

# EFFECTIVENESS OF BRAZILIAN AND GERMAN TEAMS AND THE TEAMS DEFEATED BY THEM DURING THE 17<sup>TH</sup> FIFA WORLD CUP

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## Abstract:

An attempt was made to indicate the factors of an effective soccer game. In order to do this technical and tactical actions were compared in a game of Brazilian and German players, the finalists of the 2002 World Cup, and players of the teams which lost to them.

Twelve games recorded on audiovisual tapes were used for comparative purposes. The game data were registered on observation spreadsheets. Szwarc's method of game description and notation was applied.

It was proved that shots at goal during the games, good passing and taking the ball away from an opponent in one-on-one situations are the factors which make the difference between the successful and unsuccessful teams.

**Key words:** *soccer, notational analysis, game performance, effectiveness indices, successful vs. unsuccessful teams*

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## DIE SPITZENLEISTUNG DER BRASILIANISCHEN UND DEUTSCHEN FUßBALLNATIONALMANNSCHAFTEN UND DIE LEISTUNG DER VON IHNEN BESIEGTEN MANNschaften WÄHREND DES 17. FIFA WELTMEISTERSCHAFT

### Zusammenfassung:

Ein Versuch wurde gemacht, um die Faktoren eines erfolgreichen Fußballspiels zu bestimmen. Zu diesem Zweck wurden die Technik und Taktik der brasilianischen und deutschen Fußballspieler, der FIFA World Cup 2002 Finalisten, verglichen, wie auch der Mannschaften, die von ihnen besiegt wurden.

Zwölf Fußballspiele wurden auf Videoband aufgenommen und dann verglichen. Die Spieldaten waren auf Arbeitsblättern zu sehen. Sowohl die Spielbeschreibungsmethode als auch die Spielanalyse-Methode von Szwarc wurden angewandt.

Es wurde bewiesen, dass die Torschüsse während des Spiels, genaue Pässe und das Abmehmen des Balles vom Gegenspieler in Eins-gegen-Eins Situationen den Unterschied zwischen der siegenden und der verlierenden Mannschaft machen.

**Schlüsselwörter:** *Fußball, Spielanalyse, Spielleistung, Effizienzindikatoren, erfolgreiche und erfolglose Mannschaften*

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### Introduction

It is very difficult to identify precisely the victory and defeat factors in soccer owing to its fortuitous nature (Naglak, 2001). However, if the different forms of players' activities are learnt and wide-ranging information about players' behaviour during a game is obtained, it may be possible to

determine the factors that enable effective competition performance. Another useful method to identify the essential elements of the final success is to estimate the quality and quantity of technical and tactical actions performed by players of the winning and the defeated teams in direct competition.

For that reason, play effectiveness or game performance was compared for the finalists (Brazil and Germany) and the teams defeated by them in the final of the 2002 FIFA World Cup in South Korea and Japan.

**Methods**

Twelve games recorded on audiovisual tapes were used for comparative purposes. The analysis included 7 wined games of Brazil and 5 of Germany, as well as matches of 10 national teams defeated by Brazil and Germany in South Korea and Japan in 2002 (Table 1). In total, 24 sets of observations were conducted.

Table 1. List of games used for the analysis and their results

No.	Match	Result
1	Brazil - Turkey	2:1
2	Brazil - China	4:0
3	Brazil - Costa Rica	5:2
4	Brazil - Belgium	2:0
5	Brazil - England	2:1
6	Brazil - Turkey	1:0
7	Brazil - Germany	2:0
8	Germany - Saudi Arabia	8:0
9	Germany - Cameroon	1:0
10	Germany - USA	1:0
11	Germany - Paraguay	1:0
12	Germany - South Korea	2:0

Game data were registered on observation spreadsheets. Szwarc’s method of game description and notation was applied (Szwarc, 2002). Technical and tactical actions were summed up according to type, and arithmetic means of their frequency per game were calculated separately for the finalists (Brazil and Germany; referred to as the “winners”) and the remaining teams defeated by them in direct competition (referred to as the “losers”). Next, effectiveness indices were calculated and compared.

**Results and discussion**

The data presented in Table 2 and Diagram 1 show that the Brazilian and German players were generally slightly more effective than their opponents. They gained better results in 10 out of 15 effectiveness indices. With respect to attack, significant differences were found in the effectiveness of shots at goal (S<sub>s</sub>, S<sub>g</sub>, S<sub>sfg</sub>) and passing accuracy in difficult situations (P<sub>d</sub>). The “losers” turned out to be more effective only in dribbling (D<sub>1x1</sub>) and passing accuracy in unpressured situations (P<sub>u</sub>).

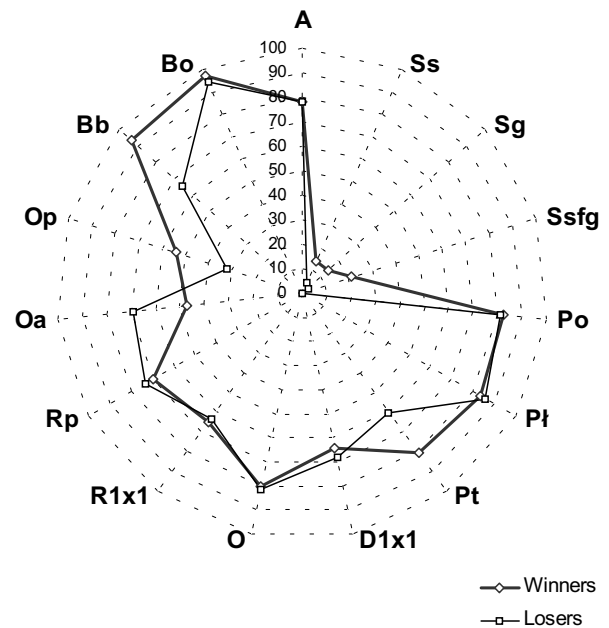


Diagram 1. Comparison of game effectiveness indices for the German and Brazilian teams and for the teams defeated by them in the 2002 FIFA World Cup

More discrepancies were found in defence-related indices. The teams defeated by the finalists obtained an even better assessment of total defence effectiveness (O) and the so-called active defence indices (R<sub>p</sub> and O<sub>a</sub>). The Brazilian and German teams had better results for winning the ball from the opponent in one-on-one (R<sub>1x1</sub>) and passive defence (Op). As regards the most important elements, i.e. goal defence (Bo) and goalkeeper play (Bb), the “losers” were much more effective than their opponents.

A detailed analysis of results shows (Table 2) that an average number of shots made by the finalists amounted up to 18 per game. They made only 4 shots more than the losing teams, but the effectiveness of the winning team shots was over 3 times greater (S<sub>s</sub> = 14.35 for Brazil and Germany and 4.73 for the remaining teams).

The ratio of 2.58 goals scored per game placed the Brazilian and German players among the average achievements of all the teams that took part in the final tournament (161 goals in 64 games, average 2.52). Moreover, this is one of the lowest indices when compared to all the previous tournaments (see Doufur, 1993; Loy, 1995; Grant et al., 1998a; FIFA, 2002).

In contrast, the defeated teams scored goals rarely (an average number of goals is only 1 per two games). This comparison reveals their low scoring capability.

Furthermore, findings include important differences in the effectiveness of shots from a kick

after a stoppage in the game. The “losers” did not score any goals from such situations, while “the winners” scored once per 2 games (on average 0.66 goal per game). They achieved an effectiveness of more than 21%. The FIFA report shows that the effectiveness of such goals was 28% for all the teams in the tournament, but the statistics also include goals scored indirectly after corner kicks (FIFA, 2002).

According to Table 2 the Brazilian and German players passed the ball 355 times per game, which is almost 33 passes fewer than the “losers”. The finalists passed the ball more precisely (82.43% vs. 81.19%, respectively). The analysis of Table 2 data shows that there were essential differences

in passing effectiveness in difficult situations (**Pt** of the winners is 80.83% and of the losers 60.25%). The frequency of accurate passing in unpressured situations (**Pi**) was almost identical, but the effectiveness index was 2% higher for the losing teams (85.84%). It was the same with dribbling. The “winners” won 33 one-on-one situations. With nearly the same quantity of dribbling (on average 32 times per game), the losers were 4% more effective (**D1x1** = 68.28%).

The analysis of research results confirms earlier findings of Przybylski (1997), Bergier (1998), and Grant and associates (1998b) that the differences between the winning and losing teams are mainly evident in the frequency and effectiveness of shots

Table 2. Play effectiveness indices for the winning and losing teams

Index symbol	Technical and tactical actions	Winners		Losers	
		mean from 12 matches	effective-ness index (%)	mean from 12 matches	effective-ness index (%)
<b>A</b>	All shots + accurate passes + 1 on 1 won in attack	342.83	78.32	359.42	77.92
	All shots + 1 on 1 won in attack + all ball losses	437.75		461.25	
<b>Ss</b>	Goals scored	2.58	14.35	0.66	4.73
	All shots at the opponent's goal	18.00		14.08	
<b>Sg</b>	Goals scored from action play	2.00	14.28	0.33	2.98
	All shots at goal from action play	14.00		11.17	
<b>Ssfg</b>	Goals scored from a kick after situations	0.66	21.05	0	0
	All shots at goal from a stoppage in the game situations	3.16		3.00	
<b>Po</b>	Accurate passes	292.75	82.43	314.67	81.19
	All ball passes	355.16		387.58	
<b>Pi</b>	Accurate ball passes in unpressured situations	271.92	83.97	272.75	85.84
	All ball passes in unpressured situations	323.33		317.75	
<b>Pt</b>	Accurate ball passes in difficult situations	22.83	80.83	41.92	62.25
	All ball passes in difficult situations	28.25		67.33	
<b>D1x1</b>	1 on 1 situations won in attack	33.66	64.33	31.92	68.27
	1 on 1 situations won + losing possession of the ball in dribbling and when running with the ball	52.33		46.75	
<b>O</b>	Winning the ball in 1 on 1 and interception	141.58	80.37	129.92	81.67
	Winning the ball (1 on 1 and interception) + failure to win 1x1 in defence	176.16		159.08	
<b>R1x1</b>	Winning the ball + kicking the ball away in 1 on 1	63.58	64.83	49.92	63.12
	Winning the ball + kicking the ball away in 1 on 1 + failure to win 1 on 1 in defence	98.08		79.08	
<b>Rp</b>	Action interruption + gaining possession of the ball (interception)	78.08	69.82	81.50	73.64
	Action interruption + gaining possession of the ball + failure to win 1 on 1 in defence	111.83		110.67	
<b>Oa</b>	Winning the ball (1 on 1 situation) + gaining possession of the ball (interception)	66.75	47.14	90.08	69.43
	All the balls taken from the opponent	141.58		129.75	
<b>Op</b>	Kicking the ball away in 1 on 1 + action interruption (interception)	76.08	53.74	41.92	32.31
	All the balls taken from the opponent	141.58		129.75	
<b>Bb</b>	Shots defended by the goalkeeper	3.25	92.86	5.00	65.93
	Goals scored + shots defended by the goalkeeper	3.50		7.58	
<b>Bo</b>	Shots defended by the goalkeeper, inaccurate shots and shots blocked by defenders	10.75	96.99	16.00	94.58
	All shots by the opponent	11.08		16.92	

at goal and passing. Moreover, passing accuracy in difficult situations is the crucial factor of effective play (see Szwarc & Dolański, 2002).

The data in Table 2 show that effectiveness in defence differentiated more the teams under analysis. The Brazilian and German players won possession of the ball more often in one-on-one situations and by interception. They won 142 one-on-one situations per game on average ( $O = 80.37\%$ ), while the “losers” won only 130 situations, but with a slightly higher effectiveness, i.e. 81.67%.

The “winners” turned out to be more effective in direct situations. They won 64 situations, whereas the “losers” only 50. In respect of one-on-one situations that were lost (35 vs. 29 respectively), the difference is not so significant ( $R1x1$ : 64.83% vs. 63.12%, respectively).

As regards ball interception, the “losers” were slightly more effective than the “winners”. Their defenders won possession of the ball 81 times per game on average in this way, while the Brazilian and German players were successful only 78 times. Moreover, the “losers” did it more effectively than the finalists ( $Rp$  counts 73.64% vs. 69.82%, whereas  $Oa$  counts 69.43% vs. 47.14%). The effectiveness of those technical and tactical activities, however, did not influence the final outcomes of the competition.

The teams of Brazil and Germany were better at passive defence consisting of clearing the ball outside the direct threat to the goal. Their effectiveness index ( $Op$ ) was 21% higher than that of their opponents (53.74% vs. 32.31%). This kind of play was particularly noticeable in the matches of Brazil with Turkey (the qualifying round) and Belgium, and of Germany with Cameroon and the USA.

It is a reason why the goal defence index ( $Bo$ ) and the index of goalkeeper play effectiveness ( $Bb$ ) noted significant values. Although the “losers” shot at goal more frequently (on average, losers’ 16 vs. winners’ 10.75 shots), the Brazilian and German goalkeepers rarely had to defend the goal (average = 3.25, while the losing teams had 5 shots

defended by the goalkeepers on average). The Brazilian and German players had 96.99% effectiveness of goal defence and nearly 92.86% effectiveness of goalkeeper play. In contrast, these indices amounted to 94.58% and only 65.93%, respectively, for the losing teams.

Findings of the analysis show that the most important factors in competition between teams of the highest sports competence is to score a goal and then to prevent the loss of the ball with the use of the simplest and most effective techniques. As a rule, winning teams leave the initiative to their opponent and force it to the position of attack (frequent futile and insignificant passing of the ball in unpressured situations). In defence “winners” mainly used simple technical and tactical methods (such as interruption of offensive actions by ball interception and tackling in one-on-one situations) and minimised the goalkeeper’s share in goal defence thanks to excellent co-operation between 7-8 defenders. This behaviour forced the opponents into disadvantageous actions, such as inaccurate passing and shots, with the use of appropriate positioning and defence, as well as shot blocking.

## Conclusions

A comparison of the quantity and effectiveness of technical and tactical actions performed by players of winning and losing teams revealed game elements that are decisive for victory. There were minor differences in the total effectiveness of attack and defence between the “winners” and the “losers”. Compared to losing teams, the “winners” showed a much higher effectiveness of a few game elements only; however, these very elements point to their technical and tactical maturity and the highest competence in individual actions. It includes a skill of passing the ball in difficult situations, frequency and accuracy of shots at goal, ball winning in direct actions with the opponent and, most of all, effective defence of their own goal.

The vital elements of effective team competition include the individual skills of players in one-on-one situations both in attack and in defence.

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# UČINKOVITOST BRAZILSKE I NJEMAČKE REPREZENTACIJE TE MOMČADI KOJE SU DOŽIVJELE PORAZ U UTAKMICAMA S NJIMA NA 17. SVJETSKOM PRVENSTVU U NOGOMETU

## Sežetak

### Uvod

Teško je točno definirati faktore koji dovode do pobjede ili poraza zbog vrlo kompleksne prirode nogometne igre. Ipak, prepoznaju li različiti oblici igračke aktivnosti i prikupe li se brojni podaci o ponašanju igrača na utakmici, moglo bi biti moguće utvrditi faktore koji omogućuju da uspješnost u natjecanju. Druga korisna metoda za identifikaciju faktora ključnih za konačni sportski uspjeh jest procjena kvalitete i kvantitete izvedbe tehničko-taktičkih elemenata igre pobjedničkih i gubitničkih ekipa u izravnom susretu. Stoga je u radu uspoređena igračka učinkovitost finalista (Brazil i Njemačka) i ekipa koje su te dvije momčadi porazile na putu do završnice Svjetskog nogometnog prvenstva 2002. g. u Sjevernoj Koreji i Japanu.

### Metode

Analiza je provedena na video zapisima 12 utakmica (7 utakmica brazilske reprezentacije i 5 utakmica njemačke reprezentacije). U analizi se promatra igra te dvije reprezentacije, ali i njihovih 10 suparnika, tako da su provedena ukupno 24 promatranja, a rezultati su upisani u pripremljen obrascu. Uporabljena je Szwarcova metoda opisivanja i registriranja (Szwarc, 2002). Izračunata je aritmetička sredina frekvencija svih TE-TA akcija za svaku utakmicu za svakog suparnika odvojeno, tj. za Brazil i Njemačku (pobjednici) te za ostale momčadi (gubitnici). Potom su izračunati koeficijenti učinkovitosti i međusobno su uspoređeni.

### Rezultati

Podaci u tablici 2 i na dijagramu pokazuju da su brazilska i njemačka momčad bile općenito neznatno učinkovitije od svojih suparnika. Postigli su bolje rezultate u 10 od ukupno 15 pokazatelja. U napadu su dobivene značajne razlike u učinkovitosti udaraca na vrata ( $S_s$ ,  $S_g$ ,  $S_{sfg}$ ) i u točnosti dodavanja u teškim situacijama ( $P_t$ ). Gubitnici su bili učinkovitiji samo u vođenju lopte ( $D_{1x1}$ ) i u točnosti dodavanja u situacijama bez pritiska ( $P_t$ ). Malo je drugačija slika u pokazateljima učinkovitosti igre u obrani. Gubitnici su bili bolji u ukupnoj obrambenoj učinkovitosti ( $O$ ) i u tzv. pokazateljima aktivne

igre u obrani ( $R_p$  i  $O_a$ ). Brazilci i Nijemci bili su bolji u osvajanju lopte u situacijama jedan-na-jedan ( $R_{1x1}$ ) i u pasivnoj obrani ( $Op$ ). Što se najvažnijih obrambenih elemenata tiče – obrane gola ( $Bo$ ) i vratareve igre ( $Bb$ ), gubitnici su bili puno učinkovitiji od svojih suparnika, finalista Svjetskog prvenstva.

Pobjednici su u prosjeku po utakmici uputili 18 udaraca na vrata (samo četiri udarca više od gubitnika), ali učinkovitost njihovih šutova bila je tri puta viša od učinkovitosti gubitnika ( $Ss = 14,35$  za Brazil i Njemačku naspram 4,73 za ostatak ekipa). Gubitnici su rjeđe postizali pogotke (u prosjeku jedan na dvije utakmice), što govori o njihovoj realizatorskoj nemoći.

Brazilski i njemački igrači izveli su u prosjeku 355 dodavanja, što je gotovo 33 dodavanja manje od gubitnika. Finalisti su bili precizniji od gubitnika (82.43% naspram 81.19%), ali je njihova učinkovitost dodavanja u teškim situacijama jako nadmašila preciznost gubitnika ( $Pt$  pobjednika 80.83% naspram 60.25% poraženih).

Igra u obrani još više razlikuje pobjednike od gubitnika. Brazilci i Nijemci su puno češće osvajali loptu u situacijama jedan-na-jedan i presijecanjem. Oni su kao pobjednici izlazili iz, u prosjeku, 142 dvoboja po utakmici ( $O = 80.37\%$ ), a gubitnici su bili uspješni u samo 130 dvoboja (81.67%).

Brazilci i Nijemci su bili bolji u tzv. pasivnoj obrani, tj. u čišćenju lopti izvan područja izravne ugroženosti vrata. Njihov indeks učinkovitosti ( $Op$ ) je za 21% viši od indeksa gubitnika (53.74% naspram 32.31%).

To je i razlog zašto su indeksi obrane gola ( $Bo$ ) i vratareve igre ( $Bb$ ) takvi. Premda su gubitnici upućivali više udaraca na vrata (prosječno 16 prema 10,75 udaraca), brazilski i njemački vratari rjeđe su morali braniti svoj gol (3,25, dok su vratari gubitnika obranili u prosjeku 5 udaraca). Učinkovitost Brazilaca i Nijemaca u varijabli obrana vrata bila je 96,99% i približno 92,86% u varijabli vratarova igra. Kod gubitnika ti su pokazatelji iznosili 94,58% i 65,93%.

### Rasprava i zaključci

Dobiveni rezultati potvrdili su iskustvenu spoznaju da je za uspjeh u natjecanju vrhunskih momčadi najvažnije postići pogodak i zadržati posjed lopte najjednostavnijim i naj-

učinkovitijim TE-TA elementima. Kao po pravilu, pobjednici su prepuštali inicijativu suparnicima i prisiljavali ih na pozicijski napad (česta izmjena uzaludnih i nevažnih dodavanja daleko od gola). U obrani pobjednici uglavnom koriste jednostavne TE-TA metode - prekidanje protivničkih akcija presijecanjem lopti ili uklizavanjem u situacijama jedan-na-jedan, izvrsna suradnja 7-8 braniča, čime smanjuju udio vratareve igre u obrani gola. Takva igra prisiljava suparnika na nepovoljne akcije, netočna dodavanja i udarce na vrata, kojima se suprotstavljaju dobrim postavljanjem u obrani i blokiranjem udaraca.

Istraživanje je pokazalo koji su elementi ključni za pobjedu. Nije bilo velike razlike u općim pokazateljima učinkovitosti pobjednika i gubitnika. Pobjednici su bili efikasniji u samo nekoliko elemenata, ali ti elementi upućuju na tehničku i taktičku zrelost pobjedničkih momčadi te na vrhunsku kvalitetu igre, osobito u individualnim akcijama. Za pobjedu odlučujući elementi jesu: točnost dodavanja u teškim situacijama, učestalost i učinkovitost udaraca na vrata, osvajanje posjeda lopte u izravnim dvobojima sa suparničkim igračima i, iznad svega, učinkovita obrana vlastitoga gola.