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SPORT AND PHYSICAL EDUCATION

PERFORMANCE ANALYSIS

CARDIFF SCHOOL OF SPORT
TACTICAL AND TECHNICAL COMPARISON OF SUCCESSFUL TEAMS AND UNSUCCESSFUL TEAMS IN THE 2010 WORLD CUP
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Acknowledgements

I would like to thank and acknowledge the following people for their contribution and support throughout the making of this study:

- Dr Peter O’Donoghue for his time and endeavour in guiding me through the research.
- My mother for her continued love, assistance and support.
- My housemates and close friends for their sustained encouragement.
ABSTRACT

Match analysis tends to focus on one element of technical or tactical play, and do not look at a range of these performance indicators in conjunction. Unsuccessful teams within studies of the World Cups are predominantly those that failed to progress further than the group stages, but this does not give a true reflection of teams that were truly unsuccessful. The purpose of this study was to analyse a selection of technical and tactical performance indicators, to find out differences between two types of teams. Inter-observer reliability tests were conducted on the system, which deemed the system reliable with positive results from the Chi Squared and Percentage Error statistics.

Post event analysis of sixteen matches from the 2010 World Cup was undertaken, from a selection of unsuccessful teams (n=8) and successful teams (n=8), using a hand notation system to code the desired events. Unsuccessful teams included England, France, Brazil and Italy because of their underperformances and premature exits from the tournament. Holland, Spain, Germany and Uruguay were selected as successful teams having reached the semi finals.

Non-parametric measures by the means of Mann-Whitney U tests reported significant differences between the two types of teams. Successful teams were significantly superior with regards to their tackling outcomes, with more turnovers and less failed tackles (p<0.05). Unsuccessful teams demonstrated inferior abilities in terms of pass completion rates, with significant differences in forward passes, and in passes that were attempted in the left zones of the defensive and attacking areas (p<0.05).

Successful teams distributed their completed pass evenly across the midfield, with 32.7%, 32.5% and 34.8% in the right, central and left zones, whereas unsuccessful teams seemed to opt for a more central route, with 39.0% of completed passes distributed in the middle area of the pitch compared to 30.1% and 30.9% in the right and left flanks.

To conclude, successful teams were found to be significantly superior to unsuccessful teams in ten different performance indicators, highlighting their importance in relation to success.
CHAPTER 1
INTRODUCTION
1.0 Introduction

1.1 Background
Football is a free-flowing game, with play naturally going back and forth from defence to attack, and most of the players have complete freedom in their movements (Wade, 1996). The sport’s unrestricted structure can explain why it has so many admirers and is what makes the game such an appealing one for both professionals and spectators. The level of success achieved by a team and the manner in which it plays is determined by many facets of the sport. Numerous talented individuals can make up a team, but in order to exploit these talents, the correct strategies need to be employed to suit the abilities of the individuals, and even counteract the capabilities of the opponents (Wade, 1967).

Both tactical and technical elements can facilitate or prevent a team from achieving success. The number of crosses, tackling, direction of passing and the type of passing are just a few of the performance indicators that contribute to what the sport essentially requires, according to Grehaigne, Bouthier and David (1997), “recapture, conserve and move the ball so as to bring it into the scoring zone and effectively score” (p.138).

In 1930, the very first World Cup tournament was held in Uruguay (Glanville, 2005) and the competition has been the summit of football performance ever since. The contest is held every four years, with all the qualifying countries playing for perhaps the most-sought for prize in the sporting world. The global familiarity that it possesses is reflected in the millions of participants playing at grass root levels (Reilly, 1996). The tournament represents football at its pinnacle, attracting spectators and television audiences world-wide.

Although European and South American teams continue to dominate the tournament, the expansion to twenty-four teams in 1982 and then to thirty-two countries in 1998 saw the emergence of teams from Africa, North America and Asia (Glanville, 2005). Countries from these regions have thrived on the big stage, with Mexico, Cameroon, Senegal, South Korea, USA and Ghana reaching the quarter and semi-final stages in recent years. This unpredictability coupled with the passionate supporters and the magnificent display of skill is what makes the tournament so appealing. Due to the significance and elitism of the World Cup competition, performance analysts utilise them and set them as yardsticks in the advancements of football-related match analysis (Horn, Grant and Williams, 2000; Luhtanen, Korhonen & Ikka, 1997; Yamanaka, Liang & Hughes, 1997) in an attempt to aid the coaching practice.
1.2 Match Analysis

Match analysis eases the enormous amount of pressure that is placed on football managers to achieve (Coghlan, 1990) as it is believed to be a systematic way of enhancing performance. It continues to become ever more present in the modern game in an attempt to bring about such success. Match analysis aims to observe a team or an individual’s performance to point out strengths to reinforce, and weaknesses that need improving (Carling, Williams & Reilly, 2005). With the progressions of the modern day game, coaches rely heavily on the information derived from such technological advances (Liebermann et al., 2002) as basing their tactical intentions on opinions and memory alone is not substantial enough (Bate, 1988). Olsen (1988) therefore states that match analysis is fundamental for the coach to gain any worthy insight into the strategies of play. Hughes (1996) outlines the main objectives of notation analysis:

- Tactical evaluation
- Technical evaluation
- Analysis of movement

As Hughes (1996) outlines, notational analysis aims to evaluate three factors that influence the level of performance. A team’s tactical understanding and ability is one of them, which is often the scope of football-related analysis studies. On the other hand, literature on the technical aspect of play seems to be lacking, but this aspect is just as prominent, if not more so, within the game itself (Yiannakos & Armatas, 2006). The study in question will essentially assess all of the core objectives of match analysis that is outlined in the literature (Hughes, 1996).
1.3 Relevant Previous Research
With the range of facets involved in the sport, research in this field has been broad, and often concentrates on time motion analysis, playing patterns and success indicators. Time motion analysis was used by Bloomfield, Polman and O'Donoghue (2004) and Reilly and Thomas (1976) to identify activities and work rate demands of various positions. Time motion analysis was also utilised by O'Donoghue and Parker (2001) to analyse players in the English Premier League.

Moreover, there is a large amount of literature that regards specific elements of a team’s performance, particularly those that bring about success. Numerous studies have attempted to identify specific traits of teams including Hughes, Robertson & Nicholson (1988) who analysed the characteristics of each possession for successful and unsuccessful teams in the 1986 World Cup. Ensum, Pollard and Taylor (2005) also conducted a study on a particular element of football, by analysing the factors related to shots at goal. In greater detail, various studies look into the effects of set pieces in relation to success, with free kicks (Sousa & Gargantua, 1998), corners (Olsen & Larsen, 1997), throw-ins (Yiannakos & Armatas, 2006) and penalties (Hughes & Wells, 2002) all having been specifically analysed.

Furthermore, several studies have looked at individual teams’ playing patterns in an attempt to explain their success or lack of. For example, the work of Taylor and Williams (2002) on Brazil during the 2002 World Cup, in addition to Rico and Bangsbo’s (1997) study of Denmark’s performances in the 1992 Euro Championships.

As regards the World Cup, it is a common area for performance analysis research, where studies often compare two sets of teams, or analyse a specific country. To name but a few, Hughes et al. (1988), Lawlor et al. (2004) and Lewis and Hughes (1988) compared two sets of teams in their studies, categorising teams that did not advance further than the group stages as the unsuccessful teams, and those that did as the successful teams. This procedure is open to criticism as teams who fail to progress from their groups can’t simply be labelled unsuccessful for that sole reason.
1.4 Statement of Problem

It is evident in the literature that there is a broad amount of research conducted into attempts to explain why teams succeed and fail, or to identify predictors of success. However, these tend to focus on individual elements of tactics and do not take into account other aspects of play, or analyse a specific team which means that the results are difficult to generalise. In addition, studies of the World Cup in the past do not seem to fully justify their selection of successful and unsuccessful teams, which may not give a true account of the performances.

1.5 Purpose of Study

The purpose of this study was to analyse and identify any differences between a sample of successful and unsuccessful teams that competed in the 2010 FIFA World Cup, in terms of a wide selection of technical and tactical aspects of play. It aimed to discover explanations on why specific teams (England, Brazil, Italy and France) under achieved in the competition and understand why they were unsuccessful compared to the semi-finalists (Spain, Germany, Holland and Uruguay). The analysis will involve a detailed quantitative analysis, based on qualitative observations. From analysing and then comparing the direction of passes, zones of passing and cross count, an idea of the teams’ tactical intentions became evident. In addition, technical abilities were portrayed by analysing the tackle outcomes, type of pass and the outcome of passes. The research aimed to distinguish any significant differences in these elements between both types of teams. Additional factors such as the opposition’s quality were considered for discussion, but eventually rejected, as the high standard of play in the World Cup sufficed.

1.6 Research Expectations

From the present study it was expected that an emergence of each type of team’s style of play in terms of technical and tactical approach would become apparent. Despite the individualism of each team’s approach, the data was processed in a reductive manner, taking into account the two types as a whole (successful vs. unsuccessful), rather than the countries individually. It was expected that some performance indicators would differ between the two types, to aid an explanation for the success/lack of success that the teams experienced during the 2010 World Cup.
1.7 Hypotheses

_Hypothesis:_ There will be no significant differences identified between the “successful teams” and “unsuccessful teams” with regards to their: pass type; pass direction; tackling outcomes; pass outcomes; passing zones; cross frequency.

_Null-Hypothesis:_ There will be significant differences between the “successful teams” in comparison to the “unsuccessful teams”. The differences will be apparent in one or more of the following: pass type; pass direction; tackling outcomes; pass outcomes; passing zones; cross frequency.

1.8 Ethical Issues

Due to the nature of this study, there are no ethical issues present. As the data is collected from television broadcasts, the footage already addresses any potential issues and is specifically made suitable for public viewing, which means that there are no constraints related to observing and analysing these recordings.

1.9 Limitations

- As the footage used to analyse the data is from broadcasted recordings of the BBC and ITV channels, the editing detriments the amount of footage that it available. When slow motion replays of previous actions are shown, some information.
- Due to time constraints, only two matches per country were analysed rather than all three of the group stage matches. Therefore, the data cannot be utilised as a complete summary for the 2010 World Cup.

1.10 Delimitations

- The study focuses on the 2010 World Cup and the results should be restricted to this level of competition of this era.
- The study is specific to the 2010 World Cup and therefore, should not be generalised to other areas of football such as the Champions League and Women’s football.
- The study is scoped on both tactical and technical elements of football and no external factors.
1.11 Terminology

Performance Indicators - Selection of actions, both tactical and technical variables to define some, or all aspects of a performance (Hughes & Bartlett, 2002).

Post-Event Analysis - Data was collected from archived recorded matches that allows the analysis procedure to take place after the actual events with the ability to pause, fast-forward, rewind and view the recording over and over.

Hand Notation - A manually devised data collection sheet to input data and code the events.

Successful Teams - Four teams that successfully qualified for the Semi-Finals of the 2010 World Cup, and consist of Spain, Holland, Germany and Uruguay.

Unsuccessful Teams - Four teams that entered the competition as highly ranked nations but suffered premature exits and underachieved in the tournament and consist of Italy, France, Brazil and England.

Strategy - The elements of offensive and defensive play that teams set out to do in order to achieve objectives (Carling et al., 2005; Grehaigne & Godbout, 1995).

Tactics – The approach in which the strategies are implemented (Grehaigne & Godbout, 1995; James, Mellalieu & Holley, 2002).
CHAPTER 2
LITERATURE REVIEW
2.0 Literature Review

2.1 Notational Analysis

Notational analysis largely concerns the identification of certain performance actions to develop tactics, strategies and practices that are related to the analysed performance. It is considered as an objective way of observing and assessing performances of both individuals and teams, providing positive and negative elements of performance.

Reep and Benjamin (1968) were one of the first to carry out an analysis of a football game, in which they used a basic hand notation system to analyse top flight English football and World Cup matches from 1953 to 1967. Having notated extensive performance indicators, the analysis found numerous patterns, including that 80% of goals scored resulted from three passes or less. This specific result triggered an immediate change within football, with many coaches adopting a direct long-ball approach, basing it as their formula for success, which still has a place in modern tactics even to this date.

Hughes (1993) stressed the need for an objective means of analysis for the coaching process, as it is invaluable in relation to achieving the successful stages within the coaching procedure (James, Taylor and Stanley, 2007; Borrie, 1996). Figure 1 highlights the coaching cycle comprised of various phases within the coaching process, including the observation and analysis phases. These phases focus on providing both qualitative and quantitative feedback to the coach and the coach then bases his next training sessions around them (Carling et al., 2005).

![Figure 1: Coaching progressions illustrating importance of observation & analysis (Carling et al., 2005)](image-url)
The information gathered through the notation analysis can be fed back to the coach quantitatively in the form of statistics such as possession levels and foul count, or in an individual manner with data regarding the player’s passing accuracy and tackling success. However, statistical information is not always either significant or presentable and this is why qualitative feedback is given to coaches, through the means of video footages. Both quantitative and qualitative approaches have a degree of objectivity and each have relative effectiveness (Magill, 2003).

Furthermore, instead of relying on the coaches’ recollection of the match events during a game, notational analysis can record numerous activities and provide a more efficient source of feedback. Unintended bias can easily loiter into a coach’s evaluation of a performance (Brackenridge & Alderson, 1985; McDonald, 1984) and in addition, Franks and Miller (1986) showed that novice observers were only able to successfully recall 42% of critical events from an International football match. Moreover, Laird and Waters (2008) on the other hand tested qualified football coaches and reported that they had a better recall ability, of 59%.

Notational analysis earns its value in assisting coaches with an effective form of feedback to have a precise account of performances (Macheath, 1987), as coaches can’t store all the match events in their memory. A coach’s recollection can be affected by several factors:

- Viewing Environment- Coaches have a habit of following the ball so they miss off the-ball incidents.
- Limitation of Human Memory- It is impossible to remember every single action during a match.
- Coach Favouritism- Some coaches have set views and are biased in their recollections.
- Emotional Effects- Affects focus levels and may distort a coach’s impression of the match.

Having considered these limitations, coaches should avoid making decisions based merely on their own memory-stored subjective assessments. Instead, they should utilise the objective data provided by the analysis system and assess the accurately measured statistical information (Carling et al., 2005) which is far more efficient than imprecise results (Newell, 1981).
2.2 Analysis Methods

Hand notation systems were the only existing measures of sport analysis before the development of technology introduced computerised systems. Different aspects of a sport can be analysed through a hand notation system, with the data collected being manually processed by the analyst to provide feedback for the coaching process. As some early sporting notation researches have not been published, it is not clarified when the first sport hand notation system was actually utilised (Hughes & Franks, 2004). It is reported however, that one of the first attempts at a design was on basketball players’ running distances during a match (Messersmith & Bucher, 1939). It is the most conventional and accessible method of data collection, considering its cost, as it only involves a specifically designed system, with recordings being made on paper. Moreover, some aspects of performance lend themselves better to hand notation systems, such as Hughes and Wells’ (2002) study on penalty kicks, which focused on their approaches, placement and outcomes.

Numerous ground breaking studies have been successfully conducted using hand notation systems looking at a player’s activities during a match (Reep & Benjamin, 1968); the role of tactics in relation to attacking success (Harris & Reilly, 1988); individual’s movement patterns (Reilly & Thomas, 1976; Withers et al., 1982). However, these dated studies indicate the recent decline of this particular system due to the introduction of computer analysis. Despite its advantages regarding its accuracy and low-priced procedures, Hughes (1993) acknowledged that hand notation systems suffer from one major disadvantage, and that is the fact that masses of data is are collected on paper which takes a lengthy time to process, therefore hindering the coaching process.

With the enhancements in technology over recent times, computerised systems have become ever more superior and are claimed to be the most useful way of acquiring an accomplished analysis system (Toledano et al., 2001). Players can now be assessed via video footages in conjunction with a computerised analysis system. As these computers allows data to be entered through a click of a button, the processing time is reduced which makes the interpretation of the data easier for the players and coaches. Computerised systems possess lots of advantages, in particular their ability to code a match’s information and input the data straight on to software that generates accurate statistical information, which is immensely efficient.
Nevertheless, the complexity of the sophisticated notation systems carries its own issues. Hughes and Franks (2008) stress the potential problems that an operator may face with the use of a computerised system. Errors in the hardware or software lead to misunderstandings and inconclusive findings. In addition, an operator error such as pressing the wrong button caused by misinterpretation subsequently means that the data entered is false (Hughes & Franks, 1997). Whether an analyst opts to use a computerised or hand notation system is decided by factors, such as the type of data being recorded, its complexity and quantity, and the analyst’s personal preference or expertise. To conclude, as long as the system can generate accurate and clarified results, whether it is through a computerised process or with a basic pen and paper system, then the players and the coaches should be able to develop their awareness of the sporting performance (Hughes, 2003).

2.3 Football Analysis

2.3.1 Indicators of Success
To sustain successful performances, teams need to ensure that they employ width, improvisation, mobility and support whilst attacking, in addition to delaying, concentrating and controlling the play whilst defending, to underpin the principles of play proposed by Wade (1996). This demand and interest in success is illustrated in the football analysis literature, with numerous studies attempting to identify specific indicators that differ between successful and unsuccessful teams (Pollard, Reep & Hartley, 1988; Ali, 1988; 1992).

2.3.2 Possession
Analysing the teams’ possession quantity and its use is a popular means of analysis within football, as there is much debate in the coaching communities regarding its role concerning success, and it is intuitively expected that longer periods of possession predicts success. Charles Reep has assuredly contributed towards the analysis of football, aiding the coaching world for over fifty years. Reep and Benjamin (1968) published ground-breaking data, including that 80% of goals came from passing sequences of three or less. Their results went on to advocate a direct style of football by using long passes from the back. The long ball strategy encourages the ball to enter the goal scoring positions of the pitch as often as possible, to increase the opportunities of scoring a goal (James, 2006). Bate’s study (1988) twenty years on supported the work of Reep and Benjamin (1968). His findings included that 94% of goals at international football level were scored after passing sequences of four or
less passes and advocated that teams should play the ball forward as much as possible, to increase the number of forward long balls and to play the ball behind the defence into space as often as possible. Moreover, Stanhope (2001) reported that possession time with the ball in the 1994 World Cup was not indicative of success.

Despite the findings of the studies mentioned above, the data has been criticised for being too narrow, having focused solely on the amount of goals scored that originated from short passing sequences, but ignoring the outcomes where no goals occurred following similar sequences. Although several teams have progressed from lower divisions having succeeded with this style of play, top-end champions have not employed these tactics which indicates that there are additional dimensions of play to be explored (Hughes & Franks, 2005). Furthermore their conclusions seemed to reject the notion of possession football as a predictor of success, but nonetheless, studies opposing their conclusions are evident in the literature too. In the 1998 World Cup, Grant, Williams, and Reilly (1999) found that successful teams maintained possession of the ball for longer periods than unsuccessful teams. Grant et al. (1999) also reported that the successful teams penetrated the defence with passes more often than the unsuccessful teams managed. In a similar study of the Euro Championships 2000, it was also reported that successful teams dominated possession in comparison to unsuccessful teams (Hook and Hughes, 2001).

Additionally, James, Jones and Mellalieu (2004) and Bloomfield et al. (2004) analysed the English Premier League and showed that the successful teams typically had greater possessions than the unsuccessful teams. These studies contradicting the direct style of play suggest that maintaining possession for longer spells is indicative of success.

2.3.3 Crosses

Griffiths (1999) studied France during their 1998 World Cup campaign and it was reported that they created significantly more crosses than their opposition. In addition, it was found that the proportion of goals scored from crosses was 11% higher in the 2002 World Cup with 29%, compared to the 18% at the previous 1998 World Cup (Carling et al., 2005). Hughes and Churchill (2005) also found that the two most effective forms of passes during the 2001 Copa America were crosses and chips, which successful teams used significantly more than unsuccessful teams.
The increase in cross count over the years suggests the use of wing play employed by successful teams as a source of success, contrary to the earlier findings of Hughes et al., (1988) which reported that successful teams attacked through the middle of the pitch. Grant (2000) on the other hand reported that unsuccessful teams crossed the ball more frequently during the group stage matches of the 1998 World Cup, in comparison to the successful teams.

2.3.4 Pitch Zone

In terms of the passing within different zones of the pitch, Scoulding, James and Taylor (2004) found very little difference between successful and unsuccessful teams at the 2002 World Cup. Horn, Williams and Ensum (2002) on the other hand reported that 86% of the passes in the English Premier League that are received in the central area just outside the penalty area known as “in the hole”, subsequently go in to the penalty area and are therefore more likely to generate scoring opportunities.

Moreover, Horn et al. (2000) found that 13/16 of goals scored by France during the 1998 World Cup were assisted from central zones, with 50% coming from “the hole”. Taylor and Williams (2002) also related pitch location to the amount of goal scoring chances, and concluded that Brazil created more attempts on goal when they retained possession in defensive areas than in any other areas of the pitch.

2.3.5 Passing

During the 2000 Euro Championships, successful teams played more penetrating passes, both through balls and over-the-top passes, while the unsuccessful teams favoured a more direct style of play, tending to play the ball aerially, with less control (Hook and Hughes, 2001). They also reported that successful teams typically varied between long and short passes and still maintained possession. With regards to long balls, Yiannakos and Armatas (2006) reported that 34.1% of all the goals during the 2004 European Championships resulted from a long pass. Armatas et al. (2009) studied the Greek Football League and stated that the league’s top teams made more penetrating passes in comparison to the lower ranked clubs. They concluded that the players within the top teams had greater technical and tactical capabilities and therefore created more goal scoring opportunities. In addition, Grant et al. (1999) also reported that the successful teams penetrated the defence with passes more often
than the unsuccessful teams. Wein (2004) goes on and states that the quality of the final ball determines the opportunity outcome.

2.4 Football Analysis of International Competitions

In their study of the 1986 World Cup at Mexico, Hughes et al. (1988) analysed successful and unsuccessful teams’ patterns of play. It was found that the successful teams managed to distribute the ball from their defensive third through the centre of the pitch, whereas the unsuccessful teams were forced to dribble up from the back using the wide areas. In the attacking third, a similar pattern was uncovered, with successful teams approaching the goal using mostly the middle of the pitch (166), in comparison to both wings (139). The unsuccessful teams on the other hand predominantly used the wide areas, with 181 approaches coming from the wings compared to 101 central approaches. Lewis and Hughes (1988) conducted a similar research at the Mexico World Cup 1986 which extended the work of Hughes et al. (1988). They also found that successful teams passed the ball out of the defence more often than the unsuccessful teams.

Although the findings of the studies mentioned above may be less pertinent to football nowadays due to the era in which they were conducted, Low, Taylor and Williams (2002) completed a similar research on the 2002 World Cup and produced corresponding findings to those of Hughes et al. (1988) and Lewis and Hughes, (1988).

Moving on to more recent publications, Grant (2000) concluded that a trait of a successful team at the 1998 World Cup was that they had more possession of the ball. However, it was also reported that the successful teams over the course of the three group stage matches did not perform as many passes per game as the unsuccessful teams. Lawlor et al. (2004) studied the following World Cup, in 2002 and found that successful teams had more runs, dribbles shots at goal, in addition to crosses and forward passes and also reported that they retained possession for longer periods than unsuccessful teams.

Japheth and Hughes (2001) studied the French national team over the course of two major competitions (World Cup 1998 and Euro Championships 2000) and they attributed the French success (they won both competitions) to their ability to keep possession for longer periods than their opposition, similarly to Lawlor et al. (2004). Despite the similarity of their possession in the two competitions, quite a few differences were noticeable. In particular, on average for every match at the World Cup, they had 6 more shots, 42 more passes, and 30
less negative turnovers in comparison to their statistics during the Euro Championships. Furthermore, the French utilised the flanks to approach the opposition defence in the World Cup, with 10 more crosses, whereas in the Euros, their attacks favoured a narrowed route. Although France had several players that were present in both tournaments (i.e. Barthez, Thuram, Desailly, Lizarazu, Vieira, Zidane, Djorkaeff, Dugarry, Deschamps), it is interesting to see the success they achieved in adapting their tactics over the four year period. Essentially, this emphasises the importance of having the ability to adapt to different playing approaches (Lago, 2009). Additionally, the French dominance signifies the need to analyse the opposition performance to try to combat their strengths and exploit their Achilles' heel (Carling et al., 2005).

Paradigm Debate:

With regards to World Cup football analysis, successful teams are generally considered as those that reach the semi-final stage of the tournament, and the unsuccessful ones that do not advance further than the opening group stages (Lewis & Hughes, 1988; Lawlor et al., 2004 and Hughes et al., 1988).

Nonetheless, teams that fail to advance further than the group stages aren’t necessarily unsuccessful, as it might simply just be that they are not good enough. In addition, teams that progress from the group stages cannot be labelled successful immediately, as some teams are expected to advance to the knockout stages anyway, due to their quality (Taylor et al. 2008).

In the present study, it was unfair to categorise teams such as New Zealand, Switzerland or South Africa as unsuccessful because they did not advance further than the group stage. Moreover, even if they did finish 3rd within their respective groups, their performances exceeded the expectations and therefore, enjoyed relative success.

Taylor et al. 2008 also noted that being eliminated from a tournament might be determined by other factors such as the draw and the opponents within the group. For instance, Ivory Coast was drawn with Brazil and Portugal in the “Group of Death”, consisting three teams that would have expected to progress, but due to the competitiveness in that group, Ivory Coast failed to qualify (Williams, 2009). This does not deem them unsuccessful.
2.6 Summary
The necessity of success is paramount in football, and is illustrated in the studies discussed in the literature above which seeks to identify indicators of success. There is research highlighting the role of various performance indicators evident in the literature, but it is often specific on one variable (i.e. possession). In addition, this research is dated considering the developments of modern football. The indicators in the current study constitute of broad indicators that are present in football to achieve success and can be used to predict the future performance of football (O’Donoghue, 2005).

Moreover, there has been analysis of individual countries such as France and Brazil (Horn et al., 2000; Japheth & Hughes, 2001; Luhtanen et al., 2001; Taylor & Williams, 2002) that propose evaluations of their technical and tactical play, but there is a need for a reductionist approach to assess truly justified categories of successful and unsuccessful teams, in major international competitions.
CHAPTER 3

METHODS
3.0 Methods

3.1 Research Design
This study undertakes a post-event analysis study design, with the implementation of performance analysis in order to observe, notate and analyse differences of specific performance indicators of successful and unsuccessful teams competing at the 2010 football World Cup. In order to fully describe a particular phenomenon, a system to organise and generate data is required. Under the discipline of performance analysis, this is provided in the form of a category set (Carling et al., 2005). Specific performance indicator categories of four successful and four unsuccessful teams over the course of two matches each were analysed, using a hand notation system designed by the researcher. The performance indicators were specifically focused on tactical and technical elements of play. The data obtained through analysis was then processed to be presented and compared to relevant previous research on tactical and technical play of other football teams playing elite levels.

3.2 Operational Definitions
Operational definitions were established to be able to group the players’ actions into the designated categories of the relevant performance indicators. All definitions were universally agreed between all researchers to maximise the consistency whilst collecting the data. By distinguishing the operational definitions, it prevented any misperceptions during analysis as both the observers had agreed perceptions. In order to notate the different variable performed by the players during data gathering, each performance variable had a particular section on the hand notation sheets. Therefore, each tactical and technical aspect of play was classified into a number of categories before analysis took place.
**Pass**
Act of passing the football with any part of the body and can be either *successful* or *unsuccesful* (Redwood-Brown, 2008)

- **Pass Outcome**
  - **Penetrating**: A pass which penetrates a defensive line/unit and puts a team mate in a good position. Deemed successful
  - **Received**: A pass which is successfully received by a team mate, which is also deemed successful
  - **Intercepted**: A pass that is intended to reach a team mate, but an opposition player intercepts the ball. Deemed unsuccessful
  - **Out of Play**: An attempted pass that goes over the touchline and out of play which is also deemed unsuccessful.

- **Type of Pass**
  - **Long Pass**: Any attempted pass which is approximately 30 yards or longer.
  - **Short Pass**: Any attempted pass which is approximately 30 yards or shorter.

- **Pass Direction**
  360° Degree Passing Circle: The circle (Figure 2) is utilised to define the direction of the pass that the individual within the team plays. If the observer is uncertain about the pass direction even after rewinding the footage, then it is recorded as a lateral pass.

![Diagram of Passing Directions](image)

**Figure 2**: Diagram to remind the observer of the passing directions during notation
**Tackle**

Defined as an individual challenging for the ball in an attempt to dispossess it from the opposition player (Hughes & Probert, 2006)

- **Tackle Outcome**
  - **Turnover**: A tackle where possession is dispossessed from an opponent and the tackling team maintains possession. A tackle that forces an opponent out of play and in doing so wins a throw-in, corner or a goal-kick; it is also notated as a *turnover*.
  - **Unsuccessful**: When a foul is given away and possession is not regained. Also, if an individual attempts a tackle but the opponent escapes the tackle still in possession of the ball then it is also deemed *unsuccessful*.
  - **Out of Play**: A tackle that dispossesses the ball off the individual from the opposition team and ends up out of play (throw-in/cornet/goal-kick).
  - **Clearance**: A clearing action that dispossesses the opposition with the ball cleared from the area: Whether the ball is cleared back to the opposition or to a team mate, it is notated as a clearance either way.

**Pitch Zones**

The area in which each pass is attempted will be notated during data collection, with the pitch divided into a defensive area, midfield area and an attacking area, with nine different zones in total (Figure 3).

![Figure 3: Diagram of the pitch divided into zones for notation](image-url)
**Cross**
Notated when a player attempts to play a lateral ball in from a wide position into the opposition penalty area. It can be deemed successful or unsuccessful.

- **Cross Outcome**
  - **Successful Cross:** When the cross provides a scoring opportunity, met by a team mate, either with a header, volley, or just controlled. This is also noted when it causes panic for the opposition defenders and forces them into a corner/defensive situation.
  - **Unsuccessful Cross:** When the cross is met by the opposition team and cleared away. This is also noted when it does not penetrate the opposition team.

**3.3 Hand Notation System**
The hand notation system played an integral role in the process of collecting data as it required a carefully designed system with maximised efficiency (see Appendix A for Hand-Notation system for Holland v Japan). First and foremost, the performance indicators that would be analysed and then compared were identified, and then the system was implemented accordingly to allow the necessary data to be obtained. In their study on technical analysis of different playing positions, Hughes and Probert (2006) incorporated a “Continuum of Technique Rating Scale” to allow them to evaluate the level of the observed skill. Nevertheless, in the present study, it was decided against adopting a rating scale as it can be criticised on the basis of having two independent variables within one scale: the skill/technique itself, in addition to the pressure/no pressure affecting the player and his execution.

**3.4 Pilot Study**
The initial system (Appendix B) was piloted on a fifteen minute video footage of Spain versus Holland during the Final of the 2010 World Cup. Some minor flaws and issues were raised in this pilot study and found in the system, which allowed it to be rectified and amended accordingly. The outstanding findings from the pilot study found that the operational definitions were not clarified enough and therefore needed to be defined in more detail. In particular, the long/short pass indicator was defined as anything the observer perceives to be a long/short pass. This was changed to: a long pass is notated when the ball is played approximately 30 yards or further, with a short pass being anything shorter than this distance. It was also noticeable that the ‘pitch zones for passing’ indicator should be changed.
from the zone where they received the ball, to the zone from which the players passed the ball. This combated the fact that several passes were intercepted and not received, which in the pilot study, ignored the outcome of the pass.

Conducting a pilot study also provided the opportunity to modify and improve the notation system. Having piloted the system, it was identified that an additional performance indicator could be collected, and therefore it was agreed to introduce the ‘cross count’ into the system, thus increasing the amount of data being collected, essentially benefiting the research. The pilot study assured that the system was fitting for the required data being collected and confirmed its feasibility. Furthermore, the inclusion of a pilot study allowed the observers to become familiar with the hand notation design and improved their understanding of the operational definitions. In the final system, diagrams of both the pass direction circle and the pitch zones were added to remind the observers whilst notation took part.

3.5 Procedure
All of the games were recorded during the 2010 World Cup, and were stored in the Cardiff Metropolitan University CPA Archive. Once the required games (Table 1) were transferred over to a hard drive, data collection could commence. Prior to observing the match, the hand notation sheets were printed off for each half. In all of the matches, both teams were being analysed during the match with data being collected simultaneously. For the viewing of the matches, the observer had two separate sheets consisting of the hand notation system devised prior to collection. Data was recorded whenever an individual completed/attempted a specific performance variable associated with the study, in any area of the pitch. After observing a sequence of data, it was entered into the tally charts on the notation sheets, with the footage being paused to avoid missing any further footage. If there was a lack of clarity within a specific sequence, the footage was rewound to the specific phase, allowing confirmation of the identified data. Notation took place during the regulated first and second half of the match. After all teams were analysed, the results were entered into eight different (one for each team) Microsoft Excel spread sheets to obtain the total values and for initial analysis.
Table 1: Matches required for analysis, stored on the Hard Drive

<table>
<thead>
<tr>
<th>Unsuccessful Teams’ Matches</th>
<th>Successful Teams’ Matches</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brazil</strong> v <strong>Portugal</strong></td>
<td><strong>Spain</strong> v <strong>Chile</strong></td>
</tr>
<tr>
<td><strong>Brazil</strong> v <strong>Ivory Coast</strong></td>
<td><strong>Spain</strong> v <strong>Switzerland</strong></td>
</tr>
<tr>
<td><strong>Italy</strong> v <strong>New Zealand</strong></td>
<td><strong>Holland</strong> v <strong>Japan</strong></td>
</tr>
<tr>
<td><strong>Italy</strong> v <strong>Slovakia</strong></td>
<td><strong>Holland</strong> v <strong>Denmark</strong></td>
</tr>
<tr>
<td><strong>France</strong> v <strong>Mexico</strong></td>
<td><strong>Germany</strong> v <strong>Ghana</strong></td>
</tr>
<tr>
<td><strong>France</strong> v <strong>South Africa</strong></td>
<td><strong>Germany</strong> v <strong>Australia</strong></td>
</tr>
<tr>
<td><strong>England</strong> v <strong>Algeria</strong></td>
<td><strong>Uruguay</strong> v <strong>South Africa</strong></td>
</tr>
<tr>
<td><strong>England</strong> v <strong>USA</strong></td>
<td><strong>Uruguay</strong> v <strong>Mexico</strong></td>
</tr>
</tbody>
</table>

3.6 Equipment

- Computer - An Acer Aspire 5310 15.4 colour Laptop was for analysis and allowed the matches to be paused, rewound and fast-forwarded.
- Software: Microsoft Word 2007, Microsoft Excel 2007, Microsoft Windows Media Player and the SPSS 19 software package were used to input, generate, process and analyse the data.
- Printer: A Ricoh Aficio SP C820DN PCL 6 printer was used to print the relevant information.
- Hard Drive: A Western Digital Elements 500GB Portable USB 3.0/2.0 Hard Drive was used to store the information, documents and the selected matches.

3.7 Reliability

Reliability involves the repeatability or consistency of a measure (Thomas & Nelson, 1996). An inter-observer reliability test was conducted to assure that all operators associated with the study were consistent with each other. An inter-observer test provides agreement and disagreement scores of two individual observers who analysed the same event. Both observers were given operational definitions to reduce the subjective interpretations. Two observers analysed a whole match of ninety minutes from the same game as an inter-observer reliability test. Reliability tests were to be utilised to validate the notation system prior to data collection. The reliability tests chosen were Chi-Square for frequency distributions and percentage error for numerical counts and percentage conversion variables.
3.8 Reliability Results

Reliability Test: 90 Minutes of Brazil v Portugal from 2010 World Cup.

Table 2: Total frequency of tackle outcome with inter-observer scores

<table>
<thead>
<tr>
<th></th>
<th>Turnovers</th>
<th>Failed tackles</th>
<th>Out of play</th>
<th>Clearances</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer 1</td>
<td>46</td>
<td>63</td>
<td>12</td>
<td>18</td>
<td>139</td>
</tr>
<tr>
<td>Observer 2</td>
<td>46</td>
<td>58</td>
<td>14</td>
<td>18</td>
<td>136</td>
</tr>
</tbody>
</table>

The inter-observer reliability for the total frequency of tackle outcome (Table 2) was $p=.954$ deeming it is reliable because $p > .8$.

Table 3: Total frequency of pass outcome with inter-observer scores

<table>
<thead>
<tr>
<th></th>
<th>Penetrating</th>
<th>Received</th>
<th>Intercepted</th>
<th>Out of play</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer 1</td>
<td>55</td>
<td>683</td>
<td>93</td>
<td>18</td>
<td>849</td>
</tr>
<tr>
<td>Observer 2</td>
<td>55</td>
<td>693</td>
<td>93</td>
<td>18</td>
<td>859</td>
</tr>
</tbody>
</table>

The inter-observer reliability for the total frequency of pass outcome (Table 3) was $p=.999$ deeming it is reliable because $p > .8$.

Table 4: Total frequency of passes in each zone with inter-observer scores

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer 1</td>
<td>30</td>
<td>44</td>
<td>34</td>
<td>189</td>
<td>326</td>
<td>181</td>
<td>7</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>Observer 2</td>
<td>25</td>
<td>40</td>
<td>31</td>
<td>194</td>
<td>332</td>
<td>187</td>
<td>9</td>
<td>27</td>
<td>8</td>
</tr>
</tbody>
</table>

The inter-observer reliability for the total frequency of passes in each zone (Table 4) was $p=.994$ deeming it is reliable because $p > .8$.
Table 5: Total count of short passes, long passes and crosses with inter-observer scores

<table>
<thead>
<tr>
<th></th>
<th>Short</th>
<th>Long</th>
<th>Cross</th>
<th>% Successful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observer 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>491</td>
<td>85</td>
<td>29</td>
<td>87.6%</td>
</tr>
<tr>
<td>Portugal</td>
<td>200</td>
<td>73</td>
<td>13</td>
<td>79.4%</td>
</tr>
<tr>
<td><strong>Observer 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>490</td>
<td>83</td>
<td>29</td>
<td>89.2%</td>
</tr>
<tr>
<td>Portugal</td>
<td>207</td>
<td>66</td>
<td>13</td>
<td>81.5%</td>
</tr>
<tr>
<td><strong>% Error</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>0.2</td>
<td>2.4</td>
<td>0</td>
<td>1.8</td>
</tr>
<tr>
<td>Portugal</td>
<td>3.4</td>
<td>10.1</td>
<td>0</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Table 6: Total count of forward, backward, right and left passes with inter-observer scores

<table>
<thead>
<tr>
<th></th>
<th>Forward</th>
<th>Backwards</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observer 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>192</td>
<td>100</td>
<td>131</td>
<td>153</td>
</tr>
<tr>
<td>Portugal</td>
<td>152</td>
<td>50</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td><strong>Observer 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>190</td>
<td>97</td>
<td>132</td>
<td>156</td>
</tr>
<tr>
<td>Portugal</td>
<td>147</td>
<td>52</td>
<td>37</td>
<td>35</td>
</tr>
<tr>
<td><strong>% Error</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>1.0</td>
<td>3.0</td>
<td>0.8</td>
<td>1.9</td>
</tr>
<tr>
<td>Portugal</td>
<td>3.3</td>
<td>3.9</td>
<td>5.6</td>
<td>2.8</td>
</tr>
</tbody>
</table>
3.5 Sample
Eight teams and sixteen games from the 2010 World Cup group stage matches were analysed. The teams were chosen on the basis of their successfulness during their campaign. Spain, Holland, Germany and Uruguay were deemed successful having reached the Semi Finals whereas England, Brazil, France and Italy were all highly ranked nations going into the competition but suffered premature departures from it, deeming them as unsuccessful. Group-stage matches were selected alone as good teams play other good teams during the knock-out stages of the World Cup, which would not give a fair reflection on the teams’ performances.

3.5.1 Justifying Successful Teams:
Spain, Holland, Germany and Uruguay were all justified as successful teams on the sole fact that they all managed to reach the semi-finals.

3.5.2 Justifying Unsuccessful Teams:
Brazil has a reputation of doing well in World Cups and entered the competition as favourites along with Spain, but they got knocked out in the quarter finals..

England drew against USA and Algeria in their group which meant they finished second in their group. This resulted in a Last 16 tie against Germany instead of Ghana.

France and Italy were deemed unsuccessful on the basis that they did not win a match, and finished bottom of their groups (Table 7)

Table 7: Final positions of Group F and Group A at the 2010 World Cup

<table>
<thead>
<tr>
<th>Group F</th>
<th>W</th>
<th>D</th>
<th>L</th>
<th>GD</th>
<th>PTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paraguay</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Slovakia</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-1</td>
<td>4</td>
</tr>
<tr>
<td>New Zealand</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Italy</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>-1</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group A</th>
<th>W</th>
<th>D</th>
<th>L</th>
<th>GD</th>
<th>PTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uruguay</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Mexico</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>South Africa</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>France</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>-3</td>
<td>1</td>
</tr>
</tbody>
</table>
3.10 Data Analysis:
Non-parametric designs that are assumption-free were used to analyse the data and test for statistical significance between the two categories. The test used in analysis was the Mann-Whitney U Test, conducted in the SPSS19 software package.

Mann-Whitney U Test was used to test two means between independent samples. This test generated the significance values of the differences of the two variables.

The data in next chapter summarises specific aspects of the teams’ performances as two independent categories (Successful Teams & Unsuccessful Teams).
CHAPTER 4

RESULTS
4.0 Results
Mann Whitney U Test was used to draw comparisons between the successful and unsuccessful teams, with (P<0.05) indicating a significant difference.

4.1 Tackling Outcomes

Figure 4: Differences in tackle outcomes

The unsuccessful teams combined, attempted 496 tackles, whereas successful teams attempted 462 (Figure 4). Successful teams completed 61 more turnovers than unsuccessful teams, with 202 in comparison to 141. This result proved significant differences (p=0.021). The failed tackled count of the unsuccessful teams (177) was also of significant difference (p=0.050) when compared with the successful teams’ count (113). The differences between out of play and clearance outcomes were not of significance.

4.2 Crossing Outcomes

There were no significant differences (P>0.05) between the total number of successful or unsuccessful crosses between successful and unsuccessful teams, illustrated below in Figure 5.
Successful teams (941.25) complete more *short passes per game* on average, in comparison to unsuccessful teams (682.2). Figure 6 also indicates that successful teams (111) and unsuccessful teams (108.75) on average play a similar amount of unsuccessful passes during a game. However, there is no significant difference (P<0.05) between short pass completion of successful and unsuccessful teams.
Figure 7: Mean number of long pass outcomes

In Figure 7 it is apparent that unsuccessful teams on average attempt to play more long balls than that attempted by successful teams. However, the results indicated that the differences between them were not significant (P<0.05).

4.4 Pass Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Successful Teams</th>
<th>Unsuccessful Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penetrating</td>
<td>283 = 6.0%</td>
<td>124 = 3.3%</td>
</tr>
<tr>
<td>Received</td>
<td>3812 = 81.3%</td>
<td>2956 = 78.8%</td>
</tr>
<tr>
<td>Intercepted</td>
<td>464 = 10.0%</td>
<td>549 = 14.7%</td>
</tr>
<tr>
<td>Out of Play</td>
<td>130 = 2.7%</td>
<td>121 = 3.2%</td>
</tr>
</tbody>
</table>

Table 8 indicates the differences in the passing outcomes between successful and unsuccessful teams. Despite the successful teams having less unsuccessful passes (intercepted & out of play) with 594, compared to the unsuccessful teams’ figure of 670, the percentages are pretty similar so there was no significant difference. Moreover, the only significant difference in terms of passing outcomes between the two teams regarded the penetrating passes indicator. In terms of percentages, 6.0% of the successful teams’ passes were penetrating ones, nearly double the amount that unsuccessful teams had (3.3%), illustrating a significant difference (p=0.021).
4.5 Direction of Passes:

Apparent in Figure 8 is that 34% of all the successful teams’ successful passes were forward in comparison to 30% by the unsuccessful team which indicates a significant difference (p=0.028). Although the mean percentages of successful backwards, right and left passes varied between the successful and unsuccessful teams, they were not of any significance. In addition, Table 9 indicates the differences in the direction of passes between successful and unsuccessful teams. Successful teams attempted a total of 1683 forward passes which was significantly (p=0.021) more than the total attempts of forward passes by unsuccessful teams (1223). Furthermore, with regards to backward passes, successful teams attempted 1005 compared to 717 by unsuccessful teams, which was also deemed significant (p=0.038).

Table 9: Total attempted passes in each direction with pass completion rates

<table>
<thead>
<tr>
<th>Direction of Pass</th>
<th>Successful Teams</th>
<th>Unsuccessful Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Pass Completion</td>
</tr>
<tr>
<td>Forwards</td>
<td>1683</td>
<td>82.9%</td>
</tr>
<tr>
<td>Backwards</td>
<td>1005</td>
<td>92.1%</td>
</tr>
<tr>
<td>Right</td>
<td>1005</td>
<td>87.7%</td>
</tr>
<tr>
<td>Left</td>
<td>946</td>
<td>89.1%</td>
</tr>
</tbody>
</table>
4.6 Passes in Pitch Zones:

Figure 9 below highlights the differences in total attempted passes between successful and unsuccessful teams in relation to the different zones on the pitch. The findings indicate that successful teams attempted significantly more passes than unsuccessful teams in zone D (p=0.010) as well as zone F (p=0.038).

Additionally, the data in Figure 9 illustrates differences in pass completion % between successful and unsuccessful teams. Highlighted is the fact that successful teams had significantly better pass completion % in both zones A (p=0.014) and I (p=0.050).

In relation to the other zones within the pitch, there are no other significant differences regarding the total number of attempted passes or the pass completion %.
**Direction of Play**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Successful</th>
<th>Unsuccessful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defensive Area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 61/72</td>
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<td></td>
</tr>
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**Key:**
- **S** – Successful Teams
- **U** – Unsuccessful Teams

**Second Column:**
Successful Passes/Attempted Passes

**Third Column:**
Pass Completion%

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**Figure 9:** Mean passing efficiency in different zones of the pitch
Table 10: Contribution percentage of each zone to its specific pitch area

In terms of the successful teams’ successful passes, Table 10 indicates that they favoured the right side channel to the left hand side. 34.1% in comparison to 26.3% in the defensive area, a mere 2.1% difference % in the midfield area and a 16% clear difference in the attacking area. The midfield area is the most equally shared in terms of successful passing, with each zone split into 32.7% (D), 32.5% (E) and 34.8% (F).
CHAPTER 5

DISCUSSION
5.0 Discussion

5.1 Reliability:
Reliability is concerned with the consistency and repeatability of a measure (Thomas & Nelson, 1996), therefore a reliability test was conducted to validate the system used in this study. Reliability was tested through an inter-observer test, with two observers analysing ninety minutes of the Brazil v Portugal match. The test was implemented to indicate a percentage of error or differences between two separate observers who watched the same match. Hughes, Cooper and Nevill (2002) proposed that percentage calculations are the best indicator of reliability. Ultimately, the reliability results validated the system in terms of data collection, as all but one performance indicator (Portugal’s long passes) revealed percentage errors of less than 10%. Nonetheless, this indicator was eventually universally agreed as reliable, having considered the strength of the remainder of the results.

However, the results from the tests identified some minimal errors between the two observers. These errors were explained (James et al., 2007), with reasons including: the possibility of operational errors (observer pressing the wrong button); observational errors (observer fails to code an event); definitional errors (observer misinterprets the activity).
Minimising some of these errors from occurring altogether is possible through ensuring that clarified operational definitions are in place, which reduces ambiguity and increases accuracy when coding the activities.

5.2 Discussion of the Results:
The results of the performance indicators analysed in the study will be discussed in the following sections. Differences and similarities between the two types of teams will be gathered and relevant literature will underpin the discussions.

5.2.1 Similarities:
In terms of successful short passes, successful teams had an overall mean of 941.25 per match, in comparison to unsuccessful teams’ figure of 682.2 (Figure 4.3) and with regards to long passes, unsuccessful teams had a greater mean of successful long passes per game with 85.75, compared to the successful teams’ figure of 79.25 (Figure 4.4). However, although there were differences between the two set of teams with both indicators, no significant (p>0.05) differences were apparent.
Similarities were also evident between the two types of teams in their lateral passing percentages (right and left combined), with 43% for successful teams, and 49% for unsuccessful teams. Horizontal passes is a common feature in football, as they are relatively simple to maintain possession, as Wein (2004) states. However, he furthers to say that too much of these directed passes slow the play down and eliminates any surprise factor.

As expected, both successful teams and unsuccessful teams attempted the majority of their passes in the middle third (4092 and 3208), illustrating the importance of the preparation phase (midfield area), as proposed in Wade’s (1996) principles of play.

Percentages of passes across the midfield areas for successful teams were pretty evenly distributed (Table 4.3), with 32.7% for left wing (zone D), 32.5% for central midfield (zone E) and 34.8% for right wing (zone F). For unsuccessful teams, although their central area of the midfield (zone E) seemed to be favoured, with 39% of their passes completed there, compared to 30.1% in the left wing (zone D) and 30.9% in the right wing (zone F), no drastic dissimilarities are evident in Table 4.3. In relation to unsuccessful teams, Hughes et al. (1988) reported similar results (28.04%, 39.62% and 32.4%), and commented that they had to attack through the wings. However, having acknowledged the 39% and 39.62% of central contributions in the two studies, these represent a reasonably high distribution of central play which doesn’t necessarily mean that unsuccessful teams are forced to attack through wide areas.

Interestingly, although the passing distributions of successful teams found in the current study are not significantly different to those of unsuccessful teams, they are considerably different to those found in the 1986 World Cup. Hughes et al. (1988) found that successful teams had a 25.43%, 51.93%, 22.64% split for left wing, centre and right wing compared to a balanced approach found in the current study of successful teams. The existing results from this study correspond with Lucchesi (2001) who advocated unpredictability in teams’ attacks, by varying their approaches.

Having not found any major differences in terms of passing distributions in the wide areas of the midfield, there was nothing major regarding the crossing outcomes either, despite what was found in the literature. Hughes (1990) stated that crossing the ball is a vital element of the winning formula, maintained by Breen et al. (2006) who found that crossing accounted for approximately 70% of goals scored during the 2006 World Cup. Moreover, Griffiths
(1999) as well as Hughes and Churchill (2005) found that the successful teams in their studies attempted significantly more crosses than unsuccessful teams.

On the grounds of the studies mentioned above, the crossing differences were expected to be significantly in favour of the successful teams. However, the data in Figure 4.2 contradicts the literature and shows that there were no significant differences ($P>0.05$) between the total number of successful or unsuccessful crosses between successful and unsuccessful teams. As a matter of fact, unsuccessful teams actually attempted slightly more crosses (184) than the successful teams (162), corresponding with Grant’s (2000) findings whereby unsuccessful teams in the 1998 World Cup crossed the ball more often than successful teams.

Further similarities were found between the successful and unsuccessful teams when looking at the data obtained from zone H within the attacking area. The results (Figure 4.6) show that both successful teams (41.43%) and unsuccessful teams (42.86%) distribute more attempted passes in this section than they do in any other attacking area (zone I & G). It is essential to have possession within this penalty box area, evident in the literature, with 90% of goals from the 1986 World Cup scored from within this area (Olsen, 1988) and 85% in the 2004 Euro Championships (Hughes & Snook, 2006). However, quantity of entries into this area as advocated in some of the literature (Bate, 1988; Reep & Benjamin, 1968) is not the fundamental principle, as Kormelink and Seeverens (1997) emphasise that teams should only efficiently move the ball into this region, as opposed to forcing it. Furthermore, it is the quality of these entries that brings about success, and not the quantity (James, 2006).

Finally, both types of teams were similar in their amount of clearances despite what was discovered in the literature. Yamanka et al. (1997) studied Japan’s national team who was categorised as an unsuccessful team, and reported that they cleared the ball significantly more than their opposition, particularly against stronger teams. Therefore, it was expected that the unsuccessful teams would clear the ball on more occasions than the successful teams. Nevertheless, Figure 4.1 shows that there was only a mere difference (1) with regards to this indicator, with no significant difference ($p<0.05$).
5.3.2 Differences:

Despite not being significant, the higher number of mean short passes from successful teams, 941.2 compared to 682.2 by unsuccessful teams, indicates that they played a possession style of football as opposed to a direct style. In contrast, unsuccessful teams in total attempted 111 more long passes, and completed 26 more long passes than the successful teams, supporting the notion of Bate (1988) and Reep and Benjamin (1968) which advocates long balls to increase the quantity of entries into the penalty area (James, 2006).

Moreover, 4082 successful passes were analysed from eight of the successful teams’ matches, compared to 3073 by unsuccessful teams suggesting that a passing style of football was an essential part of the successful teams’ tactical intentions. These findings contradict with Stanhope’s (2001) conclusions, which stated that greater pass frequency and possession count are not indicative of success but supported the study of James et al. (2004) as well as Bloomfield et al. (2004).

Differences were also found in the pass completion rates, with 87.3% for successful teams compared to 82.1% for unsuccessful teams, suggesting that successful teams are more comfortable in possession, supported by Hughes et al. (1988) and Japheth and Hughes (2001). They found that France (winners of World Cup 1998 & Euro 2000) played more passes and had more touches on the ball than all of their opponents (except Spain) over the two tournaments. Furthermore, Luhtanen et al. (2001) found that France and Italy (the two finalists at the Euro 2000 final) were the most successful in terms of passing, indicating once again its importance in relation to success.

Continuing with the pass completion rates, an overall summary of the defensive area shows that unsuccessful teams attempted more passes (293) in the zones A, B, C compared to successful teams (267), but were not as efficient, with a mere pass completion of 70% in comparison to 86.9% for successful teams. Hughes et al. (1988) propose that unsuccessful teams make more goal kicks due to the increased pressure in defensive areas, which could contribute towards these results. This can be explained by the fact that successful teams managed to defend from further up the field, completing more of their passes in the midfield area and in doing so reducing the space for the opposition and placing them under greater pressure (Hewer & James, 2004).

However, zone A alone indicates significant (p=0.014) differences in terms of successful teams’ pass completion (75.32%) compared to the unsuccessful teams (66.25%), which
cannot be excused by the goal kicks element. These differences in passes at the back may well be explained by the tactics employed by the two sets of teams. Uruguay, Holland, Spain and Germany employed three central midfielders on their teams which gave their defenders more options whilst looking for a pass. In addition, having three central midfielders means more movement which ultimately creates more space to complete the pass (Hughes, 1981). Out of the unsuccessful set, three out of the four teams employed only two central midfielders in a 4-4-2 tactic, giving fewer options for the full back to find a pass.

In relation to zone A in the left channel of the defensive area, successful teams’ pass completion rate (86.93%) in the attacking left channel (zone I) was also significantly (p=0.050) greater than that of unsuccessful teams (61.43%). It is interesting to see the significant differences in both of these areas in the left channel, which could be explained by comparing the quality of the players playing on the left side. The players of the calibre of Robben, Lahm, Iniesta and Suarez were amongst those in the successful teams, compared to the likes of Milner, Govou, Bastos and Montolivo, employed in unsuccessful teams, respectively. Furthermore, full backs are asked to ensure width and support to their wingers (Bangsbo & Peitersen, 2000) which might have been more efficient within the successful teams’ left backs compared to those in unsuccessful teams.

The successful teams’ efficiency down the left was not significantly illustrated in the crossing indicator (Figure 4.2), but nonetheless, the success rate of crosses from both sides of the pitch was greater for successful teams. Unsuccessful teams’ lesser rate of 38% compared to 48.1%, suggests that the crossing capabilities of players within successful teams were greater than those within unsuccessful teams. Wiemeyer (2003) goes on further and states that successful teams tend to have skilful wingers who often have the task of beating their opponents to deliver quality balls into the goal area.

Furthering on with wing play, additional significant differences (p=0.010 and p=0.038) between the two types of teams is apparent in the attempted passes count within the two wide zones of the midfield area (D and F). These differences once again indicate the value of having width in your play to achieve success, opposing what was discovered in the literature (Hughes et al. 1988). The use of the wide zones by successful teams suggests that they attempt to keep the ball away from the congested areas in the middle of the pitch, which allows their skilful players to go out wide (Wiemeyer, 2003) to have more space, with less interference from their opponents (Hughes & Petit, 2001).
Nonetheless, width is not fundamental to success, as Japheth and Hughes (2001) discovered that France won the 1998 World Cup through predominantly wide strategies, whereas in the 2000 Euro Championships, their success was achieved through a central approach. What this highlights is the importance of adaptability within teams, with the French demonstrating their ability of adapting attacking tactics to the characteristics of their team, and altering strategies according to the opponents (Lucchesi, 2001).

Width does however, play its role in successful teams’ ability to play more penetrating passes whilst attacking. Hargreaves (1990) states that attacking on a wide front stretches the opponents which opens up the space between defenders that is required for these penetrating passes. Successful teams completed 283 penetrating passes, significantly (p=0.021) more than the 124 completed by unsuccessful teams (Table 4.1). The results strengthen the studies of Armatas et al. (2009) and Grant et al. (1999) who also found that successful teams penetrated their opposition defences more often than unsuccessful teams.

Forward players are identified as key contributors when determining the execution of the final pass, and whether it is penetrating or not (Bangsbo & Peitersen, 2000). Their movements in the attacking area provide the midfielders with the option of playing through ball, whether it is on the ground, or in the air (Wein, 2004). The results could also be explained by the attributes of the ball carriers in the successful teams, who risk more forward and diagonal passes which unsettles the opponents and puts the ball in free areas behind the defence (Wein, 2004).

These ball carriers and forward players as mentioned by Wein (2004) may also explain the differences between the two types of teams when looking at the overall data from the attacking area (zones G, H, I). The results suggest that unsuccessful teams’ technical ability in terms of finding a team mate with a pass within these congested zones is limited (Engelbrecht, 2010) with only 65.7% of 245 attempts being completed, compared to the successful teams’ figures of 75.4% from 321 attempted passes. It may also be a result of limited support by team mates from unsuccessful teams’ within these zones.

Limited support also links in to tackling outcomes (Hughes, 1981), and proposes an explanation of the significant (p=0.050) difference between the two types of teams in terms of their failed tackles count, where unsuccessful teams failed 64 more tackles than successful teams (Figure 4.1). Hughes (1981) states that an individual challenging his opposition must have support whilst doing so, either covering the challenger, or doubling-up with him.
Ultimately, it is suggested that successful teams in the study had greater communication and understanding of each other, also found in a study by Bishovets et al. (1993), which allowed them to generate greater pressure and forcing the opposition into a mistake.

This ability to put pressure on the opposition is also signified in the turnover count, where successful teams were significantly (p=0.021) greater in their amount of turnovers, with 202 compared to 141 (Figure 4.1). A turnover is when the team regains possession of the ball off the opponent, and is an important factor to initiate new attacks (Bate, 1988). What this result suggests is that successful teams managed to pressurise their opponents effectively, which makes the turnover procedure easier for them (Lucchesi, 2003). Olsen (1988) recognises this fact and encourages teams to insert pressure throughout the pitch, in particular the opponents defensive area, a concept that Garganta, Maia and Basto (1997) also support.

### 5.4 Limitations of Study:

The first limitation of the study concerns the clarity of the hand notation system and its operational definitions. The pass outcome indicator was subject to ambiguity in situations such as, when the ball is received by a team mate, but it is miss-controlled and the team eventually loses possession, which questions the validity of qualitative observations as such.

Furthermore, the penetrating pass indicator was also of high subjectivity, as the two observers might have completely different perceptions on a pass that “puts a team mate in a good position”, as it was operationally defined.

The pitch zones can also be criticised due to the fact that the midfield area of the pitch was visibly substantially larger than attacking and defensive regions. This larger scale may give a false reflection of the actual midfield passes. However, these zones were selected as they were appropriately aligned with the actual pitch layout boundaries (penalty box indicated a zone etc.) so it was visibly clearer for the observers.

Despite having analysed sixteen matches, due to time constraints, only two matches per team were analysed, which can also be deemed a limitation. With more time available, all of the group stage matches for each sampled team could be analysed, adding a further four matches for both categories, essentially generating a stronger identity for each types of teams.
Moreover, despite the incapacity to analyse external factors such as opposition, match officials, environment and team cohesion, which is essential to success (Alberda & Murphy, 1997), these were not the scope of the study so cannot be considered as limitations.
CHAPTER 6

CONCLUSION
6.0 Conclusion

6.1 Research Summary
The study served to investigate technical and tactical elements of play between a set of successful and unsuccessful teams, by looking at differences or similarities in the data, in passing outcomes, pass type, passing direction, passing zones, tackling outcomes and cross outcomes.

Having analysed these performance indicators, the study generated several promising results, with some agreeing with previous research, whilst some were in contrast. Results that differed between the two types of teams are reported here as follows. It was found that successful teams play significantly more forwards and backward passes and play more passes that are penetrating. They are also significantly more efficient in their forward pass completion. In terms of tackling, successful teams again were dominant, with significantly less failed tackles, and significantly more turnovers. With regards to specific zones across the pitch, successful teams attempted significantly more passes in the wide areas of the midfield, and in the defensive and attacking areas of the left side, their pass completion rates were significantly higher too.

With the amounts of data collected, the system proved to be a success, revealing numerous tactical and technical indicators that are different between successful and unsuccessful teams, enabling the research subject to be advanced. As the study covered a variety of variables, rather than just a specific one, a combination of these variables could predict the successfulness of a team in World Cup competition. Having analysed a justified selection of unsuccessful teams, this study generated a true reflection of the possible differences that determine success.

6.2 Practical Recommendations
Having obtained data on basic elements of tactical and technical play from the top level of international football, the findings are easily transferable and could establish valuable information for coaches. From identifying the passing difference between the two types of teams, it is apparent that penetrating passes are likely to yield success, and therefore, coaches should implement this into their team both in creating these outcomes, as well as preventing them. Another implication for coaches to consider is the effect of wide play by the successful teams in the current study. If teams have skilful wide players then coaches should emphasise
that they need to utilise these areas, to provide space for the individuals to play and create. Additionally, the tackling outcome from the current study informs coaches that turnovers are a key element of defending. If the analyst identifies a low count of turnovers during a game, a coach should urge the team to pressurise their opponents better, in order to force that essential turnover.

6.3 Direction of Future Research
Despite the findings of the current study, there are several limitations that could be addressed and areas for further study highlighted, such as:

- Generate an individual profile for each team within the sets, to see if there are any trends or differences in their tactical or technical play.

- Analyse further teams from different competitions, including women’s football, Euro Championships, Champions League and Premier League football to get obtain a wider data set on technical and tactical play within the world of soccer.

- Developing a method to analyse off the ball actions such as closing down and marking, as these indicators also indicate a team’s tactical intentions. Taylor et al. (2005) suggested this, but it can only be achieved by a wide range of camera angles.

- Combine performance analysis with the coaching discipline to analyse teams’ teamwork efficiency, to look at communication which links into support (Alberda & Murphy, 1997).

- Analyse formations and specific individuals within a cluster of positions to gain a further understanding of the tactical intentions. It is the effectiveness of a group of players as a whole that allows teams to succeed, not as individuals (Passos et al., 2006).
REFERENCES
REFERENCES


APPENDIX A
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