Differences in Goal Scoring and Passing Sequences between Winning and Losing Team in UEFA-EURO Championship 2012

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Abstract—The objective of current study is to investigate the differences of winning and losing teams in terms of goal scoring and passing sequences. Total of 31 matches from UEFA-EURO 2012 were analyzed and 5 matches were excluded from analysis due to matches end up drawn. There are two groups of variable used in the study which is; i. the goal scoring variable and: ii. passing sequences variable. Data were analyzed using Wilcoxon matched pair rank test with significant value set at p < 0.05. Current study found the timing of goal scored was significantly higher for winning team at 1st half (Z=-3.416, *p*=.001) and 2nd half (Z=-3.252, *p*=.001). The scoring frequency was also found to be increase as time progressed and the last 15 minutes of the game was the time interval the most goals scored. The indicators that were significantly differences between winning and losing team were the goal scored (Z=-4.578, *p*=.000), the head (Z=-2.500, *p*=.012), the right foot (Z=-3.788,*p*=.000), corner (Z=-.2.126,*p*=.033), open play (Z=-3.744,*p*=.000), inside the penalty box (Z=-4.174, *p*=.000) , attackers (Z=-2.976, *p*=.003) and also the midfielders (Z=-3.400, *p*=.001). Regarding the passing sequences, there are significance difference between both teams in short passing sequences (Z=-.4.141, *p*=.000). While for the long passing, there were no significance difference (Z=-.1.795, *p*=.073). The data gathered in present study can be used by the coaches to construct detailed training program based on their objectives.

Keywords—Football, goals scored, passing, timing.

I. INTRODUCTION

FEEDBACK is one of the most important factors in improving any sport skill performance. During the old days, feedbacks were given by coaches based on their subjective observations of the athlete's performance. The subjective observations by the coaches may or may not be accurate but it is also unreliable. This was supported by [1] where they found out that percentages of coaches are correct in their post-game assessment was less than 45 percent during the 45 minutes of a soccer game. This is because the human memory system has the limitations whereby we cannot remember the whole event during the entire soccer game or competitions. Reference [2] stated the poor viewing environment during the competition event, mind sets and

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prejudices of the coaches (what coaches want or expect to see) and the emotions during the competition (such as anger and stress) also affect the feedback collection by the coaches. If coaches fails to provide the information (knowledge) or giving the inaccurate feedback, the process of learning cannot take place. However, with technological advancement in computers and video viewing, the process of giving the feedbacks to the athletes can be enhanced during the training and also the competition.

Performance analysis or match analysis is the method that often used by the coaches nowadays to obtain and share the feedbacks to their athletes during training and competition. Match analysis was can be defined as the objective of recording and examining the behavioral event that occur during competition [2]. The main objective of doing match analysis was to analyzing and identifying the team's strength and weakness, which then can be improved. Reference [3] also stated that besides analyzing for own team's performances the coaches also can analyzed the opponent's strength and weakness data and used it as the way to encounter their opponent during competition. Besides, match analysis also allows for the improvement of the physical, which related to physiological-biological and also the technical and tactical enhancement [4]. The information (feedback) from match analysis can be obtained during and also after the competition itself. The information gathered from the sports competition then is used during a sport practice to prepare the athlete for the next competition [5].

The first kind of match analysis was done by using the hand or else known as the hand notation. The hand notation was the main and the only source of doing analysis at that time. However, there was no report stated that exactly when the hand notation was first start used [1]. Although the hand notation was cheap and accurate, but it sometimes takes longer time and more sophisticated to learn and process [6]. With the introduction to technology, we can see lots of coaches has been used the computerized notational analysis to analyze their team's performance. The computerized notation system makes the coaches and sports analysts easier to understand, interpret the data and have large access to the data. Reference [1] and [7] stated the information derived from the computerized notation system can have several purposes such as immediate feedback, database development, indications of area requiring performance improvement, evaluation and also as a mechanism for selective searching

World Academy of Science, Engineering and Technology
International Journal of Humanities and Social Sciences
Vol:7, No:2, 2013

through a video recording of the game.

Soccer is one of the sports watched by wide range spectators till today. Reference [8] stated that it is one of the complex sports and it depends on various unanticipated factors that the coaches try to control in order to bring success to their clubs. Related to the coaches' limitations on receiving limited information during the competition, this is where match analysis comes in. However, there are lots of empirical researches of match analysis but they are more focused and limited on the playing pattern or physiological work rate of the individual players [9]. Reference [10] has defined performance indicators as the selection, or combination, of action variables that was aimed to define some or all of the aspects of performance. The performance indicators that are going to be evaluated need to be related to successful outcome. The performance indicators are important nowadays, as it has been suggested to be focus in developing the performance indicators and utilize them [2], [3], and [10]. From the indicators, the coaches can establish a profile of ideal performance that can be included in the athlete's training activity to achieve the performance target and also can be used to predict the future behavior of the sporting activity [11].

Until now, there are limited number of studies that investigate the performance indicators by distinguishing between the winning teams and losing teams [9], [12], [13] and [14]. Reference [6] studied the differences between winning, drawing and losing teams in the Spanish soccer league. From total of 380 matches ranged from the 2008-2009 season of Spanish Men's Professional League, they found that the of total shots, shots on goal, crosses, crosses against, ball possession and venue were the indicators that differentiate between winning, drawing and losing teams. Hugh and Churchill have compared the pattern of play between the successful and unsuccessful teams during the Copa America Tournament 2001 by looking at the shots and goals [13]. They have found out that the there was no significant difference between the successful and unsuccessful teams in shots to goal. Study by [14] have found that there are differences between successful and unsuccessful teams in converting the possession into shots to goal, with the successful teams have higher ratios in the 1990 World Cup. Reference [15] studied 24 matches on the possession of the ball between successful and unsuccessful teams in the English Premier League 2001-2002 season. They found that the successful teams have longer possession than the unsuccessful teams regardless of the match status (evolving score). During the soccer World Cup 2002, [16] have studied the differences on passing between successful and unsuccessful teams in the event. They suggested that they are no differences between the two teams as there is no significant difference in passing performance. This may be resulted because of the small sample size (6 teams, 3 teams each on successful and unsuccessful teams).

The game of soccer is a fast evolving match that it takes nearly as 1000 changes of activity take place – a change of activity for every 5.65 seconds [17][18]. However, because of the fast changing activity during the soccer matches, [1]

suggested that all computerized system should undergo intra-observer reliability to get accurate results. The aim of the study is to identify the specific performance indicator related to goal scoring and playing patterns to differentiate the winning and losing teams in UEFA-EURO 2012 Championship.

II. METHOD

A. Sample

In order to carry out the study, all 31 matches from the UEFA-EURO Championship for 2012 have been analyzed. All of the 31 matches were broadcasted live on the television provided by ASTRO Malaysia Holdings Sdn. Bhd. The matches were recorded by using the Astro Beyond ™ PVR (Personal Video Recorder). The reason of this Championship

TABLE I
VARIABLES STUDIED IN UEFA-EURO 2012 CHAMPIONSHIP

No.	Groups of variables	Performance indicators
1	Variables related to goal score	Time of scoring, part of body used to score, total shots at goal and outcome, phases of play lead to goal, area of pitch when score goal, goals according to players position
2	Variables related to passing sequence	Short passing sequences, long passing sequences

was selected is because of the involvement of top European football teams (Poland, Greece, Russia, Czech Republic, Netherlands, Denmark, Germany, Portugal, Spain, Italy, Ireland, Croatia, Ukraine, Sweden, France, and England).

B. Procedures

All recorded matches were then transferred into Sportscode Elite software (Sportstec Australia) to be analyzed. Out of 31 matches, only 26 matches were analyzed by using the computerized software as the remaining 5 matches were excluded from the analysis due to the matches end up drawn. The winning team was defined as the teams that win in every matches and the losing team defined as the teams that lose in every matches.

The variables studied were divided into two groups (Table I). These are the performance indicators that were gathered during the study: time of scoring (per 45 minutes and per 15 minutes), part of body used (head, right foot, left foot, or others), total shots at goals and the outcome (goal, missed, saved, blocked, post or crossbar), area of pitch when goal scored (goal area, inside penalty area, outside penalty area), players position (attackers, midfielders, defense), short passing sequences (4 or less passing sequences) and long passing sequences (5 or over passing sequences).

World Academy of Science, Engineering and Technology
International Journal of Humanities and Social Sciences
Vol:7, No:2, 2013

TABLE II
DIFFERENCES BETWEEN WINNING AND LOSING TEAMS IN GAME STATISTICS
FROM UEFA-EURO 2012

Goal scoring time	Winning		Losing		
	Mean	SD	Mean	SD	p value
1st half	.88	.816	.15	.368	.001*
0-15 min	.23	.514	.08	.272	.157
16-30 min	.38	.496	.04	.196	.003*
31-45 min	.27	.452	.04	.196	.034*
2nd half	1.08	.935	.35	.629	.001*
45-60 min	.23	.430	.23	.514	1.000
61-75-min	.38	.697	.04	.196	.021*
76-90 min	.46	.647	.08	.272	.013*
Extra time	.35	1.093	.19	.567	.194
Total SAG and outcome					
Total SAG	14.19	6.444	11.42	5.442	.123
Goal	2.31	1.123	.69	.788	.000*
Saved	4.65	2.952	3.65	1.875	.195
Missed	5.77	3.398	5.88	3.990	.678
Blocked	1.04	1.587	1.00	1.166	.851
Post or Crossbar	.38	.697	.27	.452	.439
Part of body used					
Head	.58	.643	.19	.491	.012*
Right foot	1.38	1.235	.35	.689	.000*
Left foot	.35	.689	.12	.326	.107
Phases of play					
Freekick	.12	.326	.15	.464	.705
Corner	.35	.629	.04	.196	.033*
Open play	1.19	1.021	.19	.491	.000*
Throw-in	.31	.471	.08	.272	.058
Penalty	.35	1.093	.23	.587	.334
Pitch area					
Goal area	.23	.430	.23	.430	1.000
Inside penalty box	1.96	1.248	.38	.637	.000*
Outside penalty box	.12	.326	.08	.272	.655
Player positions					
Attacker	1.19	.939	.38	.637	.003*
Midfielder	.96	.871	.15	.368	.001*
Defense	.19	.491	.15	.368	.705

C. Reliability Testing

The inter-tester and intra-tester reliability was tested by. The inter-tester reliability was assessed by authors, which coding one randomly selected match and data gathered were compared with each other. The intra-tester reliability test was assessed by doing three analysis on separated occasion of the same match. Each occasion was given 5 days gap in between

to prevent memory that can produce bias and unfair results [1]. Reference [1] also suggested that the percentage of error allowed is 5% to get accurate results.

III. DATA ANALYSIS

All the data gathered from the analysis was transfer to the statistical analysis software called Statistical Package for Social Science (SPSS) software version 17.0. Descriptive analysis was done to get the mean ± standard deviation for both the winning and losing teams. Wilcoxon matched pair rank test was used to differentiate between winning and losing teams and p was set at p<0.05.

IV. RESULTS

The mean ± standard deviations of the goal scoring time variables are presented in Table II where it shows the difference in game statistic between the winning and losing teams. An overall of 88 goals were scored during the tournament, 60 goals from winning teams, 18 goals from losing teams and 10 goals from drawn matches.

There are significant difference between the winning teams and losing teams in scoring in the 1st half (Z=-3.416, p=.001), 16-30 min (Z=-3.000, p=.003), 31-45 min (Z=-2.121, p=.034), 2nd half (Z=-3.252, p=.001), 61-75 min (Z=-2.309, p=.021), and 76-90 min (Z=-2.486, p=.013). While for scoring in 0-15 min (Z=-1.414, p=.157), 45-60 min (Z=.000, p=1.000) and extra time (Z=-1.300, p=.194) shows no significant difference between the winning and losing teams.

However, the total shot at goals and the outcome only shows one indicator that is significant difference which is the goal scored (Z=-4.578, p=.000). There are no significant difference between the winning and losing team in total SAG (Z=-1.544, p=.123), saved shots ((Z=-1.297, p=.195), missed shots (Z=-.415, p=.678), blocked shots (Z=-.188, p=.851) and shots that hit crossbar or goal post (Z=-.775, p=.439).

In the part of body used in scoring goal, the head (Z=-2.500, p=.012) and the right foot (Z=-3.788, p=.000) have found to be significant while the left foot was not significant (Z=-1.613, p=.107).

The winning and losing team can also be distinguish in the phases of play where the corner (Z=-.2.126, p=.033) and open play (Z=-3.744, p=.000) was found to be significant difference. The phases of play cannot be distinguish in term of free kick (Z=-.378, p=.705), throw in (Z=-1.897, p=.058) and penalty (Z=-.966, p=.334) where these indicators were not found to be significant.

As for the remaining indicators, the area of the shots taken is significantly difference only in inside the penalty box (Z=-4.174, p=.000) while the attackers (Z=-2.976, p=.003) and midfielders (Z=-3.400, p=.001) were the players that can differentiate between winning and losing teams. The goal area (Z=.000, p=1.000), outside penalty box (Z=-.447, p=.655), and the defense player (Z=-.378, p=.705) showed no significant difference between both teams.

World Academy of Science, Engineering and Technology
International Journal of Humanities and Social Sciences
Vol:7, No:2, 2013

TABLE III
DIFFERENCES BETWEEN WINNING AND LOSING TEAMS IN PASSING
SEQUENCES

Passing sequences	Winning		Losing		
	Mean	SD	Mean	SD	p value
Short passing	1.38	.983	.154	.368	.000*
Long passing	.58	.643	.269	.533	.073

The analysis of passing sequences between winning and losing teams is shown in Table III where short passing sequences (Z=-.4.141, *p*=.000) showed significant difference between both teams while the long passing sequences (Z=-.1795, *p*=.073) showed no difference between the teams.

V. DISCUSSION

The aim of the study is to differentiate the selected performance indicators relating to scoring goals and passing between the winning teams and losing teams in UEFA-EURO 2012 Championship.

On the observations of the goal scoring related to time, the winning teams was found to be statistically difference than the losing teams in scoring in the 1st half and 2nd half of the matches. There are more goals scored in the 2nd half compared to the 1st half. It can be said that as time progressed, more goals are scored. However, past studies have shown that the goals scored during a match is time dependent, and others have implicate that there is no immediate correlation between them [19]. When considering the analysis of the match by 15 minutes interval, the last 15 minutes of the match was the time most goals are scored between winning (.46 ± .647) and losing teams (.08 ± .272). Reference [7], [8], and [20] found similar results as they found that more goals scored towards the end of the match and have upward trend in term of goal scored as the time progressed. It was suggested that the physiological and tactical factors plays important roles in this situation, whereby the defenders experienced larger amount of energy depletion, physical condition and also their psychological (concentration) throughout the matches [21]. The reduction in physical and mental condition of the players will lead to poor physical performance and fatigue. Other than that, this also can be due when the losing team tries to push themselves to score goals, they are actually creating opportunities for themselves to score goals and also creating the opportunity for the opponent to concede more goals [20]. Therefore, it is important to improve the player's stamina and strength throughout time and it can be included in the training activity.

The results from the present study indicate that the winning teams made more shots at goal compared to the losing teams (14.19 ± 6.444 vs. 11.42 ± 5.442) even though there are no significance difference between them. Similar results were found in [12], [13], and [14] when the authors found that the successful teams produce more shots at goals than their opponents. This shows the important of making shots at goals as more shots can be made will produce greater chances of a team to score goal. The goal are the only outcome indicator that were found to be significance between the winning and losing teams. However, there is no significance difference found in the other outcome of shots between winning and losing teams. Similar results were found in [13] where the successful teams produce greater number of goals than the unsuccessful teams.

Concerning in distinguishing the winning and losing teams in parts of body used in score goals, the head and the right foot was the parts that was frequently used and have statistical difference between the teams. The differences may be due to the number of goals scored as these two indicators are related. Furthermore, the right foot was the most used followed by the head and left foot for both of the team. This may be due to more players are dominant on the right leg. However, further study should be conduct on examining relationship of leg dominant with the leg used when scoring goal. Regarding the use of the head, it can be suggested that the winning teams midfielders coming more from the wings and also the attackers of the winning teams have good control of the ball while the ball was in the air. Besides, it can also resulted from a poor defenders and poor air-dominance by the goalkeepers of the losing teams.

The mean for the open play for the winning teams are higher than the losing teams (1.19 vs. .19) in the phases of play indicators. The results indicate that most of the winning teams' goals are resulted from an open play situation. It can be suggest that during open play, the winning teams can organized a good offense, made a counter attack, and also have create the opportunities for set plays. In related to set plays, corner are the only set play that can be used to distinguish between the winning and losing team. Reference [17] and [22] stated that the importance of set plays has now been realized and the usage of set play has been found to be increase soccer matches.

As for the indicators related to pitch area taken when scored goals, inside penalty box was the only significance indicator between the winning and losing teams. The same result was found in the [17], [20], and [23] as they stated that most of the goal was scored inside the penalty area or the box. It was suggested that the players prefer to be near to the goalpost but not in the goalkeeper's range so that they can shoot the ball with less distraction. Therefore, finding from the pitch area take to score goal in the present and past studies should be take into consideration as the training should emphasize on shooting inside the penalty box with the same situation as real match. When looking at the player's position in the pitch, the attackers and midfielders scored more goals in winning teams compared to losing teams. Whereas, the defense player for both teams scored slightly the same amount of goals and therefore, no statistical difference was found. In the winning team, the attackers and midfielders scored almost the same amount of goals (1.19 vs. .96) as compared to losing teams (.38 vs. .15). The attackers from the winning teams

World Academy of Science, Engineering and Technology
International Journal of Humanities and Social Sciences
Vol:7, No:2, 2013

contributed to more goals because they could be more skillful player and can adapt to different situations in matches or maybe they have easier chances of making goals compared to the midfielders and defense [13]. Although the attackers from the losing teams score more goals than their midfielders and defense, they do not produce many goals as the attackers from winning teams. This is may be due because the losing teams were unable to get the ball to their attackers or may be because their attackers are not skillful as the attackers from winning teams.

Regarding to the passing sequences that contributed to goals, the short passing sequences for winning teams was found to be significant difference than the losing teams. Furthermore, the shorter passing sequence ware found to be used more frequent than the longer passing sequence by the winning teams (1.38 vs. .58). Therefore, in the present study, it can be concluded that the shorter passing sequence are more suitable in scoring goals. This was supported by [1], [24], and [25]. Reference [1] was one of the pioneers that studied 3213 matches between the year 1953 and 1968 and found that 80% of the goal was scored with three passes or less. The same finding found by [25] as the results showed three or less passes contributed to score goals and this was then called 'direct play' by [24] which support less passes for each team possession. There is also some contrary finding by [14] as they studied the 1990 and 1994 World Cup goals and stated that the shots per possession were greater at longer possessions than at shorter possessions at successful teams. They stated that more shots could be made by having longer possession of the ball. However, the conversion ratios of shots to goals are greater at shorter passing sequence. It was suggested that, the "direct play" is suitable for teams that unable to sustain possession of the ball [14]. Reference [26] stated that there are no specific principles which determine which are the best passes to use in soccer match, once any of the method can create the opportunity of scoring, depending on the situation.

VI. Conclusion

From the study, we can conclude that the winning teams scored more goal during 2nd half of the match and especially on the last 15 minutes of gameplay. The players also scored the goals most by using their right foot and head and taking their shots inside the penalty box for better chances due to near the goal but not too near to the goalkeeper. The goals were produced greater from an open play and corner. Besides, shorter passing sequences or direct play is the best method on scoring goals but it is also depending on the situation. Besides, further studies can be carried out such as the type of shot used when the goal scored and the direction of the shot during a larger number of matches. The coaches can refer to the significantly different indicators between winning and losing team to plan the training goals for individuals and the teams.

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World Academy of Science, Engineering and Technology
International Journal of Humanities and Social Sciences
Vol:7, No:2, 2013

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