test. That means, researchers use a mat or plank blocks for a foothold concentration leg that performs the test and measurement of balance. Whereas Efficient The intended tool is a tool that researchers can design brought everywhere means character portable with not too many components used but does not reduce the validity of the test kit.

Then the researcher conducted a needs analysis of 10 athletes who often carried out tests and measurements. The needs analysis here meant to see to what extent applicability what test and measurement tools will the researcher design? needed by the user (user). From the needs analysis that researchers did through a questionnaire arranged by researchers it can be seen that 100% of athletes have done balance tests and measurements, 100% of athletes are still doing balance tests and measurements in the conventional way, 100% of athletes want to try test and measurement tools standing stork test, 100% of athletes want to get tests and measurements using technology and 100% of athletes want new test and measurements.

Observations of researchers when measuring and evaluating balance, a person's balance is measured based on the athlete's ability to hold himself to stay balanced. The measurements taken are still limited with conventional technology, this can be seen from the results of the test equipment to measure the athlete's balance still using a manual method, meaning that the athlete's position is in a state of readiness with his hands on his waist, and his feet moment rests on the inside of the knee and one leg again is a concentration, at the sign of "yes" with the feet athlete tiptoe and rests on the lower

forelegs, Then tester calculate time using stopwatch, time is stopped when the fulcrum shifts and the entire foot is flat on the floor. This method is less effective as material for measurement and evaluation for athletes as well as coaches in optimizing ability and looking at the athlete's balance. Researchers want to innovate tools that are efficient and effective. The effective meaning is that the tool that the researcher designed does not change the tests and measurements of the standing stork test. That means, researchers use a mat or plank blocks for a foothold concentration leg that performs the test and measurement of balance. Whereas Efficient The intended tool is a tool that researchers can design brought everywhere means character portable with not too many components used but does not reduce the validity of the test kit. The results of the measurements taken will be connected via the Android application. Several studies regarding the use of android include (Kresnapati et al., 2020) (Sari et al., 2019). With this tool, the researchers hope that in the future athletes and/or other sports practitioners will no longer have difficulty knowing how much balance is produced. This tool will also help to maximize the ability of athletes as self-evaluation material. (Ardi et al., 2022) (Gumantan et al., 2021).

METHODS

The type of research in this research is qualitative research with development studies used in a research must be based on the issues raised (Sugiyono, 2010). The variables raised in the background of the problem will require a development and a method to solve it even though the research problem is the same, but sometimes a researcher can choose one or more types of research development that can be used to solve the problem. This study used the development model from Borg and Gall which was adapted into a simple model, namely: determining research potential and

problems, gathering information, needs analysis, product design and design validation, media expert test, swimming expert test, physical education learning expert test, trials small groups, revise the results of trials, trials large group, revising test results, final product development. Research and development in this process uses a quantitative approach and uses a research design Research & Development (R&D) from Borg and Gall which consists of ten steps, among others.

- 1) Research and Information Collecting
- 2) Planning
- 3) Develop Preliminary of Product
- 4) Preliminary Field Testing
- 5) Main Product Revision
- 6) Main Field Test
- 7) Operational Product Revision
- 8) Operational Field Testing
- 9) Final Product Revision
- 10) Dissemination and Implementation

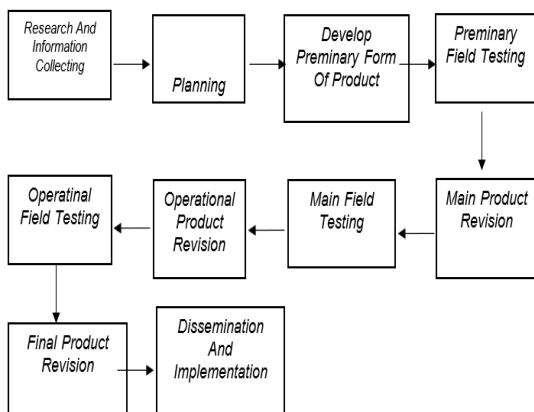


Figure 1. Borg and Gall Development Steps

RESULT AND DISCUSSION

There are several types of ways to measure balance, one of which is standing stork test which can be used as a reference in carrying out tests and measurements of balance for a person or athlete to see the ability of an athlete to carry out tests and measurements of balance, but nowadays

standing stork test that exist today, still use manual methods in measuring it without the utilization of Science and Technology in its utilization even thought of was In this all-digital era, there should be the use of appropriate technology in the field of sports, especially to measure the athlete's balance expected the tool is able to answer the challenges of science and technology and sports development (tests and measurements). In addition, in order to answer the challenges of increasingly rapid technological developments in the field of sports, it is necessary to carry out a scientific study (research) using appropriate technology to produce an innovative work product that is able to answer challenges in the digitalization era. Furthermore, in this study, the researcher developed a test kit standing stork test by changing conventional test and measurement tools (manual) in the direction of technology utilization expected able to answer the challenges of the digitalization era and as a test and measurement tool whose level of accuracy is beyond doubt because it uses a time recording sensor to measure a person's balance. In the implementation of tests and measurements standing stork test, that is where the sample will stand on a digital board designed to measure the balance of a person, the board designed by the researcher already contains a time calculation sensor. The time starts when the athlete is preparing to do the test and one leg is lifted and placed beside the knee then the foot that is measured is the foot focus which is above the impact sensor, then the implementation of the impacting leg tiptoes in accordance with the test and measurement instrument standing stork test.

Phase I Product Trial

Phase I trials were carried out on 20 students of the Faculty of Sports Science. This aims to provide input and an assessment of the results of trials conducted on samples to see the level of usefulness of the tool and

the effectiveness of the test and measurement tools standing stork test based on android, so that it meets the criteria of theoretical and empirical feasibility. The data obtained is then used as a basis for efforts to make revisions at a later stage. Results obtained in the field after carrying out the Phase I trial is the work of the test kits standing stork test based on android that is used can work quite well and the results of measuring time from people try to read properly by the time sensor that is on the feet concentration connected in the IOP system on Android are listed properly. From the results of trials conducted by researchers on 20 FIK students, it can be seen that they have been classified in the form of questionnaires, by grouping into 2 aspects namely, clarity of material, material aspects so that there are a total of 20 questions, the results of athletes' answers are grouped into 5 categories namely SS (Strongly Agree), S (Agree), SD (Moderate), TS (Disagree), STS (Strongly Disagree) Agree) with an assessment of 5,4,3,2,1. The results of the phase 1 trial on FIK students were outlined in a formula percentage number of answers/maximum score x 100% with the following results. Of the 20 small group trial samples with a total score of 1,793 divided by a maximum score of 2,000 x 100%, it resulted in a presentation of 89% with the criteria **Very Worth it**. During the Phase I trial, the researcher found field findings on the test kits standing board jump based on android that researchers pour into **Table 1**.

Table 1. Research Findings

No	Research Findings
1	Samples often do not step on the sensor when the foot that is not the impact foot falls towards the front, side or back
2	Board tool standing stork test on the pedestal where there is a sensor it is still often sticky when tested with a larger body weight

- 3 Board Standing stork test which connects the sensor with the leg focus those who do the test still have connectors that are not comfortable to stand on
- 4 Board Standing stork test cannot be exposed to water so the tool cannot be placed in any place
- 5 Pairing of test and measurement tools standing stork test with IOP android must go through Bluetooth pairing first
- 6 In the Android IOP, the norm of implementation results has not yet been seen standing stork test android based
- 7 Athlete still waiting for the implementation warning from tester

Phase II Trial Results

Phase II trials were carried out on 30 PELATDA PON athletes who often carried out tests and measurements, especially to measure balance, this aimed to provide input and an assessment of the results of trials carried out on samples to see the level of usefulness of the tools and the effectiveness of the test and measurement tools standing stork test based on android, so that it meets the criteria of theoretical and empirical feasibility. The data obtained is then used as a basis for efforts to improve the final product of test and measurement tools standing stork test android based. Results that got in the field after carrying out the Phase II trial is the work of the test and measurement tools standing stork test android-based is it possible to use and meet the criteria referred to in the test and measurement tools standing stork test android based. From the results of the trials conducted, it can be seen and classified in the form of questionnaires, by grouping them into 2 aspects namely, clarity of material, material aspects so that there are a total of 20 questions, the results of athletes' answers are grouped into 5 categories namely SS

(Strongly Agree), S (Agree), SD (Moderate), TS (Disagree), STS (Strongly Disagree) Agree) with an assessment of 5,4,3,2,1. The results of the second stage of trials on these athletes are outlined in the formula percentage number of answers/maximum score x 100% with the following results. Of the 30 samples of the Phase II trial with a total score of 2,743 divided by a maximum score of 3,000 x 100%, it resulted in a presentation of 96% with the criteria **Very Worth it**.

The Final Product

From the results of the assessment and the results of the product trial stage 2 above, it becomes material for improving the final product of test and measurement tools standing stork test based on android that the researchers developed. In the preparation efficiency of conducting tests and measurements standing stork test android based, the researcher goes through several processes to perfect the research, while the stages of the process are passed, namely (1) Defining the problem and gathering information as a rationale for making a development research concept, (2) Determining what form of development will become an object of research, (3) Making a development research in collaboration with a team of experts, (4) Revise the design of the developed test and measurement tools, (5) Initial product of the test and measurement tools standing stork test based on android, (6) Phase I trial, (7) Revision of phase I trial to experts, (8) Phase II trial and assessment by experts, (9) Final product. Furthermore, due to the limitations of the researchers, this research was carried out only up to the Phase II trial stage, at which stage experts consisting of test and measurement experts, IT experts, and sports academic experts revised and validated the test and measurement tools. standing stork test android based by category **Very Worth it**. From the stages of the process to test and measurement tools

standing stork test android-based which can later be used by coaches and athletes, especially in the province of North Sumatra and add treasury test and measurement tools in the neighborhood Faculty of Sports Science Unimed. The final product has gone through a series of development paths so that it becomes a product of test and measurement tools standing stork test based on android, namely as follows:



Figure 2. Research Final Product

Implementation Method:

Objective : To assess balance by using one foot.

Equipment : The designed Box (Block Board) measures 15 x 15 cm

Procedure : Test standing on one leg, on the dominant leg. The other leg is placed on the inner knee of the supporting leg. Both hands are placed on the waist. With the sign of "Yes" the test lifts the heel of the foot, until it only rests on the ball of the foot (tiptoe). Maintain the position for 60 seconds, without shifting the position of the fulcrum and the heel does not touch the floor. Time recording starts when the student starts to lift the heel of the pedestal (tiptoe) until he loses his balance. Provisions for the Use of Test and Measurement Equipment Standing Stork Test Android based:

1. Turn on the device by pressing the green ON switch

2. For initial users, do bluetooth pairing by opening bluetooth settings on android, then selecting the bluetooth name SLAVE_ to do the initial pairing (this process is only done the first time using the tool).
3. Open the application, then click the bluetooth logo at the bottom left.
4. Select device nameslave and wait a while, if connection succeed will be seen the text connect is green and the tool is ready to use
5. In rule use of the tool, the athlete must stand on the board provided.
6. If the athlete chooses concentration right foot, the position of the right foot must be on the part of the plate in the middle where the sensor has been installed, or vice versa.
7. Then click START MENU / START WOMEN (adjust to the gender of the athlete doing the trial)
8. The system will start calculating the time when feet stand on tiptoe with note that the middle plate is not stepped on.
9. The system will stop counting if one of the feet has stepped on the plate installed sensor.

DISCUSSION

Tool test and measurement standing stork test android based that researchers have developed is digital based with calculation of balance results connected to the android system with very easy implementation, where in practice it utilizes technology as a test and measurement tool so that the results of the tests carried out have no doubt about the validity level because using appropriate technology will have an impact on validity level test and measurement standing stork test android based the. The development process through research and development procedures. Through several planning,

production and evaluation, this product was developed with the help of someone who mastered electronics and mechatronics engineering. This development went through various stages, namely the design stage, the tool frame stage and the installation stage of the tools until they were connected to the Android system. After the initial product is produced, it needs to be evaluated by experts through expert validation and needs to be tested on samples. At the evaluation stage tests and measurement experts, IT media experts and sports academic experts. In the next stage of the research, Phase I product trials and Phase II trials were carried out.

In the process of validating test and measurement experts, IT media experts and sports academic experts are carried out using content validity according to (The Hulfian, 2022) (Siswanto, 2008) content validity, namely validity based on expert opinion that the instrument is feasible to be used as a data collection tool. Content validity proof (content validity) was obtained by agreeing with experts (expert judgment), that is test and measurement experts, IT media experts and sports academic experts. Based on the results obtained, it can be continued to the next stage because the tool is declared feasible and there are no revisions to this test tool. Quality "Development of Test and Measurement Equipment Standing Stork Test Based on Android" is included in the category "**So Worth it**" This statement can be proven from the results of the assessment analysis "**Really Worth It**" of the three good expert test and measurement experts, IT media experts and sports academic experts as well as in the assessment of trials, Phase I trials, and Phase II trials. Respondents or samples are enthusiastic about this product because respondents are interested in trying it and wondering about how it works and how it is used, this product can be disseminated for test and measurement aids standing stork test android based.

If looked at in the findings of the research results when researchers conducted Phase I and Phase II trials, there were advantages and disadvantages of this tool. The advantages include (1) Providing efficiency and effectiveness to samples in conducting tests and measurements in particular standing stork tests. (2) Can help the sample in knowing the balance test. (3) Tools are portable means you can bring Where have you been. (4) Increase knowledge about technological advances. (5) The balance test results are connected through the android system. (6) Changing manual tools in the direction of technology utilization. Lack of test and measurement tools standing stork test based on android are (1) the need for additional sensors when athlete not stepping on the sensor to stop the recording time, (2) board design standing stork test less interesting in terms of color (3) it is necessary to replace the hinges so that when stepped on it does not hurt too much and does not injure the foot

CONCLUSION

From the results of the research that has been done, the researchers concluded that the test and measurement tools standing stork test Android-based is already feasible to be used in conducting tests standing stork test. With the development of test and measurement tools standing stork test based on android that researchers have developed, p stakeholder sports fields can more easily see the test standing stork test and can also be used as evaluation material, especially in increasing the balance of tester. This development research produces a product test and measurement tools standing stork test android based which is expected to work effectively and efficiently so that it can be an attraction for athletes and coaches in activities to find out results athlete balance as well as for future researchers. This test tool is expected to provide convenience in the implementation of measuring the balance of

athletes as well as accuracy in seeing the results of the athlete's ability to balance. In carrying out tests and measurements the data will go directly to the IOP device in the Android system. Sports achievement is a compound phenomenon, because there are many factors that influence it. One of the influencing factors is the development of sports technology. In the modern era, the development of technology in sports is very rapid. Evidenced by the many changes ranging from sports infrastructure, sports learning methods and others. The development of sports technology is considered very important to advance sports achievements, especially in Indonesia. Today the development of science and technology (science and technology) is very rapid. Along with the rapid development of science and technology, there are many innovations from various studies that are growing rapidly as well. Various human activities in everyday life have also been greatly assisted by advances in science and technology, including in the field of sports which have been assisted in the process of training and matches. Support from science and technology plays a big role in helping athletes to achieve so that starting from talent search, training, tests and measurements, athletes and coaches are also helped. The development of science and technology in improving the ability of athletes to carry out tests and measurements is very necessary because it is hoped that when science and technology takes part in the world of sports, especially in terms of tests and measurements, test equipment will be more effective and efficient.

The latest advances in technological innovation in the field of sports are urgently needed for facilities and infrastructure in the field of sports. Technological innovations in the field of sports are expected to increase effectiveness, efficiency and accuracy so that they can assist in terms of more valid tests and measurements. The new technology in this study is test and measurement

technology Shoulder Clears digital-based which functions to measure shoulder flexibility using digital technology. The importance of this research is carried out because it is to help sports coaches and educators in training young athletes to develop the ability to see the flexibility of the shoulder muscles needed by several sports. In addition, the overall definition of this research is to change manual test and measurement tools towards the use of technology so that it is expected to be able to increase the level of validity of the test kits. One of the test tools that will be developed by researchers is a test tool shoulder wrist. This tool was developed using technology in recording the results of shoulder flexibility.

The new technology in this study is the shoulder flexion test and measurement technology (shoulder wrist) which serves to measure the flexibility of the shoulder using digital technology. The importance of this research is carried out because it is to help sports coaches and educators in training young athletes to develop skills in terms of shoulder flexibility. In addition, the overall definition of this research is to change manual test and measurement tools towards the use of technology so that it is expected to be able to increase the level of validity of the test kits. Shoulder flexibility test and measurement tool shoulder and wrist what the researchers observed at the time of the Pelatda KONI North Sumatra athlete's physical test which was carried out at the GSG (Gor Versatile) Jl Williém Iskandar, it was seen that the test to measure the flexibility of the shoulder muscles was still using a manual method, meaning that the test equipment was still using the manual method. , meaning that the test and measurement tools are still using conventional methods. It is hoped that there will be an appropriate technological breakthrough to assist and actualize tests and measurements shoulder and wrist so test and measurement shoulder and wrist it is more precise and its validity is not in doubt

because its utilization by using technological media is expected to be able to erode the doubts that have existed so far. In addition, the use of a wooden meter as a reference in measuring the distance measurements taken by athletes is not quite right, especially in the modern era and increasingly advanced technological waves, causing the level of relevance to be something that should be focused on, applying science and technology in the world of sports causes efficiency and the effectiveness of test and measurement tools is even more valid because changes in tests supervised by humans have turned into test kits designed using technology that need to be designed and become a focus in research that researchers will design.

Researchers are interested in conducting a needs analysis to see how far the tool can be needed by user through the calculation of quantitative data which is translated through a needs analysis questionnaire, as for user here the intention is to users with a total of 10 people of whom are trainers strength and conditioning (SC) Pelatda KONI SUMUT from 5 sports, namely sports that use test and measurement tools shoulder and wrist including Bolling, Taekwondo, Bodybuilding, Roller Skating, Archery and 5 athletes as tester who often perform tests and measurements shoulder and wrist. From these results it is known through the following percentages: 100% of athletes and coaches know the test and measurement tools shoulder and wrist, 70% of athletes and coaches say that test and measurement tools shoulder and wrist ineffective and the level of validity is questionable, 100% of athletes and coaches have never seen and carried out tests and measurements using technology, 100% of athletes and coaches need test and measurement tools shoulder and wrist android-based to measure shoulder muscle flexibility, 100% of athletes and coaches want to get a test and measurement tool shoulder and wrist android based.

Several studies regarding test and measurement tools have been carried out by previous researchers (Mesnan, 2021) which explains that the development of test and measurement tools shoulder and wrist which was developed is able to answer the world's challenges to science and technology-based shoulder flexibility test and measurement tools. In addition, the use of Android in sports is a breakthrough that must be developed and applied in an era of increasingly rapid global onslaught. other components may have. Several studies regarding test and measurement tools that have been carried out by previous researchers which are used as the basis for a conceptual framework through relevant research include (Aditya Gumantan, 2021), (Aditya Gumantan, 2020), (Romi Faraz N, 2021)

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