A STUDY OF SELECTED TECHNICAL AND TACTICAL ASPECTS AFFECTING THE PERFORMANCE OF TOP NETBALL CLUBS IN KENYA: A CASE OF NAIROBI PROVINCE

BY

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DECLARATION

No portion of the work referred to in this thesis has been submitted in support of an application for another degree qualification of this, any other University or Institute of learning.

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To Isaac Ochako Onywere, my Husband, who sacrificed his financial commitments to pay my college fees.

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ABSTRACT

The concern in all sports is to prepare teams that can win in various competitive matches. Hence, the desire of every coach is to identify the main techniques and tactics that are crucial in enhancing winning. This study investigated whether passes, interceptions, centre pass patterns and shooting techniques influence the outcome of netball matches played by Nairobi Province teams in Kenya.

Twenty-four matches played by teams in the Kenya Netball Association in Nairobi province over three months were used. There were two groups of teams (winners and losers) at the end of the matches. The performance of these groups was compared under four variables (successful and unsuccessful, passes, interceptions, centre pass patterns and shooting techniques). The data was collected by the researcher and two assistants by observing pre-recorded unedited tapes. These data were analyzed descriptively using tables charts, percentages, means and standard deviations.

Inferentially, the independent samples t-test was used to analyze the difference between the two groups. The results showed a significant difference between the two groups ($p < 0.05$) in both successful and unsuccessful passes, successful and unsuccessful direct centre pass pattern, successful stationary shooting, unsuccessful interceptions and unsuccessful indirect centre pass pattern. However, there was no significant difference ($p > 0.05$) between the two groups in both successful and unsuccessful in-motion shooting, successful interceptions, and unsuccessful stationary shooting.

The findings of the present study revealed that the teams studied were effective in using passes as their success rate was reasonably high (77.4%) compared to unsuccess rate (22.6%). However, these teams should practice on interceptions as their performance was very low in this technique.

The teams involved in the present study prefer using stationary shooting and direct centre pass patterns to in-motion and indirect patterns. However, it is recommended that coaches of these and other teams in Kenya should exploit the indirect centre and in-motion shooting patterns so as to vary their tactics. Further studies in the same area with larger samples and longer periods are also necessary in order to fully exploit and improve on the tactics and technique for winning.

CHAPTER ONE

1.0 Introduction

Netball is a ball game played by two teams of seven players each. Every team is allowed three substitutions within a match. There are three attackers (the wing attack, goal attack and goal shooter), three defenders (the wing defence, goal defence and goal keeper), and one player in the middle called the centre (Kenya Institute of Education, 1988; Stratford, 1976).

The object of the game is to score goals by aiming the ball into the ring. Only two of the attackers, namely goal attacker and goal shooter, may enter the shooting circle and throw for goals (Stratford, 1976). To start or re-start the game after a goal has been scored, the ball is passed off by the centre player from the centre circle and then passed from player to player until it can be caught by any of the two goal-scoring players in the goal circle who then attempt to shoot for goal (Churcher, 1963; Kenya Institute of Education, 1988; Stratford, 1976).

Netball was started in 1891 in Springfield, Massachusetts (USA) by Dr. James Naismith to meet the needs of his female students who wanted a sport like their male counterparts who were involved in basketball (Lawson, 1974). It was introduced to England in 1896. Netball then spread to other countries in Africa, Caribbean Islands, Australia and New Zealand (Barnett & Tomkins, 1963). At a conference in Sri-Lanka in 1960, the International Federation of Women's Basketball and Netball Associations was formed. At this conference, International Rules were drawn (Barnett & Tomkins, 1963; Stratford, 1963).

Netball has grown into a popular game in the Commonwealth Countries making it the game for the English speaking countries (Niter, 1993). Efforts have

begun to incorporate other countries as well. This has led to the introduction of this game into the All-African Games (in Africa) and the global Olympic Games as a demonstration game. Furthermore, the introduction of signs in officiating the game in 1993 by Niter, during the 5th Netball World Cup in Australia, has helped to make the rules to be understood by the non-English speaking countries (Niter, 1993).

In Kenya, netball was introduced by the early British immigrants in the mid 1940's as one of the units within the physical education curriculum. Wamukoya and Hardman (1992) pointed out that:

> "The antecedents of present-day Kenya physical education lie in the cultural fabric of its pre-colonial..., missionary and colonial infusion. Formal education began with the infusion of European culture. Physical education was included to achieve goals of a healthy, sound body" (p. 30).

The game spread rapidly and its entrenchment in the educational institutions made it famous in the country. Consequently, it got into clubs. In 1969, the Kenya Netball Association (K.N.A) was formed to govern netball affairs at club and national levels (Matthews, 1994). Member Clubs of the Kenya Netball Association are derived from all provinces in Kenya with an exception of North Eastern. Among these provinces, Nairobi has the largest and best teams. Some of the clubs in Nairobi province are Kenya Posta, A.F.C. Kamili, Central Bank of Kenya, Coffee Board of Kenya, Kenya Prisons, Post Bank, and Kenya Industrial Estates. These clubs have been grouped into First League and Second League zones (Matthews, 1994).

Kenya is a member country of the East, Central and Southern Africa Confederation of Netball which was formed in 1970. The member countries of the Confederation are Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Uganda, Zambia, Zanzibar and Zimbabwe (Matthews, 1994). This

confederation organizes the yearly regional club championships where Kenya is an active participant (Odhiambo, 1995). The first East, Central and Southern Africa club championship was held in 1971 in Uganda (Wambua, 1995). Since then, Kenyan clubs have performed quite well like in the lately held club championships in 1990 (in Zanzibar), in 1992 (in Zimbabwe) and in 1994 (in Kenya). Kenya won in all the three meets with Kenya Posta as the club champion (Wambua, 1995).

Kenyan clubs have tried to maintain this coveted title through different means. One of the ways they accomplish this is through clinics organized by the Kenya Netball Association every year. In these clinics, updates on umpiring (rules) is stressed to the teachers, coaches and administrators of the game. However, the Kenya Netball Association has left out a very important aspect that reveals much concerning performance in the game. That is, it has not addressed itself to the scientific factors that affect netball performance namely; physical fitness components, psychological variables, technical and tactical aspects, and most importantly, the last two - techniques and tactics a team uses (Edwards & Campbell, 1981). In other team sports like soccer these variables have been studied to establish their interrelations and effect on performance (Mal, 1982; Singh, 1982). The techniques and tactics that the top Nairobi clubs use to give them the constant success at regional level, should be identified in order to be retained. For the Kenya Netball Association to maintain the success at regional level and remedy weaknesses, there is a need to analyse the techniques and tactics of the game (Schmidt, 1991). This study, thus, aimed at investigating some of the technical and tactical factors that affect the performance of netball in Kenya.

1.1 Background to the Problem

Performance in training and competition can be affected by:-

(1) level of physical fitness (Asembo, 1992; Asembo & Njororai, 1995; Miller & Bartlett, 1994; Mullan, Campbell & Taylor 1994; Wekesa, Asembo & Njororai, 1993)

(2) psychological state (Eickoff, Thorland & Ansorge, 1983; Gurley, Neuringer & Massee, 1984; Hardy & MacGregor, 1994; Pates & Pafitt, 1994; Saayman & Smuts, 1994)

(3) technical and tactical know-how (Schmidt, 1991; Weber, 1991).

Performance in netball can be affected by a player's physical fitness (Mullan *et al.* 1994). The specific physical components that may affect performance in netball are strength, speed, reaction time, flexibility/agility, coordination, muscular and cardiovascular endurance (Edwards & Campbell, 1981).

The Psychological state which also affects performance is determined by variables like assertiveness, commitment, cooperation, drive, anxiety, fear and mental toughness (Bunker, Rotella & Reilly, 1985; Cratty, 1981). Fear to be injured or lose is very common among experienced players (Mal, 1982). This condition interferes with execution of techniques and tactics (Mal, 1982; Whiting, 1979). However, variables like motivation, mental toughness, commitment and assertiveness are necessary for optimal performance (Llewellyn & Blucker, 1982; Tutko & Richards, 1971). Netball, like other games, demands unwavering concentration, fast decisions and teamwork (Edwards & Campbell, 1981). Extensive studies have been conducted that reveal the importance of the psychological variables in areas like aerobic dancing (Eichoff *et al.*, 1983), dance and sport (Gurley *et al.*, 1984), basketball (Hardy & MacGregor, 1994; Pates & Pafitt 1994), recreation and sport (Saayman & Smuts, 1994).

The technical and tactical aspects of a game are very vital in determining the outcome of a match (Byshovets, Gadgler & Godik, 1991; Palmer, Hughes & Borrie, 1994). Performance in training can be affected critically by the quality of techniques and tactics used (Edwards & Campbell, 1981; Schmidt, 1991; Weber, 1991). These two factors combine in numerous ways to affect performance. The technical and tactical instructions and know-how are vital in achieving good performance (Baggallay, 1966; Kenya Institute of Education, 1987; Lawson, 1974; Stratford, 1963). A team can realize the objective of the game (scoring as many goals as possible) if its techniques and strategies are well mastered and tactfully used (Mal, 1982). In any playing situation, previously learnt and practised techniques and tactics are applied and exhibited (Wade, 1972; Winterbottom, 1964). The techniques that can affect the performance of netball are passes, catching, interceptions, ball control and footwork. However, these techniques can be used as tactics also when used as strategies for winning. The tactics used in netball include centre pass patterns, shooting, marking and dodging (Baggallay, 1966; Edwards & Campbell, 1981; Lawson, 1974; Stratford, 1963).

Thus, the three factors (physical fitness components, psychological variables and technical and tactical elements), all interact in various proportions to determine performance in netball. This study, however, focused on the last factors (techniques and tactics) because they form the foundation of performance in sports (Mal, 1982. Specifically, the study investigated passes, interceptions, shooting and centre pass patterns. These techniques and tactics can be analyzed through observation during competitions (Wade, 1972; Winterbottom, 1964). In this case, the variables presented can be described qualitatively as successful or unsuccessful. Since this analysis is considered to be ambiguous, imprecise and subjective, quantitative analysis is

preferred because it has a clearly defined scoring system. However, the two methods complement each other (Erdman, 1991; Ted & Andrew, 1975). Therefore, these variables (passes, interceptions, centre pass patterns and shooting) were analysed both quantitatively and qualitatively.

Technical and tactical analysis gives a precise and a relatively objective view of the level and cooperation of the individual performance factors within the complexity of a match situation (Singh, 1982). Based on the realistic data of the game, the coach and player get quick and reliable information for the training and competition process with the view of optimizing performance (Schmidt, 1991; Trapp, 1991). This information collected from the analysis can expose the opponents' weakness to be exploited and strengths to be appreciated. With this revelation, a team can mobilize its strategies to counteract the opponents' moves (Stratford, 1963).

In addition, the results of this analysis can be used to structure objectives to be realized and define the areas that will need remedy during training (Llewellyn & Blucker, 1982; Schmidt, 1991; Trapp, 1991). Regardless of the sport, records from such an analysis attain three objectives:

a) short-term: correcting mistakes between two teams

b) middle -term: guiding the coaching work

c) long-term: creating a data bank over championships over several seasons (Schmidt, 1991).

Proper analysis of performance enables the coach to keep up with what the team is efficient in and improve on its weaknesses (Thompson, 1991; Winterbottom, 1964).

The technical and tactical analysis in matches has been done in various games.

For example, in soccer, patterns of play of international soccer teams (Ali, 1991), effectiveness of teamwork (Byshovets *et al.*, 1991), diagnosis of a player's performance (Winkler, 1991) and analysis of playing patterns of the Cameroonian team (Yasanaka, Hughes & Lott, 1991) have been studied. In basketball, Shambrook, Bull and Douglas (1994) analyzed the effects of imagery training on the free-throw performance. Two studies in rugby investigated the effects of law changes upon patterns of play and patterns of play in international matches respectively (Hughes & Clarke, 1994; Treadwell, 1991). Equally in cricket, Stockill and Bartlett (1994) studied the temporal and kinematic differences between junior and senior international bowlers and identified important parameters which lead to higher ball release speed in senior bowlers compared to juniors. Similarly, tennis has received attention from Lames (1991a, b) who designed the coding method for analyzing this game.

In netball, Palmer *et al.* (1994) did a comparative study of the centre pass patterns of the successful and non-successful international teams. However, this study was done exclusive of other variables which combine with this tactic to influence performance. The present study analyzed these centre pass patterns together with shooting, passes and interceptions which are fundamental techniques and tactics in netball (Stratford, 1963; 1976).

1.2 Statement of the Problem

Various studies on technical and tactical components have been done in other forms of sport while in netball such investigations are scarce. These investigations initiated in other games have led to the improvement of the techniques and tactics pertinent to those games. Football, basket-ball, lawn tennis, hockey, volleyball are developed and popular because of the research back-ups. However, netball is a

"neglected" game since no researchers have put their attention in it in Kenya. Thus this study sought to bridge this gap in netball. The study investigated whether passes, interceptions, centre pass patterns and shooting patterns determine the outcome of matches among Nairobi Province teams in Kenya.

1.3 Purpose

The purpose of this study was to investigate whether passes, interceptions, centre pass and shooting patterns determine a team's performance in netball matches in Nairobi province. Additionally, the study established the centre pass and shooting patterns that significantly affect performance in netball. To do this, however, the study:

(i) compared the winning and losing teams to establish any significant difference.

(ii) developed a chart that can be used to analyze a match of netball.

1.4 Research Questions

(i) Do passes and interceptions significantly determine success in a netball match?

(ii) Which type of centre pass and shooting pattern significantly influence winning in netball matches?

(iii) Is there any significant difference between winners' and losers' performance?

1.5 Assumptions of the Study

a. The actual video recording captured all the scenes of a match.

b. The umpires were strict and adhered to the rules of the game.

c. The teams for the study were well prepared physically and psychologically.

1.6 Significance of the Study

The findings from the study could:-

a) be used by coaches to give guidance to players with regard to the level of play and the set objectives

b) be used by physical education teachers and students to analyze netball matches

c) provide feedback for motivation and further improvement of performance

d) provide more knowledge in netball literature and

e) develop a netball observation chart to be used in analysing netball matches.

1.7 Limitations

1. Three months duration matches were used.
2. The matches for the study had varied playing durations (20, 30, and 40 minutes).
3. The matches of the study consisted of super league teams only.
4. There was inadequate relevant research literature.

1.8 Definition of Terms

1. Centre Pass Patterns

Refers to the patterns formed for moving the ball to the shooting circle from the first pass given by the centre player (Edwards & Campbell, 1981). Two centre pass patterns are normally formed when:

(i) the centre pass is given to either the goal attacker (GA) or wing attacker (WA)

(ii) the centre pass is passed to either wing defender (WD) or goal defender (GD) (Baggallay, 1966). In the present study, the former pattern was referred to as direct centre pass pattern while the latter was referred to as indirect centre pattern.

2. **In-motion Shooting**

A kind of shot attempted or made while the shooter is moving horizontally or vertically for appropriate distance or height respectively (Baggallay, 1966).

3. **Interception**

This is a defending technique where a defender blocks, possesses, or deviates the course of an outgoing ball (Lawson, 1974). Interception will be successful if the defenders possess the ball as a result of it.

4. **Qualitative Evaluation**

Subjective evaluation which has no clearly defined scoring system, the scorer can and does affect the final score (Ted & Andrew, 1975).

5. **Quantitative Evaluation**

Objective evaluation in which a test has a clearly defined scoring system (Ted & Andrew, 1975).

6. **Stationary Shot**

A shot attempted or made from a static position (Edwards & Campbell, 1981).

7. **Successful Passes**

A successful pass is one that reaches the right player in the right space, at the right time (Edwards & Campbell, 1981).

8. **Tactics**

Skillfully planned moves or positioning of players by a team to outwit its opponents. These include attacking systems, centre player tactics, shooting, marking, dodging, centre pass patterns and ball passing patterns (Baggallay, 1966; Edwards & Campbell, 1981).

9. **Techniques**

Refer to the skills related to footwork, catching, throwing, throw up, ball control and interception (Edward & Campbell, 1981).

10. **Top Netball Clubs**

Refers to the top ranked teams in the national league.

11. **Unsuccessful Passes**

These were the passes that were interfered with while on their way to the receiver. Such disruptions were interceptions, fouls, balls going out of playing court and balls that fell (Edwards & Campbell, 1981).

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.0 Factors that Affect Performance in Sports

Several factors combine to affect the quality of performance of an individual and the team in the game of netball. These include, physical fitness components (Miller & Bartlett, 1994; Mullan *et al.*, 1994), psychological variables (Bunker *et al.*, 1985; Cratty, 1981; Iso-Ahola & Hatfield, 1986) and technical and tactical elements (Mal, 1982; Vanderzwaag, 1978). Each of these factors is discussed below.

2.1 Physical Fitness Components

The game of netball demands proper physical conditioning in all its phases (Stratford, 1963). Running to get free, to receive a pass or to keep in touch with an opponent and jumping to intercept, catch or shoot for goal, needs a physically fit player (Edwards & Campbell, 1981; Stratford, 1963). The specific components that need to be developed in order to condition players physically are:

1. coordination
2. flexibility
3. endurance
4. speed and
5. strength (Banister & Wenger 1982, Edwards & Campbell, 1981; Hollman, Rost Liesen, 1980; Rothstein, 1981; Stone & Kroll, 1986).

Before securing a score in netball, many actions and movements are executed by players. There is a lot of running, jumping, changing directions to evade an opponent, forceful arm actions to pass the ball and the regularly impacted landing from a jump (Barry & Jack, 1969; Mal, 1982; Stratford, 1963). To accomplish all these motor activities, a player needs to have sufficient endurance, strength, tremendous speed, adequate flexibility, dynamic balance and coordinative abilities. Specifically, the factors that have special importance for an attacker are endurance, acceleration ability, explosive strength, flexibility of hip and ankle joint, reaction ability, balance ability (dynamic) and adaptation (Barnett & Tomkins, 196; Mal, 1982).

Some studies have been carried out that show the importance of physical fitness elements in various games. In netball, Mullan *et al.* (1994) investigated the reliability and construct validity of current netball sprint tests (the England 777 and the Australian 505 testing batteries) - in comparison with straight sprint ability (20m). These figures were codes used to identify the above mentioned tests that are used for sprints and agility. Forty college female volunteers were assigned into seven groups of eight based on sporting background. These were NET1 (College first team); NET2 (College second and third teams); HOCK (College Hockey team); MIX (Mixed sport); SED (Sedentary students). Results on a two-way ANOVA revealed significant differences between the SED group and all the other groups on the 777, the 505, and 20m tests.

In other games like basketball the importance of physical components has been enhanced through research. Miller and Bartlett (1994) conducted a detailed analysis of the activity patterns of players of the three major playing positions in basketball; (guard, forward and centre) in order to identify the physical demands of those

positions. The results revealed that centres spent a significantly greater percentage of on-court time stationary as compared to guards and forwards. As much as a player's physical fitness is important, a team cannot win without techniques and tactics. Players like goal shooters can just lean against the pole, receive the ball and shoot. So technical and tactical knowledge surpasses physical fitness (Massimo, 1975).

2.2 Psychological Variables

Coaches must be as familiar with sport psychology as they are with team strategies and techniques (Llewellyn & Blucker, 1982; Lawther, 1951). Once the coach understands the role of physiological variables in sports, he should also learn about the role of psychological variables (Lliewellyn & Blucker, 1982).

Psychological constructs that affect sport performance are made up of personality characteristics of players, level of anxiety, amount of motivation, fear, confidence, commitment to sports, aggression and cooperation (Bunker *et al.*, 1985; Cox, 1985; Harris, 1986; Williams, 1979). Given the uniqueness of each individual player and the different ways in which one has been socialized, it requires a discerning mind to be able to design programs to fully develop individual personalities and a winning team (Singh, 1982).

Successful athletes have certain personality traits or characteristics which can be divided into two major categories, drive factors or the individuals's willingness to achieve and emotional factors including attributes regarding to self and the coach. Tutko and Richards (1971) have identified these traits as drive, aggression, determination, responsibility, leadership, self-confidence, emotional control, mental toughness, coachability, conscience development and trust. These elements contribute a lot to good execution of skills and tactics. They create favourable environment for

successful motor performance (Pates & Pafitt, 1994).

In any game situation, quick decisions by players is a major characteristic of success. Making a correct decision is very important and depends on the ability of the player to quickly and correctly analyze the game situation. The performer must be able to cope effectively with the pressure of competition. Split-second timing, alert concentration and proper anticipation of an opponent's moves are universal requirements for success in many sports (Iso-Ahola & Hatfield, 1986; Mal, 1982). For players to accomplish and cope with what has been mentioned above, they should possess the traits that were identified by Tutko and Richards (1971).

Netball is like many games where scoring is usually performed with some sense of responsibility and anxiety whether it will be successful or not. This, causes higher psychological load (Mal, 1982). For the defenders to mark and intercept, there is need for assertiveness (aggressiveness) to use every opportunity possible to possess the ball or deviate its course (Edwards & Campbell, 1981; Llewellyn & Blucker, 1982; Bunker *et al.*, 1985). Players who are not aggressive enough give their opponents ample time in a game and normally fail to save several passes or shots. When this happens, scoring chances are lost leading to panic (Edwards & Campbell, 1981; Mal, 1982). Anxiety means over-arousal of the players which negatively affects players' performance (Hardy & MacGregor, 1994; Llewellyn & Blucker, 1982). At this stage, motivation is often minimal from the coach or spectators because of the poor play (Bunker *et al.*, 1985). Influence of spectators, fear of opponents, losing and injury are other factors that curtail the effectiveness of good performance (Mal, 1982; Markham, 1981).

Some sports psychologists have done studies indicative of how psychological conditions affect performance in sports. For instance, Pates and Pafitt (1994)

examined the relationship between somatic anxiety and an anaerobic task and the relationship between somatic anxiety and a working memory task. They used 12 basketball competitive players and the results indicated a significant linear and positive relationship between somatic anxiety and an anaerobic task and significant linear and negative relationship between somatic anxiety and a working memory task. The Psychological factors usually come into play during a match. For a team to play a game, the players must be proficient in techniques and tactics (Edward & Campbell, 1981). This makes the latter factors more important than the former.

2.3 Technical and Tactical Aspects

During pre-season training, a coach prepares a team physically, psychologically and technically and tactically. Among these three phases of preparation, the technical and tactical phase is the most important since it is the one used and depicted during the actual play (Mal, 1982; Sigh, 1982). A coach with very little knowledge about techniques and tactics of a game would be destined to fail in his career (Massimo, 1975).

In the game of netball, the fundamental techniques and tactics that affect performance are:

1. passes
2. interception
3. shooting and
4. centre pass patterns (Baggallay, 1966; Edwards & Campbell; 1982, Kenya Institute of Education, 1987; 1988).

Since these techniques and tactics form the basis of the game of netball, they were the target variables for this study.

Passing is very vital in determining the quality of a game in netball (Lawson, 1974). It is the technique through which the ball is advanced to the goals for scoring. Consequently, inaccurate passes by a team will negatively affect performance. Poor ball passing can lead to constant lose of possession to the opponents. The ball should be passed to the correct member of the team and in front of her. Short, accurate passes that are difficult to intercept, but easy to receive should be used (Baggallay, 1966; Churcher, 1963; Lawson, 1974). In netball, any pass may be defended and therefore it is always essential to make the pass as quickly as possible (Edwards & Campbell, 1981). A thrower should use an appropriate pass for shooting, when the receiver is marked tightly, for quick, short distance team-mate and when to evade a taller interceptor (Barnett & Tomkins, 1963).

Interception is a defending device which involves blocking of the outgoing ball (Stratford, 1963). In interception, a defender either claims the ball or deviates its course to reach the receiver (Barnett & Tomkins, 1963; Churcher, 1963).

Through shooting a goal is scored or the scoring opportunity is lost (Stratford, 1963). This makes it the most important tactic. The two shooting players (goal attacker and goal shooter) should always attempt to score whenever they possess the ball. In these attempts, a shooter can shoot while in motion or stationary (Edwards & Campbell, 1981). In-motion shooting technique involves a one-step horizontal movement to gain good distance or jumping for height to shoot, while stationary shooting technique is used when the shooter is in a standing position. The shooters should be good at targeting from any point (shooting requires precision) when opportunity allows (Baggallay, 1966; Churcher, 1963; Edwards & Campbell, 1981;

Lawson, 1974; Stratford, 1963). Poor shooters will bring failure to a team (Lawson, 1974).

The centre pass patterns can be either direct or indirect. The former involves the first pass being given to either the goal attacker or the wing attacker, while the latter directs this pass to the two defenders (wing defender or goal defender). Since these two defenders are offside in the goal third, they should receive the first centre pass so that the other two attackers can advance to the goal third for the next pass which can then be passed on to any of the shooters to score (Barnett & Tomkins, 1963; Churcher, 1963). The centre pass should not be considered completed until the ball is through the net for a goal. Therefore the centre pass does not merely consist of the first pass, but also the subsequent pattern of play into the circle (Edwards & Campbell, 1981).

These techniques and tactics can be observed and analyzed to determine their influence in performance (Wade, 1972; Winterbottom, 1964). Although the technical and tactical aspects of performance on netball appear complex, it is possible to analyze them through observation. The evaluation of performance serves as a criterion for the judgement of the effectiveness of the training process. During training each player gets instructions relevant to her role and ability. For some players, some techniques and their variations receive more emphasis than others (Mal 1982). A comprehensive and precise diagnosis of a player's performance in training and competition is a prerequisite for proper planning and implementation of optimum training as well as successful match play (Winkler, 1991).

In games like basketball, technical and tactical analysis has been part of the evolution of the sport (Schmdit, 1991). This study involved recording of the field shots, the free shots, goal assists, fast breaks and even the goal attempts. In the same

game, Shambrook *et al.* (1994) investigated the effects of imagery training in an applied setting using regularly competing sports performers. A multiple baseline design across individuals was used to assess the impact of imagery training programme on free-throw performance.

In rugby, Hughes and Clarke (1994) carried out a computerized analysis of rugby to examine the effects of law changes upon patterns of play in international matches. They compared the pattern of play before the new rules with matches that used the new rules. It was found that the number of possessions per match fell very significantly, and the number of passes per possession rose significantly. There were no significant differences in the average number of tries scored per match. It was concluded that the new penalty/time out law was having a significant effect on the number of possessions in the game. Patterns of play from a series of game features, particularly those associated with winning and losing have been studied by Treadwell (1991) in the same game. After a four year study, he concluded that the game itself provides a rhythm for prediction. Clear physiological rhythms and strategical patterns emerged from the analysis.

Stockill and Bartlett (1994) conducted a study aimed at identifying temporal and kinematic differences between junior and senior international bowlers (cricket) and to identify important parameters which lead to higher ball release speed as in senior bowlers compared to the juniors. The analysis using t-test showed that the seniors released the ball significantly faster than the junior bowlers because of the higher angle of the trunk giving advantage to the bowling humerus and the greater upper limb lengths that facilitate the higher run-up speeds.

Soccer is one game which has received a lot of attention from researchers. These researchers have done many technical and tactical investigations using both

manually, computer- and video- assisted methods (Ali, 1991; Byshovets *et al.*, 1991; Cohen, 1969; Ekblom, 1986). The appreciation and application of technical and tactical analysis of the matches as a helpful way of building a successful team was pioneered in the 1870's. According to Batty (1969), the England team changed their tactical deployment of players after losing to a superior system of the Scotland team in a friendly match in 1872. The initial analysis that focused on the deployment and roles of individual players later led to the isolation of specific aspects of the game such as the success rate of throwing, goal kicks and goal-keeper's clearance (Winterbottom 1964). These in themselves are tactical devices that a coach can lay emphasis on in training based on feedback derived from match observations (Trapp, 1991; Winterbottom, 1964).

In general, several studies have been covered in soccer using manually manipulated systems. These include; the effort of individual players and general team superiority measured through the ball contacts made (Winterbottom, 1964); the frequency of lifted balls during matches; the duration of the game and duration of individual ball play (Trapp, 1991).

In the same game, a study by Byshovets *et al.* (1991) on effectiveness of the team work actions resulting in creation of goal scoring opportunity using computer analysis, led to the conclusion that scores of the matches played, depended primarily on the correlation between midfield attacks, number of scoring chances created, shooting accuracy and effective use of set pieces. Most typical attacking and defensive plays were singled out that formed a basis for a number of training programs. Similarly, an investigation by Yasanaka *et al.* (1991) on the Cameroonian soccer team showed that the playing style approached that of the South American and European teams more than the British Isles teams.

In another study, Hughes and Sykes (1994) analyzed the effects of the 1992 back-pass on patterns of play in English soccer. A total of 10 games played after the rule change were analyzed and compared with similar analysis of 10 matches played before the rule change. There was significant time-wasting in the form of back-pass to the goal keeper after the rule change.

One study on the tactical aspect in netball is one that was conducted by Palmer *et al.* (1994) which investigated the specific centre pass patterns for play of successful and non-successful international netball teams. Four England matches were compared with four matches played by Australia and New Zealand, the last being the top two nations in the world. It was found that netball teams can be identified by the quality of the skills, tactics and the ability to create goal-scoring opportunities to score-off centre play. Significant differences existed between the standard of the team and the ability to play the ball forward on the first and second passes of centre play. The successful teams also had significantly more active goal-shooters. The Palmer *et al.* (1964) investigation did not study other variables that combine with the centre pass patterns to affect a team's standard of playing.

As observed from the reviewed literature, the research works done in technical and tactical aspects of the game (netball) are sparse. The only studies done in the game of netball focused on fitness testing and centre pass patterns (Mullan *et al.*, 1994; Palmer *et al.*, 1994). Furthermore the relevant studies done so far:

i) looked only at the centre pass patterns without combining them with other variables like passes, interceptions and shooting

ii) further stimulated shooting as an important aspect in winning.

The present study is thus a follow-up of the study by Palmer *et al.* (1994) on the centre pass patterns linked with passes, interceptions and shooting.

CHAPTER THREE

RESEARCH METHOD

3.0 Introduction

This chapter covers methodology that was used in the present study. The areas specifically include: target population, sampling procedure, sample size, research instrument, data collection procedures and data analysis techniques.

3.1 Target Population

In the 1995 Netball League, twelve teams (clubs) from different provinces constituted the super teams. These teams were Kenya Posta, A.F.C. Kamili, Kenya Prisons, Kenya Commercial Bank, Coffee Board of Kenya, Post Bank, Kenya Railways, Kenya Industrial Estates, National Housing Company, Sony Sugar (Nyanza), Stima Nyeri (Central) and Bandari (Coast). Out of the above mentioned clubs (teams), Nairobi Province had the first nine teams in the league. According to the 1995 national league ranking, Kenya Posta, A.F.C, Kamili and Kenya Prisons (teams in Nairobi Province) were the best teams respectively. Thus the target population for this study consisted of the Nairobi Province clubs. This province was selected on the basis that it had the highest number and highest ranked teams in super league compared to other provinces.

3.2 Sample Size and Sampling Procedures

In Nairobi Province, 12 tournaments were scheduled for the year 1995. To manage the research, three tournaments were purposefully selected. The tournaments were held over 3 months and 6 teams registered in every tournament. Thus, using

these teams and corresponding matches, there were about 30 matches in one tournament. The matches within the 3 months duration were 90 (i.e. 30 x 3). 26.5% percent of the 90 matches, amounting to 24 matches, were used in this study. Specifically, the investigator video-taped 8 matches in every tournament. To get equal representation of these matches, simple random sampling method was used. The researcher wrote numbers 1 - 30 on pieces of papers. The papers were folded and the researcher picked up eight pieces. The numbers on the selected papers provided the matches that were video-taped.

3.3 Research Instrument

A Netball match observation chart was used as an instrument for collecting data (Appendix A). This chart had two sections: (i) space where the occurrence of the technical and tactical variables observed in a match were entered as the match progressed and (ii) a summary table where the various totals were shown. The chart was a modified instrument of the ones that have been successfully applied in the games of football, volleyball and hockey (Asembo & Njororai, 1995; Wekesa, 1992; Wekesa *et al.*, 1993). The researcher carried out a pilot study on five matches to establish the usefulness of this research instrument and to train her research assistants. As a result the instrument was modified accordingly and final chart prepared (Appendix A).

3.4 Data Collection Procedure

The actual data collection was done by observing the video-tapes of the sampled matches. The sampled matches were video-taped and the researcher with two assistants analyzed the 24 matches, one after the other. The data collected by the

three people (principal researcher and assistants) were compared for accuracy purposes and any contention was solved by a joint review of the tape. The variables for observation were passes, interceptions, shooting (stationary or in-motion) and centre pass patterns (direct and indirect). Using a netball match observation chart, the researcher and her assistants analyzed the flow of the game noting the type of centre pass pattern used (direct or indirect), interceptions, passes and shooting (stationary or in-motion) for both teams. These variables were analyzed as successful using codes of plain letters - P (passes), I (interceptions), C (direct centre pass patterns), D (indirect centre pass pattern), S (stationary shooting), Sm (in-motion shooting), while codes for unsuccessful variables had a dot on top e.g. $\dot{P}$, (unsuccessful passes). The team that started the match was considered team A while the defending one referred to as team B. Thus, variable codes for team A were designated by capital letters and the other team had small letters. At the end of a match on the video play, each variable had the overall (O), successful (S) and unsuccessful (U) totals shown.

3.5 Analysis of Data

The data obtained from the research were summarized and presented using tables, charts, percentages, means and standard deviations.

In the present study, the performance of the winning teams was compared to that of the losing teams by the independent samples t-test. Thus, inferential statistics using SPSS (Statistical Package for Social Sciences) was utilized to establish any significant difference between the two samples (winners and losers) (Norman, 1975).

The t-test for two samples is formulated by:-

$$\frac{\bar{X}_1 - \bar{X}_2}{S^{2}_{p}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)} - 1$$

where:

$$S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

(Montgomery, 1991; p.35)

The significance of the observed difference between the means of the two groups' performance was tested at 4 levels corresponding to the variables. Thus, there were:

a) Groups
   1. Winning teams
   2. Losing teams.

b) Variables:
   1. Passes
   2. Interceptions
   3. Centre Pass Patterns
   4. Shooting patterns.

CHAPTER FOUR

RESULTS

4.0 Introduction

This study compared performance of the winning and losing groups to establish any difference under four variables (successful and unsuccessful passes, interceptions, centre pass patterns and shooting techniques). The probability level of $p < 0.05$ was chosen to denote statistical difference. Findings of the present study are presented below.

4.1 Passes

In Table 1, the proportion of successful and unsuccessful rate of passes for winners and losers is indicated. The winners had a high successful execution compared to the losers. However, the losers had more unsuccessful passes than the winners.

Table 1: Proportion of the Success and Unsuccess Rates of Passes for Winners and Losers

Groups	Outcome		Total
Winners	Successful	3463 (42.15%)	4302 (52.36%)
	Unsuccessful	839 (10.21%)	
Losers	Successful	2899 (35.29%)	3914 (47.64%)
	Unsuccessful	1015 (12.35%)	
	Total	8216 (100%)	8216 (100%)

As evidenced in Table 2, the winners performed better than losers as their successful utilization of passes was higher than that of losers.

Table 2: Comparison Between Successful and Unsuccessful Passes for Winners and Losers

Outcome	Winners	Losers	Total
Successful	3463(80.5%)	2899 (74%)	6362 (77.4%)
Unsuccessful	839(19.5%)	1015 (26%)	1854 (22.6%)
Total	4302(100%)	3914 (100%)	8216 (100%)

Out of all the successful passes recorded for the winning and losing teams, the former had more of these passes compared to the latter. On the other hand, the winners had less unsuccessful passes compared to the losers (Table 3). Therefore there was a statistically significant ($p < 0.05$) difference between the winners and losers in both successful and unsuccessful passes.

Table 3: Frequency, Percentage and t-test Analysis of Passes for the Winners and Losers

Outcome	Winners	Losers	Total	t-value	p-value	Comment
Successful	3463 (54.43)	2899 (45.57%)	6362 (100%)	3.16	0.003	Significant
Unsuccessful	839 (45.25%)	1015 (54.75)	1854 (100%)	-3.57	0.001	Very significant

df = 46; $p < 0.05$

A comparison of the means and standard deviations of the winning and losing teams (Fig. 1) revealed that the former had more (144.3 ± 24.4) successful passes than the latter (120.2±28.3). The losers had more (42.3±7.2) unsuccessful passes compared to the winners (35.0±7.1).

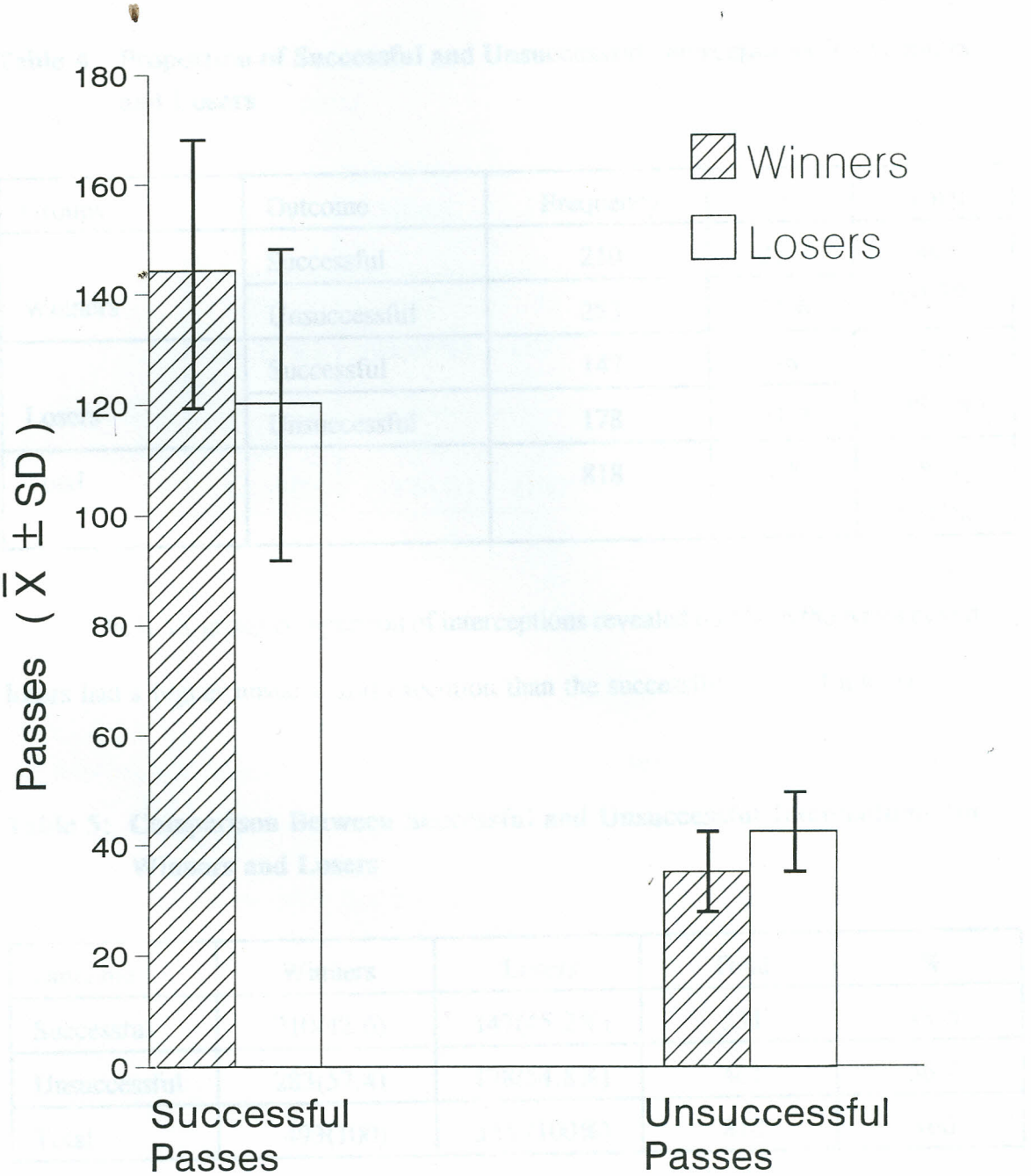

Figure 1: Successful and Unsuccessful Passes for Winners (n = 24) and Losers (n = 24)

4.2. Interceptions

As shown in Table 4, the winning teams had more success in the execution of interceptions than the losers. Similarly, the former had a higher unsuccessful performance compared to the latter.

Table 4: Proportion of Successful and Unsuccessful Interceptions for Winners and Losers

Groups	Outcome	Frequency	%	Total
Winners	Successful	210	25.7	493 (60.3%)
	Unsuccessful	283	34.6	
Losers	Successful	147	18	325 (39.7%)
	Unsuccessful	178	21.7	
Total		818	100	818 (100%)

The intra-group comparison of interceptions revealed that both the winners and losers had a higher unsuccessful execution than the successful usage (Table 5).

Table 5: Comparison Between Successful and Unsuccessful Interceptions for Winners and Losers

Outcome	Winners	Losers	Total	%
Successful	210(42.6)	147(45.2%)	351	43.6
Unsuccessful	283(57.4)	178(54.8%)	461	56.4
Total	493(100)	325 (100%)	818	100

The summary in Table 6 indicates that the winners recorded more successful interceptions as compared to losers. Similarly, the former had more unsuccessful

interceptions compared to the latter. A weak significant difference ($t = 3.09$; $p > 0.05$) was established between the two groups for the unsuccessful interceptions while in the successful interceptions there was no significant difference between the two groups ($p > 0.05$).

Table 6: Frequency, Percentage and t-test Analysis of Interceptions for Winners and Losers

Outcome	Winners	Losers	Total	t-value	p-value	Comment
Successful	210 (58.82%)	147 (41.18%)	357 (100%)	2.02	0.05	Not significant
Unsuccessful	283 (61.39%)	178 (38.61%)	461 (100%)	3.09	0.04	Significant

df = 46; $p < 0.05$

A comparison of the groups' means and standard deviations (Fig. 2) showed that winning teams had more (8.8 ± 5.1) successful interceptions compared to the losers (6.1 ± 3.8). The former also had more (11.8 ± 4.8) unsuccessful interceptions while the latter had less (8.2 ± 3.2).

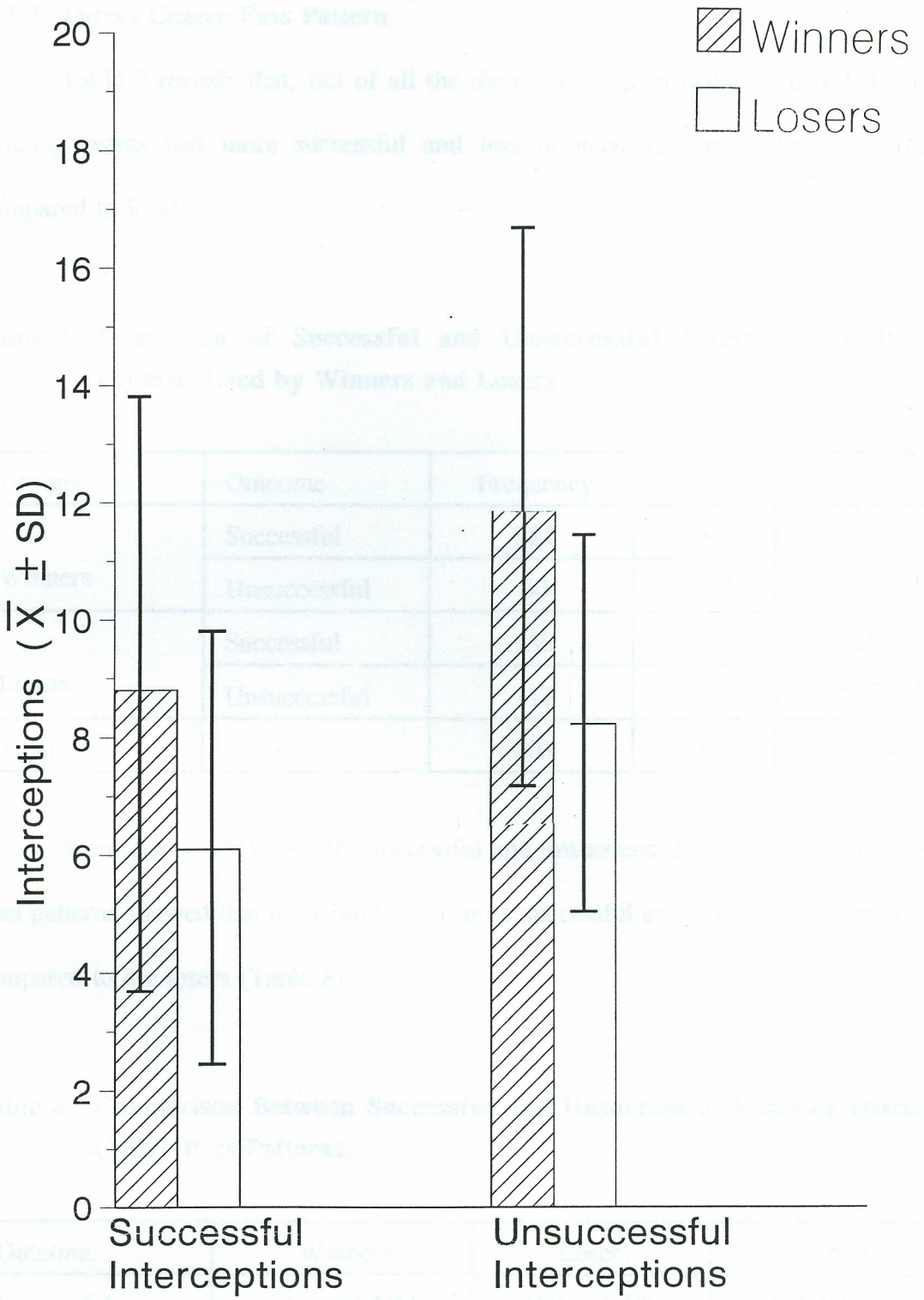

Figure 2: Successful and Unsuccessful Interceptions for Winners (n = 24) and losers (n = 24)

4.3.0. Centre Pass Patterns

4.3.1 Direct Centre Pass Pattern

Table 7 reveals that, out of all the direct centre pass patterns recorded, the winning teams had more successful and less unsuccessful centre pass patterns compared to losers.

Table 7: Proportion of Successful and Unsuccessful Direct Centre Pass Patterns Used by Winners and Losers

Groups	Outcome	Frequency	%	Total
Winners	Successful	281	45.6	341 (55.9%)
	Unsuccessful	60	10.3	
Losers	Successful	150	25.3	262 (44.1%)
	Unsuccessful	112	18.8	
Total		603	100	603 (100%)

A comparison between the successful and unsuccessful rates in direct centre pass patterns showed that the winners had more successful execution in this variable compared to the losers (Table 8).

Table 8: Comparison Between Successful and Unsuccessful Rates of Direct Centre Pass Patterns.

Outcome	Winners	Losers	Total
Successful	281 (82.4%)	150 (57.3%)	431 (70.9%)
Unsuccessful	60 (19.6%)	112 (42.7%)	172 (29.1%)
Total	341 (100%)	262 (100%)	603 (100%)

Table 9 compares the performance between winners and losers in direct centre pass patterns. The winners had more successful direct centre pass patterns compared to losers. This difference between the two groups was found significant ($t = 4.57$; $p < 0.05$) by an independent samples t-test analysis. The winners had less unsuccessful direct centre pass patterns compared to the losers. Statistically, using t-test analysis, a significant difference ($t = -3.2$; $p < 0.05$) was established between the two groups.

Table 9: Frequency, Percentage and t-test Analysis of Direct Centre Pass Patterns for Winners and Losers

Outcome	Winners	Losers	Total	t-value	p-value	Comment
Successful	281 (65.2%)	150 (44.8%)	431 (100%)	4.57	0.000	Highly significant
Unsuccessful	60 (34.9%)	112 (65.1%)	172 (100%)	-3.2	0.003	significant

d.f = 46 $p < 0.05$

The means and standard deviations of the two groups were compared (Fig. 3) and indicated that the winning teams had higher (11.3 ± 4.1) successful direct centre pass patterns compared to the losers (6.3 ± 3.5). This comparison for unsuccessful direct centre pass patterns showed a lower average (2.6 ± 2.0) for the winners compared to the losers (4.7 ± 2.5).

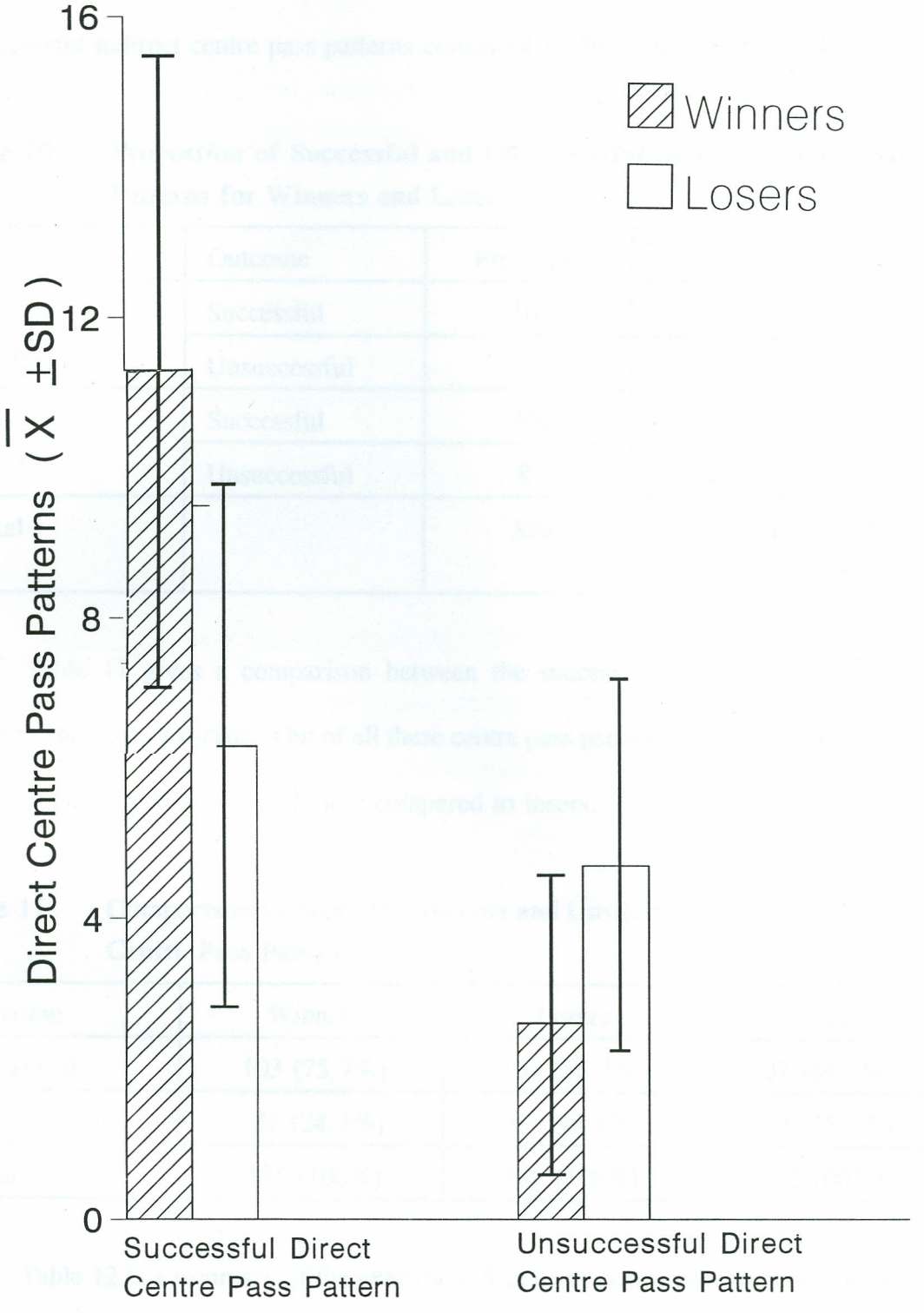

Figure 3: Successful and Unsuccessful Direct Centre Pass Patterns for Winners (n=24) and losers (n=24)

4.3.2 Indirect Centre Pass Pattern

Out of all the indirect patterns used, the losers had more successful and unsuccessful indirect centre pass patterns compared to the winners (Table 10).

Table 10: Proportion of Successful and Unsuccessful Indirect Centre Pass Patterns for Winners and Losers

Groups	Outcome	Frequency	%	Total
Winners	Successful	103	32	135 (42.3%)
	Unsuccessful	32	10.3	
Losers	Successful	104	32.4	185 (57.7%)
	Unsuccessful	81	25.3	
Total		320	100	320 (100%)

Table 11 gives a comparison between the success and unsuccess rates of indirect centre pass patterns. Out of all these centre pass patterns used by winners and losers, winners recorded slightly less compared to losers.

Table 11: Comparison Between the Success and Unsuccess Rates of Indirect Centre Pass Pattern

Outcome	Winners	Losers	Total
Successful	103 (75.7%)	104 (56.2%)	207 (64.9%)
Unsuccessful	32 (24.3%)	81 (43.8%)	113 (35.1%)
Total	135 (100%)	185 (100%)	320(100%)

Table 12 is a summary of the execution of indirect centre pass patterns for the winners and losers. The winners and losers were very close in the utilization of the successful indirect centre pass patterns. These results indicated a slight difference between the two groups which was not confirmed by a t-test analysis ($t=-0.5$, $p>0.05$). However the losers had more unsuccessful indirect centre pass patterns

compared to the winners. This comparison showed a big difference between the two groups and was confirmed statistically by a t-test analysis ($t=-3.83$; $p<0.05$).

Table 12: Frequency, Percentage and t-test Analysis of Indirect Centre Pass Patterns for the Winners and Losers

Outcome	Winners	Losers	Total	t-value	p-value	Comment
Successful	103 (49.8%)	104 (50.2%)	207 (100%)	-0.5	0.6	Not significant
Unsucces-sful	32 (27.7%)	81 (72.3%)	113 (100%)	-3.83	0.00	Highly significant

d.f = 46 $p < 0.05$

Figure 4 shows a comparison of the means and standard deviations of the losers and winners in indirect centre pass patterns. There was a slight difference between the two groups in the successful utilization of this variable with winners having 4.29 ± 2.68 and losers 4.54 ± 3.3. Unsuccessful indirect centre pass patterns' average was more for losers (3.38 ± 2.01) compared to the winners (1.33 ± 1.66)

Table 13 has the proportion of successful and unsuccessful centre pass patterns used by winners and losers. Out of all the centre pass patterns made, the winning teams had more successful patterns compared to losers. On the other hand, the losing teams had more of the unsuccessful patterns compared to the winners.

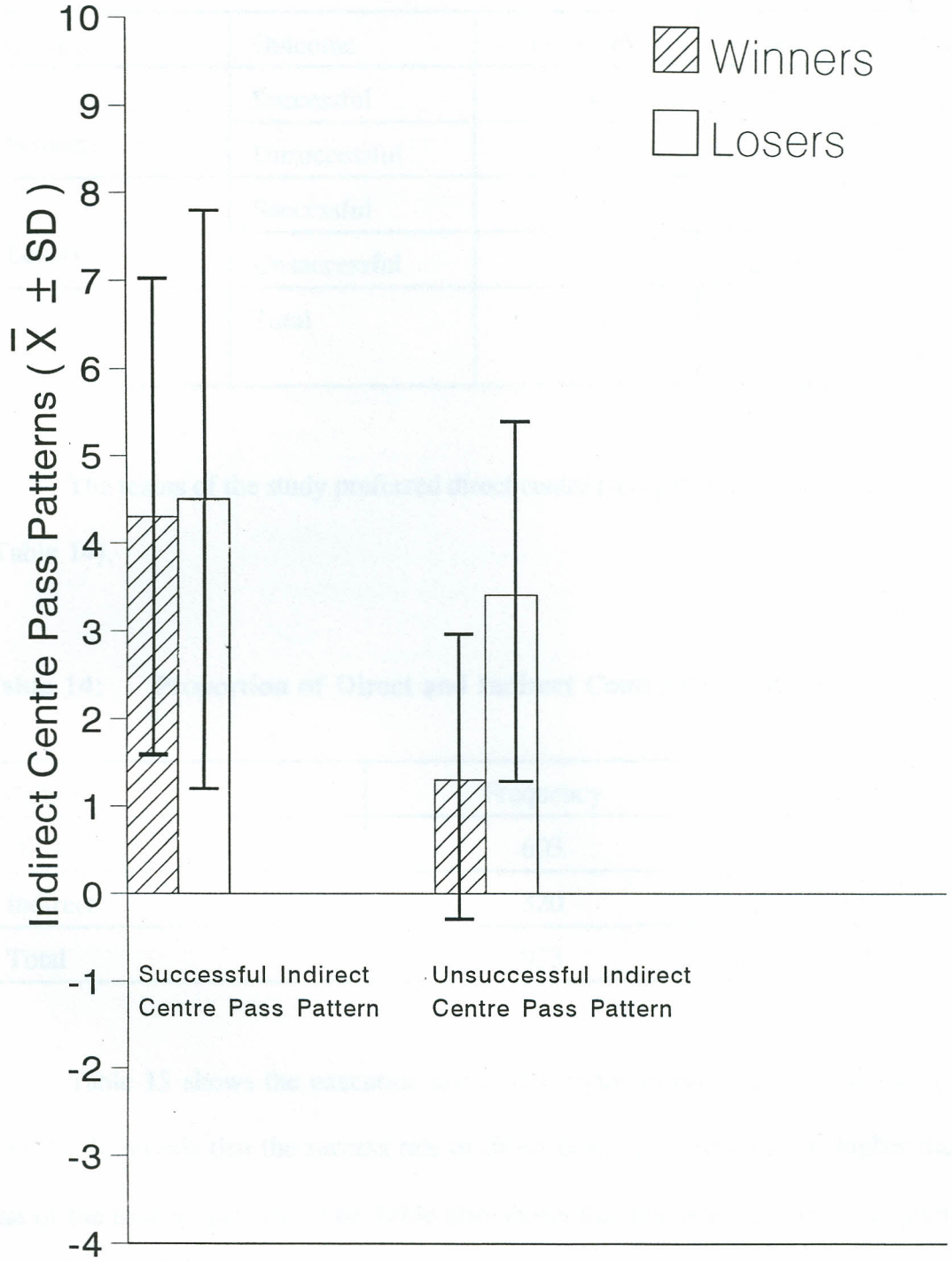

Figure 4: Successful and Unsuccessful Indirect Centre Pass Patterns for Winners (n=24) and Losers (n=24)

Table 13: Proportion of Successful and Unsuccessful Centre Pass Patterns

Groups	Outcome	Frequency	%	Total
Winners	Successful	384	41.6	476 (51.6%)
	Unsuccessful	92	10.0	
Losers	Successful	254	27.5	447 (48.4%)
	Unsuccessful	193	20.9	
	Total	923	100	923 (100%)

The teams of the study preferred direct centre pass patterns to indirect patterns (Table 14).

Table 14: Proportion of Direct and Indirect Centre Pass Patterns

Pattern	Frequency	%
Direct	603	65.3
Indirect	320	34.7
Total	923	100%

Table 15 shows the execution and performance in each centre pass pattern. The Table reveals that the success rate of direct centre pass pattern was higher than that of the indirect pattern. The Table also shows that the direct centre pass pattern was utilized more than the indirect one.

Table 15: Execution of Centre Pass Patterns in relation to Winners' and Losers' performance

Groups	Outcome	Frequency	%	Total
Winners	Successful direct pattern	281	30.4	341 (36.8%)
	Unsuccessful direct pattern	60	6.4	
	Successful Indirect pattern	103	11.1	135 (14.7%)
	Unsuccessful Indirect Pattern	32	3.6	
Losers	Successful Direct Pattern	150	16.2	262 (28.4%)
	Unsuccessful direct Pattern	112	12.2	
	successful Indirect pattern	104	11.3	185 (20.1%)
	Unsuccessful Indirect pattern	81	8.8	
	Total	923	100.0	923 (100%)

4.4.0. Shooting Patterns

4.4.1. Stationary Shooting

The frequencies in Table 16 indicate that from all the shooting attempts made by winners and losers, the winners scored more goals using stationary shooting technique compared to losers.

Table 16: Proportion of Successful and Unsuccessful Stationary Shooting for Winners and Losers

Groups	Outcome	Frequency	%	Total
Winners	Successful	446	47.4	554 (58.9%)
	Unsuccessful	108	11.5	
Losers	Successful	267	28.3	385 (41.1%)
	Unsuccessful	121	12.8	
	Total	942	100	942 (100%)

Table 17 indicates an intra-group comparison of stationary shooting for each group. The Table reveals that the winners made more successful attempts. The losers had more unsuccessful goals compared to the winners.

Table 17: Comparison Between Successful and Unsuccessful Rates of Stationary Shooting for Winners and Losers

Outcome	Winners	Losers	Total
Successful	446 (80.5%)	267 (68.8%)	713 (75.7%)
Unsuccessful	108 (19.5%)	121 (31.2%)	229 (24.3%)
Total	554 (100%)	388 (100%)	942 (100%)

Table 18 depicts a summary of the goals made via stationary technique. The winners had more goals using the stationary technique compared to losers while the losers missed more scoring attempts compared to winners. These frequencies show a difference between the two groups and this was confirmed by an independent samples t-test analysis ($t=5.56$; $p<0.05$) which established a high significant difference. However, the t-test analysis did not establish any significant difference between the two groups in unsuccessful attempts ($t=-0.65$; $p>0.05$).

Table 18: Frequency, Percentage and t-test Analysis of Stationary Shots for Winners and Losers

Outcome	Winners	Losers	Total	t-value	p-value	Comment
Successful	446 (62.6%)	267 (37.4%)	713 (100%)	5.56	0.000	Highly significant
Unsuccessful	108 (47.8%)	121 (52.2%)	229 (100%)	-0.65	0.52	Not significant

d.f = 46; $p < 0.05$

A comparison of the means and standard deviations for winners and losers (Fig. 5) revealed that the winners recorded more (18.63 ± 5.00) successful stationary shots compared to the losers (11.00 ± 4.55). For the unsuccessful stationary shots, the winners recorded a slightly lower average (4.46 ± 3.06) compared to the losers (5.08 ± 3.5).

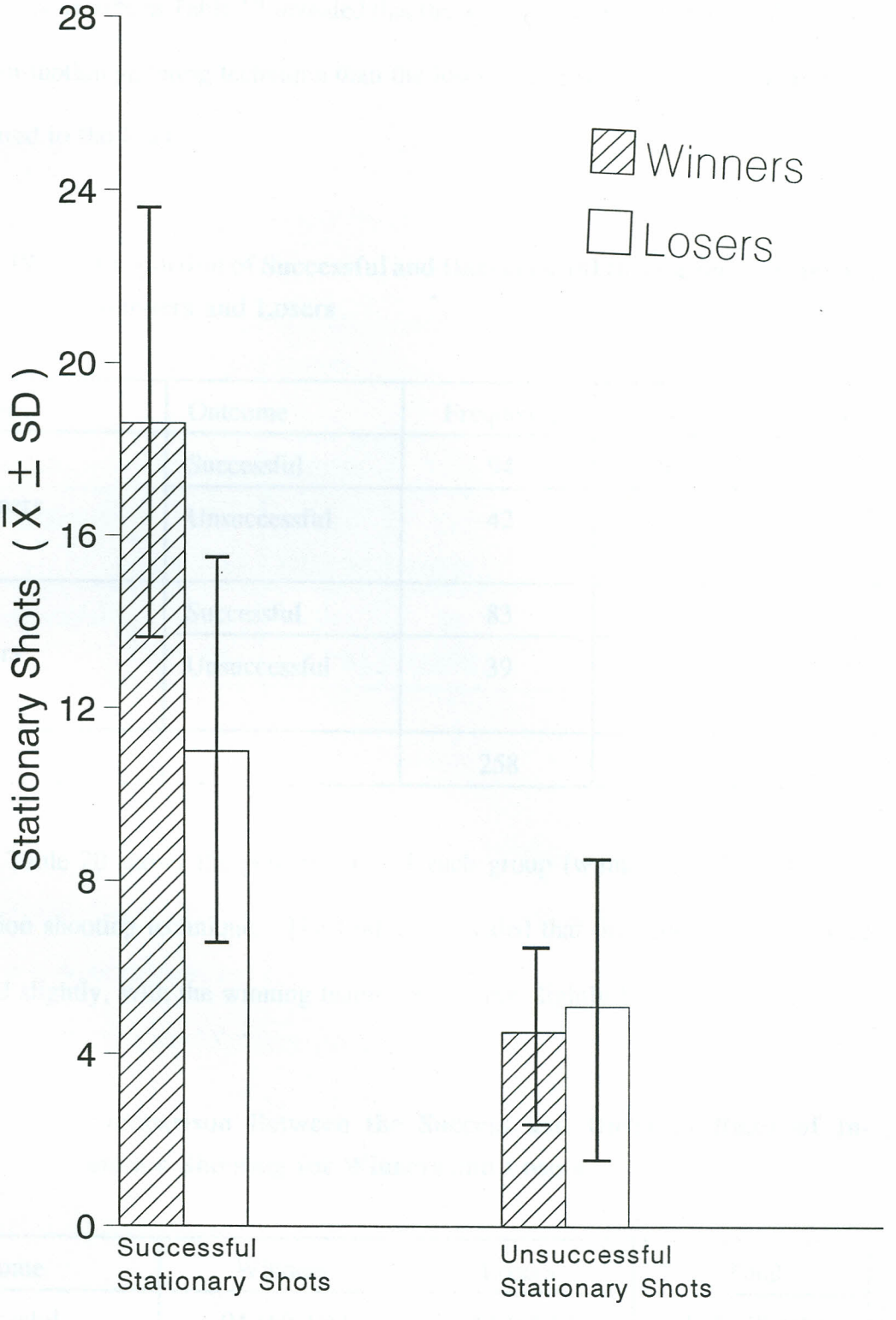

Figure 5: Successful and Unsuccessful Stationary Shooting for the Winners (n=24) and losers (n=24)

4.4.2 In-Motion Shooting

The results in Table 19 revealed that the winning teams had more goal attempts using in-motion shooting technique than the losers. The winners missed more goals compared to the losers.

Table 19: Proportion of Successful and Unsuccessful In-motion Shooting for Winners and Losers

Groups	Outcome	Frequency	%	Total
Winners	Successful	94	36.4	136 (42.7%)
	Unsuccessful	42	16.3	
Losers	Successful	83	32.2	122 (47.3%)
	Unsuccessful	39	15.1	
Total		258	100	258 (100%)

Table 20 shows the performance of each group (winners and losers) in the in-motion shooting technique. The findings revealed that the groups' performance differed slightly, with the winning teams performing slightly better than the losers.

Table 20: Comparison Between the Success and Unsucess Rates of In-motion Shooting for Winners and Losers

Outcome	Winners	Losers	Total
Successful	94 (69.1%)	83 (68%)	177 (68.6%)
Unsuccessful	42 (30.9%)	39 (34%)	81 (31.4%)
Total	136 (100%)	122 (100%)	258 (100%)

As depicted by Table 21, the winning teams scored more goals via in-motion shooting technique compared to losers. However, there was no significant difference ($t=1.12$; $p>0.05$) between the two groups in successful in-motion shots. Out of all missed in-motion shots, the winners missed more shots compared to the losers. These frequencies show a difference between the two groups but the t-test analysis did not.

Table 21: Frequency, Percentage and t-test Analysis of In-Motion Shots for Winners and Losers

Outcome	Winners	Losers	Total	t-value	p-value	comment
Successful	94 (49.8%)	83 (50.3%)	177 (100%)	1.12	0.27	Not significant
Unsuccessful	42 (27.7%)	39 (72.3%)	81 (100%)	0.95	0.35	Not significant

d.f = 46; $p < 0.05$

A comparison of the means and standard deviations for the two groups (Fig. 6) also showed that winners had a slightly higher average (4 ± 2.1) of successful in-motion shots compared to the losers (3.3 ± 2.03). For the unsuccessful in-motion shots, the results showed a very small difference between the averages for winners (1.83 ± 1.5) and losers (1.46 ± 1.22).

The teams in the present study utilized the stationary shooting technique more than the in-motion technique as revealed by Table 22.

Table 22: Comparison Between Stationary and In-motion Shooting for Winners and Losers

Patterns	Winners	Losers	Total
Stationary	554 (80.3%)	388 (76.1%)	942 (78.5%)
In-motion	136 (19.7%)	122 (23.9%)	358 (21.5%)
Total	690 (100%)	510 (100%)	1200 (100%)

Table 23 is a comparison of performance for winners and losers in relation to shooting. The winners attempted scoring using stationary shooting several times compared to losers.

Table 23: Performance of Winners and Losers in Shooting Patterns

Groups	Outcome	Frequency	%	Total
Winners	Successful Stationary	446	37.2	554 (46.2%)
	Unsuccessful Stationary	108	9	
	Successful In-motion	94	7.8	136 (11.3%)
	Unsuccessful In-Motion	42	3.5	
Losers	Successful Stationary	267	22.5	388 (32.6%)
	Unsuccessful Stationary	121	10.1	
	Successful In-motion	83	6.9	122 (9.9%)
	Unsuccessful In-Motion	39	3	
Total		1200	100	1200 (100%)

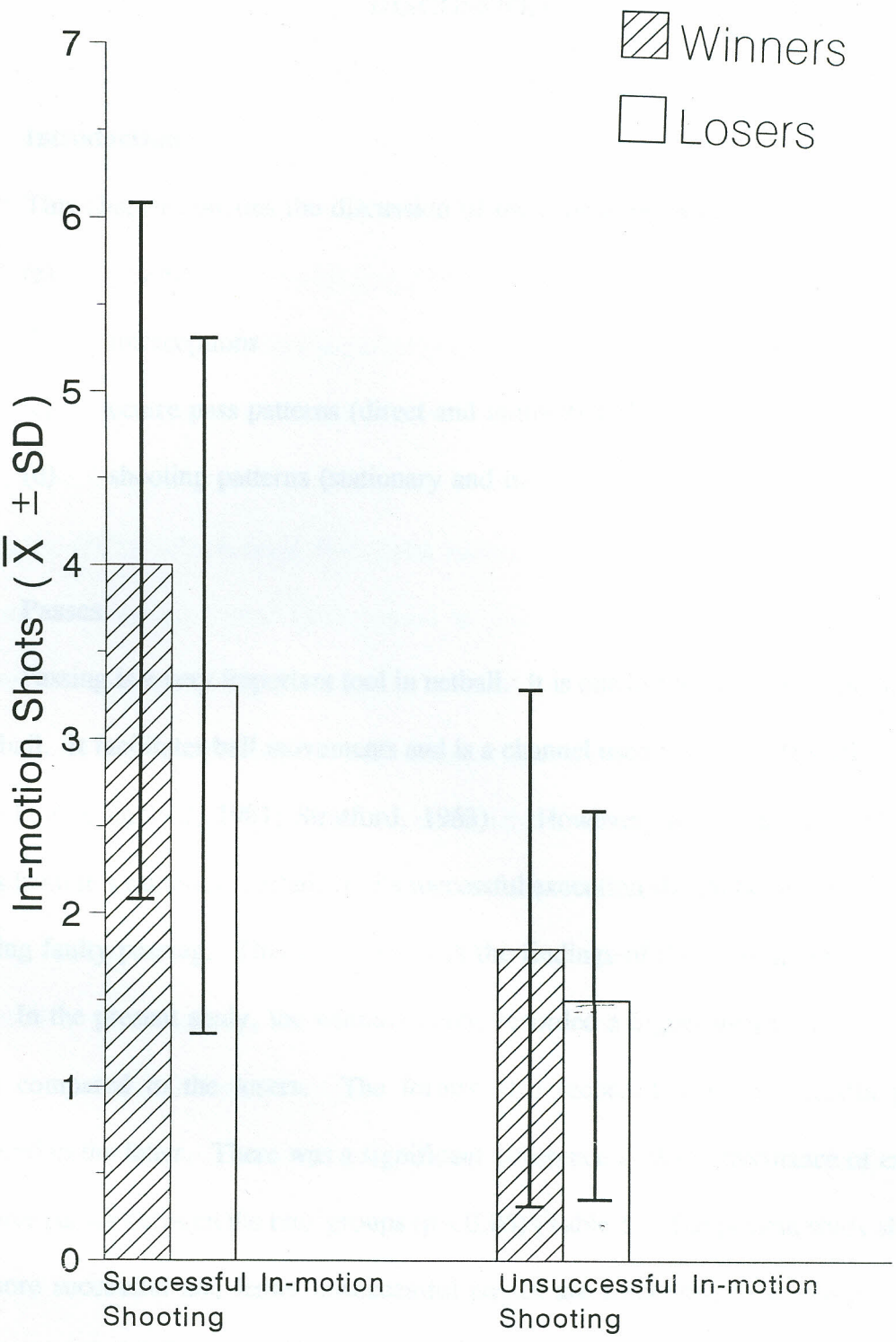

Figure 6: Successful and Unsucessful In-motion Shooting for Winners (n=24) and Losers (n=24)

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter contains the discussion of the following variables:

(a) passes

(b) interceptions

(c) centre pass patterns (direct and indirect) and

(d) shooting patterns (stationary and in-motion).

5.1. Passes

Passing is a very important tool in netball. It is one of the basic skills in the game of netball. It facilitates ball movements and is a channel used to score (Baggallay, 1966; Edwards & Campbell, 1981; Stratford, 1963). However, for a team to yield good results from this important technique, its successful execution should be maximized while reducing faulty passing. This was evident in the findings of the present study.

In the present study, the winning teams recorded a higher average of successful passes compared to the losers. The former also recorded less unsuccessful passes compared to the latter. There was a significant difference in the performance of each of the above passes between the two groups ($p < 0.05$) (Table 3). The present study showed that more successful and lesser unsuccessful passes are associated to winning. These findings agree with Baggallay (1966) in netball and Winterbottom (1964) in soccer who identified passing as a tactical device that can be emphasized to optimize winning.

Successful passing, as indicated in this study, enhanced prolonged team ball possession. This is in agreement with Muckle's (1981) contention that individual ball possession in the game of soccer is the first and most important tool for winning. A netball team in possession of the ball exchanges the passes among its members to obey the 3-seconds rule of individual possession. It can then break through the defence creating higher scoring opportunities. The present study agrees with Winterbottom's (1964) observation and Palmer *et al.* (1994) study that superiority of team performance is determined by ball contacts and ability to forward this ball to the goals. The findings of the present study showed how important accurate passes are in any successful attack. This agrees with Coleman's (1975) observation that good passes in basket-ball lead to scoring. In addition, the winning teams' performance in passes could be attributed to good ball exchanges where the ball rarely dropped or went out of court (Edwards & Campbell, 1981). Similarly, the present results revealed that the winners had more successful passes because the losers did not intercept most of the passes targeted to their corresponding opponents. Alternatively, the winners might have had good dodgers who successfully received the passes targeted to them. Another possibility could be that the winners used short, fast and accurate passes that were hard to intercept (Lawson, 1974; Barnett & Tomkins, 1963).

On the other hand, the losers had more unsuccessful passes, probably because they executed interception-induced passes (long passes) (Stratford, 1963). A good pass is one usually given to a pre-determined receiver, but it seems, the losers passed the balls without targeting them to a specific player (Edwards & Campbell, 1981). In netball, passes vary in distance, strength, speed and direction as determined by the throwers.

Team members, should therefore discern the uniqueness of each pass and respond accordingly. If the Centre player gives low, high, slow or fast balls, the receiver should anticipate this and react accordingly. Along this, a team should have a communication system among its players to coordinate them as to who should receive the first centre pass, or who can shoot (Edwards & Campbell, 1981). So it is possible that the losers lost many balls because of lack of knowledge about the nature of passes given by each player and lacked communication amongst themselves.

Low-skilled players have a tendency of over-staying with the ball because their team mates hardly get free to receive a pass. This has two risks; being penalized for 3-seconds rule infringement and, throwing the ball anywhere to get rid of it (Baggallay, 1966). This kind of time- wasting is unnecessary in netball just like in other team games. For instant, in soccer, Hughes and Sykes (1994) found out that a pass back to the goal-keeper wasted time. Staying with a ball for long in netball gives defenders time to resume their defending positions. There is a likelihood that losers failed to pass the ball as quickly as possible. The least intercepted passes are ones received while the player is in-motion and the losers hardly used them. There is a relationship between passes and interceptions. The winners had more unsuccessful interceptions compared to losers (Table 5). This might imply that the former used faulty interceptions to commit fouls to interfere with the game. According to the present study's operational definition, any pass executed after or during a foul becomes unsuccessful. Thus through faulty interceptions the winners interfered with their opponents' passes.

The winning teams in the present study were more efficient in the execution of passes as their success rate was higher than that of losers. However, the general

performance for both groups showed efficiency in the use of passes as the overall success rate was greater compared to unsuccess rate. Individual group performance indicated that winners had on the average 4 successful passes in 5 passes they made, while losers had on the average 3 successful ones in 4 passes. However, there is a challenge to the Nairobi province teams to practise passes that are given and received while in-motion. Similarly, short passes are more effective. In netball, any pass may be defended and it is always essential to make the pass as quickly as possible, but with care (Table 2).

5.2. Interceptions

Interception is an important defence weapon in netball and other team sports (Coleman, 1975; Lawson, 1974; Trapp, 1991). However, many authors have observed the limited use of this technique (Baggallay, 1966; Stratford, 1963; Edwards and Campbell, 1981). The teams used in this current study did not intensively use this skill.

In the present study, winners had slightly more successful interceptions compared to the losers although the statistics showed no significant difference here ($p > 0.05$). The winners also had more unsuccessful interceptions and, statistically, ($p < 0.05$), there was a significant difference between the two groups. This study has shown that the winners had more successful and unsuccessful interceptions compared to the losers (Table 6). The findings of the present agrees with Baggallay, (1966) who observed that good defenders intercept any ball thrown for a pass or shot. The winners had more successful interceptions probably because their opponents made long and inaccurate passes that are vulnerable to interception. Equally, these results revealed that the winners were active in defending. However, the winners had higher average in unsuccessful interceptions and

this could be attributed to obstruction and contact fouls inherent in interceptions maneuver (Lawson, 1974). Possibly, the winners used fouls to disrupt the game and this explains why they had more unsuccessful interceptions. The losers recorded fewer successful interceptions in this study showing their minimal defensive play. They also might have not dodged enough for passes and did not make use of in-motion passes that disadvantage a defender. This finding agrees with Baggallay (1966) who observed that only loose marking allows free penetration of passes from the centre to the goal. Another observation from the current study is that interceptions were used very minimally by the two groups. Baggallay (1966) argues that if defenders could intercept every throw for a pass or shot, interceptions would have a higher frequency than their counterparts (passes and shots) (Tables 2, 5 and 22). Evidently, the teams in the present study as Baggallay (1966) noted, did not use this skill as much as it should be.

Baggallay, (1966) further pointed out that many players concentrate on man-to-man marking instead of intercepting the ball. In addition, coaches put a lot of emphasis on offensive training at the expense of defensive ones.

The present study showed that the Nairobi Province teams were not effective in the execution of interceptions as the overall success rate was less than the unsuccess (Table 4) rate. Awareness of the importance of this technique should not be over looked (Baggallay, 1966). The relevant advice to these teams is that the coaches should concentrate on ball interception more than man-to-man defence. More practice on this skill is necessary to polish it.

5.3. Centre Pass Patterns

Centre pass patterns play an important role in netball. Since the centre passes are exchanged alternately, every team should try and acquire a score from them (Baggallay, 1966; Edwards & Campbell, 1981). This current study has shown that good teams were able to score off a bigger percentage of their centre passes.

The present study showed that the winners obtained a higher success rate in direct centre pass patterns. However, they had a low rate of unsuccessful direct patterns compared to losers (Table 7). Thus there was a difference between winners and losers in direct centre pass patterns. This difference was found statistically significant ($P < 0.05$) (Table 9). The winners had a slightly lower number of successful indirect patterns compared to losers leading to a non significant difference between the two groups ($P > 0.05$) (Table 12). In the unsuccessful indirect pattern a highly significant difference was established between the two groups ($P < 0.05$). There was a high average of the unsuccessful indirect centre pass patterns recorded for losers. This is because the losers used the indirect pattern as an alternative when the two attackers (GA & WA) were tightly marked for a pass. This could have given the opponents time to organize their defence. Another possibility is that the defenders who receive this centre pass are not normally good at dodging as this is not their major role.

Further, the results revealed that the direct centre pass pattern was preferred to the indirect one (Table 14). This present study shows that the teams of this study might have practiced more on the direct centre pass pattern compared to indirect one. This is why its success rate was more compared to indirect (Table 15). These findings do not agree with several authors' observations (Baggallay, 1966; Barnett & Tomkins, 1963;

Stratford, 1963), who recommend the use of indirect centre pass pattern. The Nairobi province teams prefer using direct pattern probably because the ball moves faster to the goals. These findings of the present study are in agreement with Palmer and co-workers (1994) who found that successful teams have the ability to pass the ball forward to the goal. This is possible due to skilful dodging which is characteristic in winning.

The non-successful teams were tightly marked that receiving the first pass and subsequent passes was difficult. This implies that the losing teams were less efficient in dodging. This agrees with Baggallay's (1966) observation that only exceptional dodging allows passes to advance to the goal from the centre.

The overall success rate of both direct and indirect patterns (69%) was reasonably high compared to the unsucccess one which was only 31% (Table 15). This implies that the Nairobi province teams were effective in using centre pass patterns, though they concentrated on the direct one. On the other hand, this may show weakness in the defence systems that allow easy ball penetration to the goals. The pertinent advice to the Nairobi Province teams is that coaches should perfect both patterns to avoid monotony which can lead to prediction by opponents. Equally, there is need for more practice on the factors that influence the success of the centre pass patterns like dodging, defending and communication.

5.4. Shooting Patterns

Just like in many other team games, netball aims to score as many goals as possible so as to win (Edwards & Campbell, 1981; Njororai 1995a; 1995b). Accuracy in shooting leads to successful scoring while lack of it restricts many scoring chances.

Similar findings were recorded in the current study where the winning teams had more successful goal attempts.

The success to unsuccess ratios for stationary pattern for winners on average was 4 successful goals in 5 attempts, while for the losers was about 2 successful goals to 3 attempts. The success to unsuccess ratios of in-motion shooting for winners was about 2:3 and for losers was about 1:2. The above ratios indicate that winners had more shooting attempts compared to losers. They also reveal that stationary pattern was utilized more than in-motion. This may have led these teams to perfect the stationary pattern as a result. This leaves the shooters unproficient in the in-motion shooting technique. Thus, more practice is needed by the Nairobi province netball players in the in-motion technique. This study also indicated that the winning teams made more scoring attempts using stationary shooting compared to losers. The former also had a higher success in execution compared to losers. Similarly in-motion shooting favoured the winners who had slightly more goals compared to losers (Table 23).

These findings showed that the winners scored more goals using both shooting patterns compared to losers. This present study agrees with Byshovets and co-workers, (1991) and Palmer and co-workers (1994) who concluded that active and accurate shooting is a major characteristic in winning. The present study has also established that the winners and losers managed to score over 50 percent of their scoring attempts (Table 23). These figures agree with Coleman (1975) who reported an over 50 percent scoring ability attained by top basketball players. The higher frequency of scoring attempts recorded for the winners indicated that these teams made use of the ball retrievals (rebound) quite frequently. Coleman (1975) encourages the use of the second

attempts to recover the missed goals. The bigger number of scores by the winning teams also suggests that the opponents were not active in interception. Baggallay (1966) observed that if the goal defender and goal keeper could intercept all balls thrown for shots, very few of these shooting attempts could succeed.

The present study also showed that the teams of the study used the stationary shooting pattern more often compared to the in-motion one (Table 22). These results tend to agree with Coleman (1975) that in-motion shooting pattern is avoided by many players because it has limited scoring chances. This is because when executed from a run or jump, the shooter in most cases overthrows the ball past the ring. If a shooter takes a step in front of her opponent, she is charged with obstruction. This discourages the use of this technique. Coleman (1975) also comments that this type of shooting is used by players who are proficient in shooting. This implies that the Nairobi province netball shooters have not gained proficiency to use in-motion shooting technique.

In conclusion, the present study has shown that the Nairobi teams prefer using stationary shooting to in-motion one. However, more practice should be done on the in-motion pattern to perfect it.

5.5 Conclusion and Recommendations

The present study has revealed that Nairobi province netball teams are effective in using passes since the overall success rate was higher than the unsuccess one. However, there is need for more practice on dodging by the losing teams whose success rate was slightly lower. In interceptions, the present study has shown that the teams involved in the study were ineffective because their unsuccess rate was more compared

to the success rate. The advice to be given to these teams is that they should practice more on this technique and concentrate on intercepting the ball more than the man-to-man defence.

In relation to centre pass patterns, direct centre pass pattern was regularly used and was more successful compared to indirect pattern. However, the individual success rate of each pattern revealed that indirect pattern is just as useful as the direct one. Therefore, there is need to practice on the former pattern as much as the latter. This will give a wider exploit of centre pass patterns.

In the present study, teams tended to prefer stationary shooting to in-motion shooting. Therefore a lot of practice is necessary in both stationary and in-motion shooting patterns. The in-motion pattern should be used and practiced regularly to facilitate proficiency in its use. Therefore, within the limitations of the present study, it is concluded that passes, direct centre pass pattern and shooting influence winning among the Nairobi teams. Areas considered vital for further research studies from the present study include:

(i) application of the present study to other provinces and outside Kenya

(ii) using matches played within the typical one hour duration

(iii) comparing the different levels of performance over a period of more that three months and

(iv) Studying various types of passes to find out the most effective.

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APPENDIX A:

NETBALL MATCH OBSERVATION CHART

SECTION A

SECTION B

	TEAM A			TEAM B			
Variables	S	U	O	S	U	O	Remarks
Passes							
Interceptions							
Direct Centre Pass							
Indirect Centre Pass							
Stationary Shots							
In-motion Shots							

KEY:

C = Direct centre pass pattern
D = Indirect centre pass pattern
I = Interceptions
P = passes
St = Stationary Shots
Sm = In-motion Shots
S = Successful
O = Overall
U = Unsuccessful

Total Score (a) ..... (b) .....
Name of analyzer .....
Signature .....
Date .....

APPENDIX B:

Raw Data of Successful and Unsuccessful Passes for Winners and Losers

	Winners		Losers	
Matches	Successful	Unsuccessful	Successful	Unsuccessful
1.	137	32	114	35
2.	203	37	121	55
3.	170	28	116	36
4.	127	31	97	40
5.	167	53	125	49
6.	174	35	157	38
7.	101	23	94	38
8.	134	48	74	54
9.	148	36	136	48
10.	176	43	189	53
11.	130	32	80	29
12.	116	24	96	43
13.	129	31	123	32
14.	138	33	121	44
15.	126	42	112	48
16.	175	41	175	51
17.	126	31	139	42
18.	118	30	119	43
19.	125	38	148	40
20.	154	29	143	38
21.	135	32	92	39
22.	171	38	93	39
23.	138	40	107	41
24.	145	32	114	47

APPENDIX C:

Raw Data of Successful and Unsuccessful Interceptions for the Winning and Losing Teams

	Winners		Losers	
Matches	Successful	Unsuccessful	Successful	Unsuccessful
1.	9	12	5	4
2.	16	10	4	3
3.	19	12	16	5
4.	3	6	6	8
5.	18	11	9	8
6.	4	13	7	11
7.	6	13	4	5
8.	21	16	12	9
9.	8	12	4	2
10.	11	15	15	4
11.	7	3	3	10
12.	7	18	5	6
13.	6	5	4	9
14.	7	25	4	7
15.	7	16	5	8
16.	11	16	12	6
17.	3	11	3	6
18.	8	8	3	6
19.	8	12	2	14
20.	3	15	5	9
21.	4	6	6	15
22.	5	8	5	9
23.	8	10	4	7
24.	11	10	4	7

APPENDIX D:

Raw Data for Successful and Unsuccessful Direct Centre Pass Pattern for Winners and Losers.

	Winners		Losers	
Matches	Successful	Unsuccessful	Successful	Unsuccessful
1.	15	0	4	5
2.	19	0	6	11
3.	14	2	2	5
4.	12	2	4	4
5.	7	2	5	4
6.	10	7	15	9
7.	10	2	8	3
8.	7	6	5	5
9.	12	2	4	2
10.	11	1	5	4
11.	12	5	3	3
12.	9	0	3	4
13.	19	1	8	4
14.	14	5	9	4
15.	9	3	9	2
16.	11	2	4	3
17.	18	1	11	6
18.	9	7	4	1
19.	10	4	6	6
20.	9	2	15	4
21.	11	2	4	5
22.	7	2	3	10
23.	10	0	8	2
24.	16	2	5	6

APPENDIX E:

Raw Data of Successful and Unsuccessful Indirect Centre Pass Patterns for Winners and Losers

	Winners		Losers	
Matches	Successful	Unsuccessful	Successful	Unsuccessful
1.	2	2	2	4
2.	3	1	3	2
3.	6	1	3	8
4.	2	0	7	5
5.	4	3	1	1
6.	8	5	0	2
7.	1	0	1	3
8.	4	0	8	2
9.	2	0	12	6
10.	10	4	2	7
11.	7	1	7	4
12.	4	1	8	1
13.	0	1	1	2
14.	1	0	3	4
15.	6	1	11	4
16.	10	4	6	6
17.	4	0	6	0
18.	4	2	4	2
19.	6	0	0	4
20.	5	5	7	2
21.	2	0	2	2
22.	5	1	5	2
23.	5	0	5	3
24.	2	0		5

APPENDIX F:

Raw Data of Successful and Unsuccessful Stationary Shots for Winner and Losers

	Winners		Losers	
Matches	Successful	Unsuccessful	Successful	Unsuccessful
1.	20	5	8	8
2.	32	6	6	3
3.	21	8	9	11
4.	17	5	9	5
5.	17	13	11	5
6,	18	7	18	6
7.	15	3	15	3
8.	16	10	6	16
9.	10	1	10	0
10.	19	1	20	8
11.	25	2	5	2
12.	13	3	13	5
13.	14	4	14	2
14.	17	1	11	7
15.	14	4	12	5
16.	25	2	20	2
17.	25	2	16	8
18.	14	4	14	0
19.	16	4	6	6
20	13	9	15	2
21.	14	3	6	3
22.	21	5	7	5
23.	16	5	11	2
24.	26	2	8	4

APPENDIX G:

Raw Data of Successful and Unsuccessful In-motion Shots for the Winners and Losers.

	Winners		Losers	
Matches	Successful	Unsuccessful	Successful	Unsuccessful
1.	8	1	3	1
2.	3	3	2	3
3.	4	1	1	1
4.	3	2	2	6
5.	2	5	3	0
6.	7	3	4	2
7.	0	1	6	2
8.	4	1	2	0
9.	6	0	6	0
10.	4	1	3	1
11.	1	2	1	3
12.	4	1	0	2
13.	6	2	3	1
14.	4	1	4	2
15.	4	4	5	1
16.	2	1	4	0
17.	3	0	2	1
18.	3	2	9	4
19.	8	2	6	4
20.	7	4	6	2
21.	4	4	3	1
22.	2	0	2	1
23.	3	0	3	0
24.	3	1	3	1