THE PHYSICS OF TRADITIONAL WALL BALL GAME AND ITS RULES

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ABSTRACT:- *Wall Ball Game is traditional game commonly played in Ethiopia, particularly in Ankober Worda. Only the young men are involved in the game and played by two teams that not consist of equal members of players. In the present study the application of basic concepts of physics in Wall Ball game was described. Descriptive method has been implemented and data collection techniques such as interview, field observation, close and open ended questionnaires and oral information are used. In Wall Ball game, it is found that the team representative who, throw the ball from their team to the opponent should make an angle rages from $110^{0} - 115^{0}$ from standing point. Then the player from opponent teams who catch the throw ball, should come to the mid-field and throw back the ball to hit the team representative with an angle ranges between from $99^{o} - 102^{0}$. If the angle is out of this range the probability to hit the team representative will decrease.*

KEYWORDS: *Wall Ball game, Ankober Worda, Range, Projectile Motion*

I.

II.NTRODUCTION

Wall Ball game is cultural fencing has broken off from the fathers and the tournament takes place in April, very year as the name implies, this cultural game comes from a pillar of stone. Only the young men are involved in the game with two teams having unequal number of players. The surprising thing is the players have no the idea of physics that plays assert role in this game

A cultural game has a power to capture the ideas and behaviors of people imagination at one period of time and carry that through time to their descendants [1, 2]. The game as various importance such as biological, spiritual, social, political, economic, cultural and historical linkages. Cultural game studies is an interdisciplinary and trans-disciplinary field of research that looks at the ways how culture is created and what roles culture has for example regarding to power and politics[3]. The cultural studies have made a major contribution to our understanding of the complex relationships between cultural sport and power and about the strength of culture [3]. Anyone who can watch a baseball in motion can

see a projectile motion [4]. The ball travels in a curved trajectory and returns to the ground [5]. Projectile motion of an object is simple to study if you make to assumptions: - (1) the free fall acceleration is constant over the range of motion and is directed down ward and (2) the effect of air resistance negligible [6, 7]. In Wall Ball game studies the relative importance of the angle of release in the event, the estimation of the optimum angle of release in way that the distance thrown is maximized. This paper will focus on the trajectory that a wall ball game follows and the concept of two dimensional motion particularly proctile motion.

II. FINDINGS

2.1 General Techniques, Rules, and Scoring of Wall Ball game

Wall Ball game is played by only male who are adult and youth. The nature and the organization of players have team formation which is divided by two groups and the proportion of players may not be always equal. The playing field prepared and dissects into two equal parts for first time by the group representatives and bound by the stone at the end line and at the center of the field.

In order to start the game the team representative throws the ball upward the sky. The team two or team one player trying to catch the thrown ball and then the game begin and continued by players who catch the ball.   There is no time limitation the later players joined the teams based on their interest. If from team two player receives the ball and trying to come on the center of the field and striving to kick the representatives of team one without crossing the boundaries, whereas any one of members of team one players hold ball without kicking his representatives and moving to the position of team representatives and try to kick a person who stand at position of center of the field.   Since the team one representatives striving to escaped from his attempt of hitting however the team two players come back and if he kicked the score will be counted as one point (+1) for team two. In general, if one player receive the throwing ball and move to of the field center and kick the representatives the score one point (+1) for his team, where as if team have conceded one point would be canceled.

While either of team members may change to opponent team. When the player leaving his former team and the team have debit or cost his former player insulting (shaming) by

showing the teams defeat and his weakness associated to various poem and songs. The game continuedin this way until either of the team score ten points and then shift place. The one on the left of the field will come to the right and vise versa

2.2.Areas of Playing ground

The preparation of playing ground prepared one day before the game and the length of playing ground is 80 m and the divided in two equal parts that means half-half 40m. Finally after playing ground measurement is done, digging out the groundand put the stone at positions of standing track of team representative and center of the field which serves as scope of boundaries. Figure 1 below shows the wall ball game playing ground
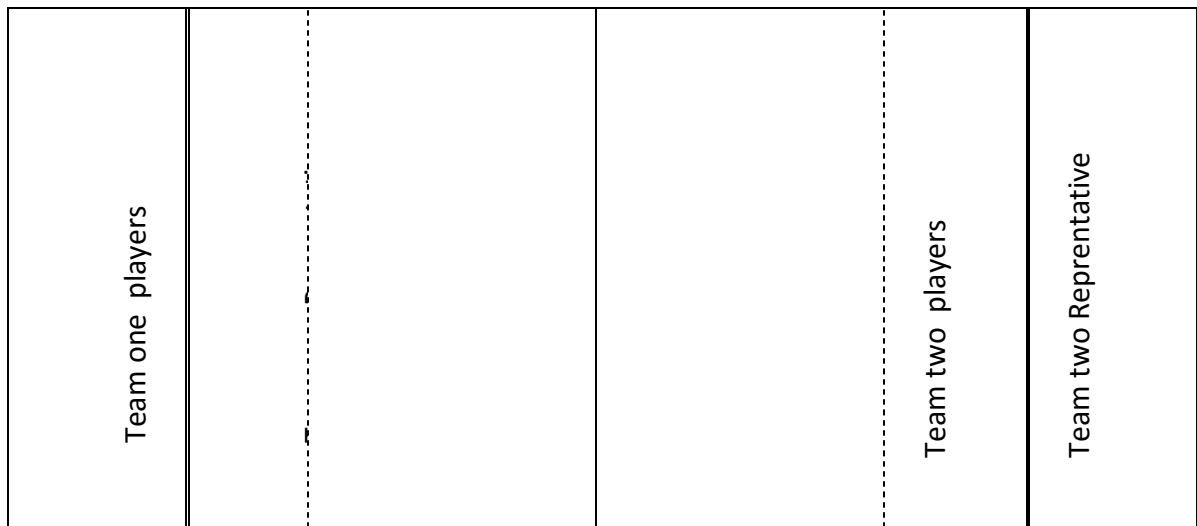
Figuger 1: Playing area of Wall ball game.

2.2.   Morale value of the Wall ball game

Generally one team scores ten points on the opponent team, the team shifting the playing field. At this time the loser changing silently whereas the scorer insulting by different poems which is advocates defeated. The representative of one team continues his position as captain only not score points by the opponent team, whereas if opponents scores the team voluntarily delegates another representatives, however the ball not kick the team representatives, continuing his position until the accomplishment of the game.

The nature of the game, during the game the player who are tall, physically fit and strong sprit players have a better potential to receive thrown ball however, all players have equal opportunities or chance to receive the thrown ball.

III. METHODS

Descriptive method has been implemented and the data collection techniques such as interview , field observation , close and open ended questionnaires and oral information were used   materials are in-depth interview, field observation, close and open ended questionnaires, oral information were used .

IV.RESULT AND DISCUSSION

4.1.   Physics of Wall Ball Game

In this game projectile motion more describes the motion of the ball.When the ball travels in air, the force of gravity and air resistance acting on it. Those basic resisting forces will limit the motion of the ball. Inmany physical problems air resistance is neglected in the analysis of tothe projectile motion .There fore, the aim of this study is to investigate the motion the Wall ball game in air. Projectile motion is the motion of an object thrown or projected into the air, subject to only the acceleration of gravity. The object is called a projectile, and its path is called its trajectory. The motion of falling objects, as covered in problem solving basics for one dimensional kinematics, is a simple one dimensional type of projectile motion in which there is no horizontal movement. In this paper study two-dimensional projectile motion for Wall Ball game.

The most important fact to remember here is that *motions along perpendicular axes are independent* and thus can be analyzed separately. This fact was discussed in kinematics in two dimensions, where vertical and horizontal motions were seen to be independent. The key to analyzing two-dimensional projectile motion is to break it into two motions, one along the horizontal axis and the other along the vertical. (This choice of axes is the most sensible, because acceleration due to gravity is vertical thus, there will be no acceleration along the horizontal axis when air resistance is negligible.)

Of course, to describe motion of Wall Ball game, ball must be deal with its velocity and acceleration, as well as with displacement and find their components along the *x-axis* and *y-*axes. Assume all forces except gravity (such as air resistance and friction) are negligible. The components of acceleration are then very simple; $a_{y=-g=-9.8\frac{m}{s^2}}$ (N.B upward direction is defined as the positive direction) and $a_x = 0$, because gravity is vertical.

Review of kinematics equation (constant acceleration)

$$x = x_o + \overline{v} \quad \text{.. (1)}$$

$$\overline{v} = \frac{v_0 + v}{2} \quad \text{.. (2)}$$

$$v = v_o + at \quad \text{.. (3)}$$

$$x = x_o + v_o t + \frac{1}{2}at^2 \quad \text{.. (4)}$$

$$v^2 = v_o^2 + 2a(x - x_o) \quad \text{.. (5)}$$

The total displacement (R) of a Wall ball at a point along its path and it makes an angle θ with the horizontal that have the following two equations respectively

$$h = \frac{v_i^2 \sin^2 \theta}{2g} \quad \text{.. (6)}$$

$$R = \frac{v_i^2 \sin 2\theta}{g} \quad \text{.. (7)}$$

In Wall Ball game the following figure 2 shows team players, team representatives and center of the field.
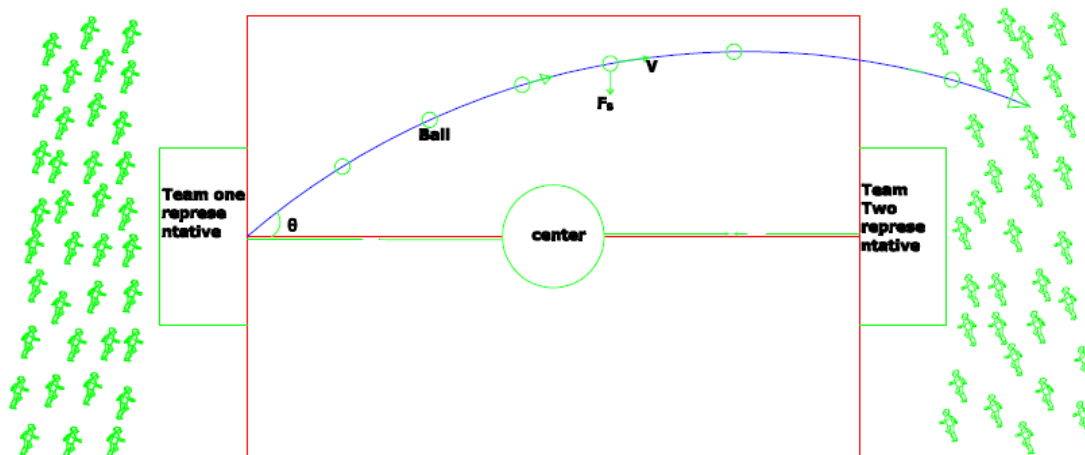

Figure 2: Plying field and trajectory of the motion of the ball

In Wall ball game in general the following steps are used to analyze motion:-

Step 1.*Resolve or break the motion into horizontal and vertical components along the x- and y-axes.*

These axes are perpendicular (by considering A as amplitude) so,

$A_x = A \cos \theta$ and $A_y = \sin \theta$ are used.

The magnitudes of the components of the velocity vare:

$v_x = v \cos \theta$ and $v_y = v \sin \theta$, where *v* is the magnitude of velocity.

Step 2.*Treat the motion as two independent one-dimensional motions, one horizontal and the other vertical.* The kinematic equations for horizontal and vertical motion take the following forms:

Horizontal motion ($a_x = 0$)

Vertical motion $y = y_o + v_{oy}t - \frac{1}{2}gt^2$ and $v_y{}^2 = v_{oy}{}^2 - 2g(y - y_o)$.

Step 3. *Solve for the unknowns in the two separate motions—one horizontal and one vertical.* Note that the only common variable between the motions is time t.

Step 4.*Recombine the two motions to find the total displacement and velocity. Because* the $x-$ and y-motions are perpendicular, we determine these vectors by using the techniques outlined in the <u>Vector Addition and Subtraction: Analytical Methods</u> and employing $A = \sqrt{A_x{}^2 + A_y{}^2}$ and

$\theta = \tan^{-1}\frac{A_x}{A_y}$. An angle (θ) that estimate angle of throwing ball to the opponent team.

V.CONCLUSIONS

In the present study explored the projectile problem and examining the relationships between optimal launch angle and other variables. Overall, in this game, if the ball is to be shifted against the opposing team, the team representative must throw the ball into the sky. When throwing the ball in to the opposite team should be make an angle between110^o-

115°. If the throwing ball angles decrease ball can not hand hold by the opposite team. Therefore, the handhold ball must be throwing between $99^{\circ}\text{-}102^{\circ}$ to strive the opposite team representative. When the throwing ball at the center of the field to strive the opposite team representative the angle of projection must be less however, the angle of projection is high the percentage of scoring is less and the probability hand hold of ball by the opposite team player is high.

In general Wall ball game is famous and has great social impact in the community according to social interaction, recreational activities, leisure time, and physical strength.

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