

# Development and Validation of Scoring System to Determine the Winners of Kalari Adimurai

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## Abstract:-

## Introduction

The goal of this research is to design and validate Kalari Adimurai's new scoring method for determining the winners. Five variables were allocated as test items to achieve the aim of the scoring system: accuracy and precision, torque, sequence, firmness, and persistence.

## Methodology

It was decided that each component would be given equal weight and scored with a total of twenty points. The winners will be determined by a panel of three judges and a ring chairperson.

## Statistical Technique

As a sport activity, the inter-rater reliability was calculated to investigate the consistency of the judges' score. A minimum of 60% agreement was set to test the significance level.

## Results and Discussion

The statistical inter-rater reliability of the scoring supports it with a high degree of agreement (70 percent), which exceeds the required percentage of 60 for sports.

**Keywords:-** Accuracy & Precision, Torque, Firmness, Sequence and Persistence.

## I. INTRODUCTION

A "score" is a quantifiable assessment of an individual or team performance in a sporting activity. Score is often expressed in the abbreviated unit of measurement, and occurrences in the competition can raise or lowers the score of the competitors which involved in respective sporting activity. Most games with a score utilise it as a quantitative measure of game success, and in competition, the goal of getting a higher score than one's opponents is commonly set in order to win. (htt5)

A. *Reviews on scoring of Martial arts (Karate and Pencak Silat)*

### ➤ *Karate scoring system*

Contestants are awarded a red or blue belt to judge the katas. A panel of five judges uses a red or blue flag method to determine their decisions. Technical performance accounts

for 70% of the score, while athletic display accounts for 30%. Even though the candidates will not be competing against one other, the display should be realistic.

The contestants must demonstrate all of the attention and power that they would perform in an actual battle, as well as the potential impact of their tactics on the audience. Contestants must balance speed, power, and strength with grace, balance, and rhythm.

### ➤ *Criteria for Evaluation (Katas)*

- Displaying the fundamental aspects of kata: degrees of strength, constriction and expansion of the body, variation in the tempo of the movements, and fighting spirit
- Showing fluidity in foot movements and following the right course of direction
- Demonstrating a comprehension of the purpose of each movement
- Overall performance and demonstrating the main features of the selected Kata
- Proper use of stances and postures, as well as the capacity to focus the mind
- Power and accuracy in the execution of fundamental techniques

### ➤ *Scoring*

- Beginner Under Belts: 6 – 7.5 points
- Intermediate Under Belts: 7 – 8.5 points
- Advanced Under Belts: 8.5 – 10 point

### ➤ *Scoring System in Pencak Silat (Tunggal):*

TUNGGAL (Single) category is the category of Pencak Silat competition performed by one Pesilat that performs his skill in Jurus Tunggal Baku (Single Compulsory Movement), accurately and firmly, complete soulfully with empty hands and with weapons according to rules and regulations apply for Tunggal category.

Two variables are used to evaluate success in this category:

### ➤ *Accuracy of movement*

Subtracting the penalty points from the total number of moves yields the score.

### ➤ *Firmness of movement*

The composition is divided into four sections: motions, movement rhythm, soulfulness, power, and stamina.

The total score varies between 50 and 60 points.

#### B. Scoring in Pencak Silat (Tunggal):

The winner is the contestant who gains the highest score for his/her performance from 3 (three) out of 5 (five) jurors with elimination of the highest and the lowest score. (htt7)

#### C. The beginning of the scoring system of Kalari Adimurai:

The evaluation of scoring systems for Pencak Silat (Tunggal) and Karate (Katas) will provide the basis and lead the way to framing the scoring system for the Chuvadu event in Kalari Adimurai. The World Federation Kalari Adimurai's technical board finalised the five variables: accuracy and precision, torque, firmness, sequence, and persistence. The variables chosen provide an accurate assessment of chuvadu event in Kalari Adimurai.

#### D. Introduction to Chuvaddu

Chuvaddu (Single) category is the category of Kalari Adimurai competition performed by the Athlete that performs their skill in Chuvaddu (bare hand Movement), accurately and firmly, complete soulfully with free hands according to rules and regulations apply for Chuvaddu category.

#### E. Description of scoring variables in Kalari Adimurai

Scoring consists of five components

- Accuracy and Precision
- Torque
- Sequence
- Firmness
- Persistence

Accuracy and Precision score includes the following elements:

- The accuracy and Precision of movement in each movement.
- The position of upper and lower limbs in each movement.
- Repeating the same movement.

Torque score includes the following elements:

- The swing phase of hands and legs in each movement.
- The time taken for each swing will be considered.

Sequence includes the following elements:

- The transition from one movement to other movement
- The transition phase of one direction to other direction
- The uniformity of the movement will be considered

Firmness includes the following elements:

- The control of block and punch in each movement.
- The power of block and punch in each movement.
- The soulfulness will be considered.

Persistence includes the following elements:

- The ability to withstand energy throughout the event.
- Able to perform the stunt without tired.

Each scoring components carries 20 points of each. The athlete accumulates maximum score 100 points(5×20)

The selection of the winner

- The final scores will be calculated using the average of five judges for each component.
- The athlete who gains performance obtains the maximum points from all the five judges will be awarded winner.
- If the scores are tied, the winner will be determined on the basis,
- The athlete who score maximum points in Accuracy & precision.
- If the score still remains the same,
- The athlete with the highest sequence and firmness scores.
- If the score still remains the same,
- The ring chairperson requests the athlete do execute the same event.
- The athlete finishes within lesser time along with five (5) components.
- If the score still remains the same, The position will be shared.
- After the Jury has completed their duty of scoring all contestants in Chuvaddu category, the score of each contender is announced by the ring chairperson.

#### F. Importance of Torque in Kalari Adimurai:

Torque is vital for human movements since it is what causes joint movement. It is also interesting to note that muscles have small moment arms in general, which implies that increasing muscular force is the primary way to increase muscle torque. Rotation occurs when a force is applied to a bone at a distance from the joint center and at an angle that prevents the force from passing through the joint center (assuming that it is the only torque created at the joint). (htt4)

The Kalari Adimurai technique involves rotation movement in both the upper and lower limbs. Hence the technical board decided that Torque should be assessed since Kalari Adimurai movement patterns or skills produce force, whether they are defensive or offensive techniques. Because other martial arts, such as Karate and Pencak Silat, do not quantify torque measurement. This is why torque was selected as one of the major determinants.

#### G. Scoring system Kalari Adimurai vs Karate vs Pencak Silat:

Kalari Adimurai (Chuvaddu), Karate (Katas), and Pencak Silat (Tunggal) are all stunts executed without opponents scoring, which will pose a challenge for the judges as well as the audience to cope with the scoring system. Adding at least five criteria to the scoring system to make it easier to interpret for the judges and audience seems logical. All determining criteria are given equal weight and share equal points in Kalari Adimurai (20 points). Whereas the Karate and Pencak Silat scoring systems do not specify the determining elements in detail, relying solely on the judges' assessment. For karate and Pencak Silat results, an individual judge will be assigned a maximum of 10 points and a maximum of 60 points.

Finally, the outcomes will be based on the average of the middle scores. Due to the complexity of the Karate and Pencak Silat scoring systems, a simple scoring method was developed by WFKA technical board. This is the reason behind WFKA technical board chose these five determining variables to include in their scoring system.

*H. Relationship between five determining factors:*

The accuracy in sports defined as "The capacity to regulate movement in a certain direction or at a specific intensity," Another way to express accuracy this implies exerting control and being able to react quickly. (htt)

Torque implies moving the arms and legs into secure postures before and during fundamental movements. (htt1)

The ability of the body and/or things to move in response to a stimulus by combining fundamental movement skills with movement aspects. (htt2)

Firmness or Strength is defined as the capacity of certain muscular groups to create maximum force in a single exertion to overcome a resistance.

Persistence or Endurance is a muscle group that can create sub-maximal force over a long period of time either through repeated movements. (htt3)

In general, all five of the aforementioned elements are significant in sports, and the factors are interconnected. Due to their correlations, these determining aspects constitute highly linked action in martial arts such as Kalari Adimurai (Chuvaddu), Karate (Katas), and Pencak Silat (Tungal).

*I. Inter-rater reliability*

Inter-rater reliability is a statistical term that describes the degree of agreement between numerous raters or judges.

It is used to determine the reliability of responses provided by various things on a test. If a test's inter-rater reliability is low, it might mean that the elements on the exam are confusing, unclear, or even superfluous. The idea of "agreement among raters" is simple, and inter-rater reliability

has long been measured as a percentage of agreement among data collectors. (htt11)

The better the inter-rater reliability, the more consistently several judges assess comparable items or questions on a test. In most domains, an inter-rater agreement of at least 75% is necessary for a test to be regarded as trustworthy. However, in other domains, larger inter-rater reliabilities may be required.

The appropriate degree of agreement will be determined in accordance with the field. However in sporting event, acceptance of a 60% is good enough rater agreement to determine the winner.

**II. METHODOLOGY**

*A. Formation of Judges Group:*

The WFKA technical board members recommended that there will be one ring chairperson and three judges for the competition to determine the winner in each group.

*B. Selection criteria for judges:*

It was established by the technical board that judges should have knowledge of movement analysis rather than knowledge of Kalari Adimurai's skills. As a result, PE instructors were chosen as competition judges. Twenty PE teachers volunteered as judge in the event .

*C. The Judges' Workshop:*

The workshop for the PE instructors was delivered by a well-trained Asans (Masters in Kalari Adimurai) and technical board members during a 45-day period. The 45-day preparation period will lay the groundwork for appraising the contenders and determining the competition's victors. Three simulated competitions were held before the championship. The judges were initially unable to decide the winners. Before the major tournament, Asans (Masters of Kalari Adimurai) and technical board members thoroughly prepared the judges.

*D. Scoring quantitative vs qualitative:*

1	<b>Quantitative</b>	<b>13.5</b>	<b>14.0-14.5</b>	<b>15.0-15.5</b>	<b>16.0-16.5</b>	<b>17.0-17.5</b>	<b>18.0-18.5</b>	<b>18.5</b>
2	Qualitative	worst	poor	bad	average	good	better	best

*Instruction to the Judges*

The technical board provided hints and recommendations to improve the quality of the judges' scoring and ensure consistency among judges. When deciding on the winner, the judges used about 80% and 70% of the qualitative and quantitative criteria, respectively. Despite that the results were revealed in qualitative data i.e.,

in numbers. Furthermore, the judges were instructed to make their decisions based on the group's competence. For instance, the perfection capability of a under the age of six (Under-6) cannot be compared to the perfection capability of a competitor under the age of sixteen (Under-16). The hints were given in below table.

*Score sheet model: for individual competitor*

Judge's Score	Accuracy & Precision	Torque	Sequence	Firmness	Persistence	Total
Judge I	16	16.5	17	16.5	17	83
Judge II	17	16.5	16	16.5	17	84
Judge III	17	16.5	16.5	16.5	16.5	83

*Ring Chairperson Scoresheet Model:*

Total score of Judge I	Total score of Judge II	Total score of Judge III	Total Points
83	84	83	250

The judge will have 20 seconds after Chuvaddu's performance to submit their score for the five elements. The cumulative score of each judge is then forwarded to the ring chairperson. The total scores of Judge I, Judge II, and Judge III will be announced by the Ring Chairperson, followed by the total points.

### III. RESULTS AND DISCUSSION

In terms of the national championship, the five-factor scoring system works well, and the technical board chose to preserve it, though it may accept a few improvements in the near future. The statistical inter-reliability supports the scoring with a high level of agreement (70%) that exceeds the required percentage of 60 for sports.

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