# CHAPTER-III

# METHODOLOGY

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The design of the study, selection of teams, selection of variables, reasons for selecting the variables, reliability of rating, orientation of the raters, collection of data and the statistical techniques employed for the analysis of the data are explained in this chapter.

## 3.1 DESIGN OF THE STUDY

The multigroup comparative and the relationship design were employed to analyse this study. All the teams that played against India in Champions Trophy 2005 were chosen for analysis. The fundamental skills and various other parameters were analyzed besides the total performance of each team. The relationship was found out between the total performance and the parameters chosen for each team. Thereafter, a comparison was made among the teams in all the parameters chosen.

## 3.2 SELECTION OF TEAMS

The Champions Trophy 2005 was organized by the International Hockey Federation. Six National hockey teams where chosen for participation in Champions Trophy 2005. The qualification of the teams for this tournament were given here under.

Australia, Netherlands, Spain, Germany, India and Pakistan.

| | | |
|---|---|---|
| Australia | : | The defending Olympic Champion. |
| Netherlands | : | The runner-up of the 2004 Champions Trophy. |
| Spain | : | The Winners of the 2004 Champions Trophy. |
| Germany | : | The winners of the 2002 world cup. |
| India | : | The host nation. |
| Pakistan | : | 2004 Olympic qualifier ($3^{rd}$ position). |

For the purpose of the study, the above mentioned teams which qualified to play in the Champions Trophy 2005 for the reason shown above, were chosen.

## 3.3 SELECTION OF VARIABLES

The research scholar reviewed the available scientific literature, books, journals, periodicals, magazines and research papers pertaining to the study besides the expert's opinion.

Taking into consideration of the feasibility criteria in terms of availability of the instruments and relevance of the variables to the present study, the following variables were selected for investigation. Initially as many as thirty nine variables were considered for the scouting. The following variables were finally selected considering the importance and their relation to the total performance.

**I Fundamental Skills**

      a.     Trapping

      b.     Passes

      c.     Dodging

      d.     Tackling

**II  Goal Keeping**

**III Penalty Corner**

**IV Penalty Stroke**

**V Attack**

**VI Defence**

**VII Total Performance**

## 3.4    REASONS FOR SELECTING VARIABLES

### 3.4.1. Trapping

Trapping is the mother of all skills. This is the most important basic skill of the game invariably connected with all the other skills of the game. A player uses this skill to his or the team's advantage to initiate or execute the next move. A team with bad trapping always suffers. Perfect trapping enhances the confidence and superiority in an individual and contribute to the success of the team.

Considering the above facts, trapping was selected as one of the variables for analysis.

### 3.4.2 Passes

Pass is the best dodge. In team games various passes are being used while in attack or in defence. Effectiveness of the passes reflects the possession of the ball which results in attack. A team which indulges in passes has always shown supremacy in ball control, a good team spirit than the opponent and organizes or reorganizes its defence. Passes provides an opportunity for all the players to be a cohesive unit which helps them to be together, maintain optimum level of team spirit, fitness, technical and tactical abilities. Considering the above facts, passes were chosen as a variable for investigation.

### 3.4.3 Dodge

The supreme nature of an individual is exhibited through this skill. This skill helps an individual to outwit an opponent by keeping the ball under control. The ultimate aim is to score a goal or goals and win the match. At times it may not be possible to pass the ball effectively and create an opening to score a goal. It is, therefore, required to dodge an opponent to gain the ground or to create an opening or to score a goal. Because of the above reasons dodge is chosen as a variable.

### 3.4.4 Tackling

Tackling is one of the most defensive skills which aims either to snatch or to dispossess the ball from the opponent. It is also used effectively to restrict the movements of the opponents. When no other defensive tactics is possible especially in one versus one situation, a player has to show his supremacy by way of employing effective tackling skills which will help the team ultimately. Every individual must acquire this skill to put the team in an advantage situation. Hence, tackling was chosen as one of the variable.

### 3.4.5 Goal Keeping

The net result of a match largely depends upon the goal keeping. It is the last line of defence in any system of play. Goal Keeper is the only player who is permitted to play the ball not only with the stick but also with the other segments of the body within the prescribed area. Goal Keeper must possess extraordinary qualities to play the ball by wearing the protective gears. Good goal keeping can win great matches. Considering the above reasons goal keeping was chosen as one of the variables.

### 3.4.6 Penalty Corner

The champions of today are seen perfect in the conversion of penalty corners. It is seen that different variations in penalty corners are being adapted and executed successfully. This requires lot of understanding among the specialized players. Same way, it is important for the defending team to plan their tactics to foil the attack. Due to these reasons, penalty corner was selected as one of the variables.

### 3.4.7 Penalty Stroke

Penalty stroke is one of the finest opportunities for the attacker to score a goal. The chance of scoring a goal in this particular situation is above 90%. It is a war of nerves with the perfection of executing the skills between the attacker and the goal keeper. Penalty stroke is a skill being used to break the ties in case of drawn matches. Considering the above reasons, penalty stroke was selected as one of the variables.

### 3.4.8 Attack

The team having the possession of the ball is called an attacking team. The effectively planned movements of the attacking team with variations in attack will always help the team to achieve the desired result. The efficiency in keeping possession of the ball for a longer period results in an effective planning of an attack that may get a goal for the team. Due to the above reasons, attack was chosen as one of the variables.

### 3.4.9 Defence

The team which is not in possession of the ball is the defending team. The members of this team systematically organize themselves to restrict the movements of the attacking team. They try to snatch the ball from the opponent or dispossess them at the earliest without conceding the goal. Clear thinking and application of needed skills will always keep the defence in good stead. Defence is very important in the game of hockey. Because of the above reasons, defence was selected as one of the variables.

### 3.4.10 Total performance

Total performance was the criterion variable. The selected variables may not give a concrete picture on the total performance of the teams in one figure. There are many other factors like physical fitness, tactical play, team cohesion, etcetera which are to be accounted through subjective rating and also quantify the total performance out of a rating scale.

Due to the above facts, total performance was chosen as a variable.

### 3.5 RELIABILITY OF THE DATA

The reliability of data was ensured by establishing the instrument reliability, tester's competency and reliability of rating.

### 3.6 INSTRUMENT'S RELIABILITY

For the purpose of analyzing the matches, a standard video compact disc player and a television set were used. The video compact disc player and television set were procured from reputed firms and were put into use for research purpose. Thus, they were considered reliable and precise for the purpose of the study.

### 3.7 TESTER'S COMPETENCY

The tester's competency was assessed together with the reliability of the test. For this purpose, a match of seventy minutes duration was analyzed twice under identical conditions on two different occasions. This was done by test, retest method on consecutive days. The scores thus obtained for each variable by test retest method were correlated using Intra class Correlation. The Coefficients of correlations are presented in Table 1. As the correlated "r" values are greater than the table value, the tests were considered competent.

**TABLE – I**
**RELIABILITY COEFFICIENT OF TEST – RETEST SCORES**
**OF FUNDAMENTAL SKILLS, TECHNICAL**
**AND TACTICAL VARIABLES**

| S.No | Variables | Coefficient of Correlation |
|------|-----------|---------------------------|
| 1 | Trapping | .95* |
| 2 | Passes | .96* |
| 3 | Dodging | .93* |
| 4 | Tackling | .96* |
| 5 | Goal Keeping | .94* |
| 6 | Penalty Corner | .96* |
| 7 | Penalty Stroke | .96* |
| 8 | Attack | .95* |
| 9 | Defence | .93* |

* Significant at 0.05 level

`r` Value to be significant at 0.05 level with df(8) = 0.89

## 3.8    THE RATING OF TOTAL PERFORMANCE

A panel of three experts who were coaches of national repute with outstanding experiences in the game of hockey acted as judges and rated the total hockey performance of all the teams chosen for the study separately through video analysis.

Three experts assessed the total performance of the teams, the mean score of the experts was considered reliable and true indicator of total performance which has been selected as the criterion measure.

Further to find out the significant difference between the scores awarded by the three experts, the total fifteen matches played by six teams were observed and the ratings were done for each team separately. The 'F' ratio was computed and presented in Table II. The judges were oriented on guidelines to assess the total performance so that their assessment might not differ very much.

**TABLE - II**
**ONE-WAY ANOVA OF THE RELIABILITY RATING OF TOTAL PERFORMANCE BY EXPERTS**
(Scores in points)

| Source of Variance | df | Sum of Squares | Mean Squares | F ratio |
|---|---|---|---|---|
| Between Groups | 2 | 0.4957 | 0.2478 | |
| Within Groups | 105 | 76.6031 | 0.7295 | 0.34 |
| **Total** | 107 | 77.0688 | | |

\* Significant at 0.05 level

$F_{0.05}(2,105) = 3.09$

The obtained F ratio was not significant. Therefore, the assessment made by the three experts did not differ. They were consistent and their ratings were not biased. Hence, their ratings were considered reliable.

### 3.9    ORIENTATION OF THE RATERS

Orientation is a programme designed to introduce one into a new situation. To bring forth the best efforts from the experts, it was essential to explain in detail about the study. Hence, before the collection of data the investigator held a meeting with the experts in order to orient them about the purpose of the study.

The investigator explained the procedure that would be followed to assess different variables through video analysis. Scouting procedures were also explained to them to avoid ambiguity in their minds regarding the assessment. All the experts readily agreed to co-operate and put in their best efforts in the interest of the scientific investigation which might be of great value in the assessment. The experts were co-operative throughout the scouting.

### 3.10    COLLECTION OF DATA

Video analysis was considered as one of the most accurate and reliable methods of scouting. All the fifteen matches played by six teams were recorded in video compact disc. The aim of the video analysis was to get proper feed back and also action replay facility in order to observe the matches properly and record different variables chosen in this study.

The scouting of fifteen matches by the six teams namely Australia, Netherlands, Spain, Germany, India and Pakistan was done by observing the matches on the television screen at normal and slow rates of speed as required to enable the investigator and experts to record the data pertaining to different variables scoring was done for each variable in numerals for the occurrence of events during the course of the game. The following variables were recorded for the purpose of the study.

### 3.10.1 Trapping

**Aim**

To keep the ball under control and to organize an attack.

**Description**

The ball which is received by the player and kept under control while playing.

**Scoring**

The total number of successful and unsuccessful trapping made by the players was counted in numerals and recorded as scores.

### 3.10.2 Passes

**Aim**

To beat the opponent, to gain the distance or to keep the ball in possession.

## Description

The ball is played among own team mates to beat the opponents, to gain the distance and to keep the ball in possession.

## Scoring

The total number of successful and unsuccessful passes was counted separately in the three different areas namely defence, midfield and attack areas and was recorded in numerals as scores for each team.

### 3.10.3 Dodging

## Aim

To beat the opponent, to gain the ground by keeping possession of the ball.

## Description

The skillful act of an attacker is to outwit the opponent by keeping the ball in possession.

## Scoring

The total number of successful and unsuccessful dodges made by the players was counted in numerals as scores for each team.

### 3.10.4 Tackling

**Aim**

To dispossess the ball from the opponent.

**Description**

The skillful act of the defender is to dispossess the ball from the opponent.

**Scoring**

The total number of successful and unsuccessful tackling made by players was counted in numerals and recorded as scores.

### 3.10.5 Goal Keeping

**Aim**

To prevent goal attempts made by the attacking teams.

**Description**

An attempt made by the goal keeper to stop the ball entering in between the goal posts and under the cross-bar from a legitimate attempt of an attacker.

**Scoring**

The number of attempts saved by the goal keeper to prevent the ball from entering into the goal was counted and recorded as scores.

### 3.10.6 Penalty Corner

**Aim**

To build up an effective attack and to score.

**Description**

Penalty corner is awarded against the defending team for the intentional and unintentional infringements within their own twenty-five yards area and within their own shooting circles respectively.

**Scoring**

Total number of penalty corners awarded against each team was counted and recorded as scores.

### 3.10.7 Penalty Stroke

**Aim**

To score a goal through a legitimate attempt.

**Description**

It is an attempt made by an attacker to beat an opponent (Goal Keeper) from the seven yards spot by using a legitimate stroke.

**Scoring**

Total number of penalty strokes awarded against each team was counted and recorded as scores.

### 3.10.8 Attack

**Aim**

To score a goal with a well organized move within the framework of the rules of the game.

**Description**

The team which is in possession of the ball organizes planned and effective movements to outwit the opponents and score a goal.

**Scoring**

Total number of attacks made by each team was counted and recorded as scores.

### 3.10.9 Defence

**Aim**

To restrict the movements of the opponents and to take possession of the ball at the earliest.

**Description**

It is a systematic effort of a team to restrict the moves of the opponents and take possession of the ball at the earliest.

**Scoring**

The total number of attempts made by the defending team to restrict the moves of the opponents and win possession of the ball was counted and recorded as scores.

### 3.10.10 Total Performance

**Aim**

To quantify the performance of each team by the subjective rating of the experts.

**Description**

The total performance of the teams was determined individually by subjective rating through video analysis. For this purpose a ten point rating scale was used (Appendix I). This rating scale had ten important categories of the game namely, physical condition of the team, proficiency in the execution of skills, set plays, tactical play of the team, conversion ability in penalty corner and penalty stroke, team attack, team defence, build up of the team in the mid field, goal saving ability of the goal keeper and team cohesion. Each category was scored with a minimum of one point to a maximum of ten points. The total score was the sum of scores of all the ten categories. The total scores were divided by ten to get each rater's individual score from the rating scale. The average score of the three experts was the measure of criterion variable for each team.

**Scoring**

The average score of the three experts for each team was considered as the total performance.

### 3.11  STATISTICAL TECHNIQUES EMPLOYED

The following statistical procedures were employed for the descriptive analysis of performance of the Indian Hockey team in the Champions Trophy 2005.

For the purpose of comparing the total performance, passes, dodge, goal keeping, penalty corner, penalty stroke, attack, defence, tackling and trapping among the participating teams, one-way analysis of variance (ANOVA) was employed as suggested by Clarke.[1] When the 'F' ratio was found significant, Scheffe's Post-hoc test[2] was employed. To find out the tester's reliability one way intra class correlation was employed, Multiple correlation was employed to find out the combined contribution of all variables with the total performance for each team separately. To find out the agreement between the tournament ranking of each team in Champions Trophy 2005 and the ranking of the total performance by the experts through subjective rating spearman's rank order correlation was employed as suggested by Garrett. H[5]