

## The efficacy of “High Pick and Roll” in relation to the defence’s reaction and its effect on the result of the game

Christos Koutsouridis, Georgios Karamousalidis & Christos Galazoulas

To cite this article: Christos Koutsouridis, Georgios Karamousalidis & Christos Galazoulas (2018): The efficacy of “High Pick and Roll” in relation to the defence’s reaction and its effect on the result of the game, International Journal of Performance Analysis in Sport, DOI: [10.1080/24748668.2018.1501983](https://doi.org/10.1080/24748668.2018.1501983)

To link to this article: <https://doi.org/10.1080/24748668.2018.1501983>



Published online: 01 Aug 2018.



Submit your article to this journal 



CrossMark

View Crossmark data 



# The efficacy of “High Pick and Roll” in relation to the defence’s reaction and its effect on the result of the game

Christos Koutsouridis, Georgios Karamousalidis and Christos Galazoulas

Laboratory of Evaluation of Human Biological Performance, School of Physical Education & Sport Science, Aristotle University of Thessaloniki, Thessaloniki, Greece

## ABSTRACT

This research was conducted to find out how effective the High Pick and Roll is, according to the defence’s reaction. This survey also investigates the total impact of this offensive strategy on the game’s final result. The sample consisted of 20 randomly selected basketball games of the Olympic Games in Rio (2016). The results show that the outcome of the High Pick and Roll can affect the result of the game ( $p = 0.001$ ). Furthermore, there is an important statistical difference between the effectiveness of High Pick and Roll against various defensive plays. When the defending team played Trail and Sag, the majority of the attacks were successful whereas when the team played Switch, Deny or Trap most of attacks were missed ( $p = 0.01$ ). Finally, most of attacks ending with a ball handler’s Drive were successful while when the ball handler was shooting, a great percentage of Shots were missed ( $p = 0.01$ ). Apart from that, the effectiveness of each defensive play and the effectiveness of the offensive outcomes were also depicted. From the data presented above, it is clear that the High Pick and Roll is a crucial factor in basketball and the information and statistics included in this paper could be useful for basketball coaches, both from theoretical and practical perspective.

## ARTICLE HISTORY

Received 13 April 2018

Accepted 16 July 2018

## KEYWORDS

Basketball; High Pick and Roll; effectiveness; performance analysis

## 1. Introduction

Performance analysis in sports is gradually acquiring more significance and therefore constitutes one of the major topics of study in Sports Sciences (Hughes, Dawkins, David, & Mills, 1998; Lames & McGarry, 2007; Vaquera, García-Tormo, Gómez Ruano, & Morante, 2016). Thus, the role of competent analysts becomes essential in order to provide coaches and athletes with particular guidelines for better decision-making under different situations (Nunes et al., 2015). Performance analysis in basketball tries to illuminate the factors that have an impact during the game and determine which of them are the key points (Christoforidis, Papadimitrou, Taxildaris, Aggelousis, & Gourgoulis, 2000; Tsitskaris, Theoharopoulos, Galanis, & Nikopoulou, 2002; Vaquera et al., 2016; Wang, Liu, & Moffit, 2009). That is why success is relative to the training procedure and the coaches’ decisions, especially in designing the training and selecting the most appropriate offensive and defensive plays (Gómez et al., 2015).

Pick and Roll is an offensive strategy that includes two players. This situation helps the ballhandler to create various offensive opportunities (Nunes et al., 2015; Remmert, 2003), as a second teammate tries to prevent the trajectory of the ball handler's defender through a legitimate obstruction of his movement (Lamas et al., 2011; Nunes et al., 2015).

In addition, Remmert (2003), while analysing the offensive tactic in high level teams, observed that the Pick and Roll was the offensive action used more than any other, in executing an attack. Therefore, there are a number of researches that have studied the variables that affect this offensive cooperation. Pick and Roll is one of the most common offensive actions used on the top level of the game (Gómez et al., 2015). It is the offensive action most frequently selected in order to find an offensive solution in the last minutes of the game (Nunes et al., 2015; Zamora, Hidalgo, Cárdenas, & Ocaña, 2007), as well as one of the most difficult offensive actions to defend against (Lorenzo Calvo, Menéndez García, & Navandar, 2017; Polykratis, Tsamourtzis, Mavridis, & Zaggelidis, 2010; Vaquera et al., 2016).

In researches studying Pick and Roll, the frequency of its occurrence in the total of offensive actions was revealed. Garefis (2008) concluded that 37.4% of the teams' offensive actions were executed after a Pick and Roll. Similar results were found by Karl (2003) (30–40%) and Polykratis, Tsamourtzis, Karypidis, Mavridis, and Christodoulos (2009) (40.7% for the Greek national team and 22.6% for the US national team on 2006). Similar percentages were also reported by Karypidis, Mavridis, Tsamourtzis, and Rokka (2010) and Lamas et al. (2011) (29% and 34.8%, respectively).

Pick and Roll usually is executed on the central area of the court (Muñoz, Serna, Daza, & Hileno, 2015; Nunes & Iglesias, 2010). This type of Pick and Roll is named High Pick and Roll and it is analysed in this research.

The major factors of the Pick and Roll are as follows: (a) the speed and the angle of the screen set by the screener, in order to interrupt the trajectory of the ball handler's defender, (b) how well the ball handler will estimate the defender's reaction and (c) the execution of the decision made (Gómez et al., 2015; Hollins, 2003). Coaches should take into consideration basic variables that define its effectiveness, in order to improve planning of the relative drills and training (Gómez et al., 2015). The importance of studying the defenders' reaction to Pick and Roll is related to the efficacy of the offensive players, especially when they create the time and space that put them in advantage over their opponents (Garganta, 2009; Gómez et al., 2015; Grehaigne & Godbuout, 2013). Lorenzo Calvo et al. (2017) found that when the defenders made a Switch after a ball screen, the inside offensive players were the ones who finished the action more often and the duration of the execution was a crucial factor.

Polykratis et al. (2009) recorded and analysed the effectiveness and the differences in performing a Pick and Roll between the national teams of Greece and USA and between the national team of Greece and its opponents (2010) during the Men's World Basketball Championship of 2006. According to the first survey, it was revealed statistical differences among the players who took part in a Pick and Roll situation. Moreover, there was a marginal statistical difference between the relation of the defensive strategies against Pick and Roll and the effectiveness of the latter. In the second survey, Point Guard and Centre of the team in offence took part in 49.6% of the Pick and Roll situations executed.

Marmarinos, Apostolidis, Kostopoulos, and Apostolidis (2016) also recorded the relation between success in the Pick and Roll and the general placement of all Euroleague teams for the 2012–2013 season. It was found that Ball handlers took 43% of the shots after a Pick and Roll situation whereas their Drive was more effective than their Shoot.

In another study Gómez et al. (2015) studied the effects of time (quarter minute, time possession remaining), of space created to execute and of the players on the on-ball screens. They found that screener's and dribbler's moves post screen were significantly related with the effectiveness of the final outcome of the play. The action of the screener that had reduced the effectiveness of the Pick and Roll was a Repick while the action that had increased the Ball Screen effectiveness was to Roll to the basket. The ball handler's actions that increased effectiveness of the Pick and Roll were to Drive to the basket and Field Goal. Actions that decreased effectiveness included Passes to an open teammate and Drives away to the basket.

Variables that affect Pick and Roll were also studied by Vaquera et al. (2016). These variables are related to the offensive play (transition or set play), the score line, ball possession, the game's quarter and the effectiveness or not of the Pick and Roll.

The aim of this study is to record, through observation and analysis of the games in a top sports event, the difference in the effectiveness of the High Pick and Roll offence in regard to the defence's reaction and to trace its effect on the game's result.

## 2. Method

### 2.1. Sample

The research was conducted to study competitive teams of the highest level. Therefore, the sample consisted of 20 videotaped men's games of the latest Olympic Games that took place in Rio in August 2016. 8/20 of the games studied were all the knockout games of the tournament whereas 12/20 of the games studied were randomly selected from the group stage of the contest. The following teams took part in the analysed games: Argentina, Australia, Brazil, Croatia, France, Lithuania, Nigeria, Serbia, Spain and USA. The research team consisted of the three authors of this study. The researchers independently observed all the games and reached to the conclusion presented in the Results section.

### 2.2. Recording instruments

The instruments used for this study were: a laptop with installed operating system Windows 10 Pro, MS Office 2010, SportScout STA Version 3.2 and the software pack SPSS 22.

### 2.3. Procedure and variables

For the analysis of the games with the SportScout STA 3.2, an analysis table was created in order to record High Pick and Roll. The analysis table comprised the variables (High Pick and Roll result, team, defensive play, position of offensive player, pair of execution, offensive outcome) indicated in Table 1.

**Table 1.** Variables.

Result of high PnR <sup>i</sup>	Team	Defence	Position of offensive player	Pair of execution	Offensive outcome
Successful	Winners	Slide Through <sup>a</sup>	Point Guard	PG <sup>j</sup> – SG <sup>k</sup>	Ballhandler's Drive
		Push & Under <sup>b</sup>	Shooting Guard	PG – SF <sup>l</sup>	Ballhandler's Shoot
		Switch <sup>c</sup>	Small Forward	PG – PF <sup>m</sup>	Pass to Roll
		Trail & Sag <sup>d</sup>	Power Forward	PG – C <sup>ad</sup>	Pass to Pop
		Deny <sup>e</sup>	Centre	SG – SF	Other
		Trap <sup>f</sup>		SG – PF	
		Hedge Out <sup>g</sup>		SG – C	
		Stay WtP <sup>h</sup>		SF – PF	
				SF – C	
				PF – C	

<sup>a</sup>The defender of the Ball Handler goes under the screener.

<sup>b</sup>The defender of the Ball Handler goes under the screener and his defender.

<sup>c</sup>The defenders change matchup.

<sup>d</sup>The defender of the Ball Handler trails over the screen.

<sup>e</sup>The defender leads the Ball Handler to the opposite side of screen.

<sup>f</sup>The defenders of the players who execute Pick and Roll trap the ball handler.

<sup>g</sup>The defender of the screener slides out and hedge, leading the ball handler at least one dribble away.

<sup>h</sup>Stay with the player: when there is a fake screen or the ball handler goes to the opposite side of screen.

<sup>i</sup>Pick and Roll.

<sup>j</sup>Point Guard.

<sup>k</sup>Shooting Guard.

<sup>l</sup>Small Forward.

<sup>m</sup>Power Forward, <sup>ad</sup>Centre.

Table 2 shows the signs used for the analysis of the games in relation with the offence's outcome (successful and unsuccessful).

#### 2.4. Statistical analysis

The software pack SPSS 22 for windows was used for the processing of the data and the statistical analysis. To determine possible differences Crosstabulation Analysis was used with chi-square distribution and the level of significance set at  $p < 0.05$ . Because  $\chi^2$  check measures possible differences between observed and expected counts, Adjusted Standardised Residual (critical value = 1.96 and  $p = 0.05$ ) was used to determine which cross-section is responsible for the independence of the variables. CHAID decision trees were also created.

### 3. Results

In a total of 1043 High Pick and Roll plays (Table 3), most defence approaches were by Trail and Sag ( $n = 426$ , 40.8%) followed by Switch ( $n = 241$ , 23,1%) and Hedge out

**Table 2.** Signs used for high pick and roll.

Successful	Unsuccessful
Two-point shot made (+ 2)	Missed two-point shot (-2)
Three-point shot made (+ 3)	Missed three-point shot (-3)
Foul (F)	Turnover (T)
Foul → 2 free throws (2FT)	Block (B)
Foul → 3 free throws (3FT)	Steal (S)
Two-point shot AND F (2 + 1FT)	Offensive foul (OF)
Three-point shot AND F (3 + 1FT)	Shot clock violation (24)

**Table 3.** Ways of defending in relation to the offensive outcome.

Variables	Drive		Shot		Pass to roll		Pass to pop		Pass to 3rd Pl.		Total		
	n	%	n	%	n	%	n	%	n	%	N	%	
Slide Through	17	22.4	s = 8	29	38,2	s = 13	5	6,6	s = 3	8	10,5	s = 10	7,3
			u = 9		u = 16		u = 2		u = 5		u = 7		u = 39
Push & Under	4	30,8	s = 3	5	38,5	s = 4	1	7,7	s = 1	1	7,7	s = 0	1
			u = 1		u = 1		u = 0		u = 1		u = 1		u = 9
Switch	60	24,9	s = 33	65	27	s = 18	44	18,3	s = 18	11	4,6	s = 4	61
			u = 27		u = 47		u = 26		u = 7		u = 7		u = 101
Trail & Sag	123	28,9	s = 70	79	18,5	s = 35	77	18,1	s = 43	24	5,6	s = 11	123
			u = 53		u = 44		u = 34		u = 13		u = 13		u = 140
Deny	3	13,6	s = 1	4	18,2	s = 1	3	13,6	s = 1	2	9,1	s = 0	10
			u = 2		u = 3		u = 2		u = 2		u = 2		u = 207
Trap	2	18,2	s = 0	0	0	s = 0	1	9,1	s = 0	0	0	s = 0	8
			u = 2		u = 0		u = 1		u = 0		u = 0		u = 219
Hedge Out	27	15,4	s = 17	12	6,9	s = 2	54	30,9	s = 30	6	3,4	s = 3	76
			u = 10		u = 10		u = 24		u = 3		u = 3		u = 497
Stay WtP	34	43	s = 20	12	15,2	s = 6	6	7,6	s = 4	6	7,6	s = 2	21
			u = 14		u = 6		u = 2		u = 4		u = 4		u = 546
Total	270	25,9		206	19,8		191	18,3		58	5,6		318
													1043
													100
													s = 497
													u = 546

s = successful, u = unsuccessful.

( $n = 175$ , 16.7%). Nevertheless, there were matches where the teams selected basically a different defence approach.

In Trail and Sag, which was used against most of the Pick and Roll, the Drives by the ball handlers as well as the Pass to a third player were the most common offensive choices (28.9% each option). In Slide Through and Push and Under, most offensive actions resulted in a Shot taken by the ball handler while when Switch took place the situation was more balanced between Shot and Drive as well as Passing to a third player. When the defence chose to defend against the Pick and Roll by using Deny, Trap and Hedge out most offensive actions were executed by a player who did not take part in the Pick and Roll. Most ending of the offensive actions (45.7%) were executed by the ball handler (25.9% Drive and 19.8 Shot), 23.9% by the screener (18.3% in Roll and 5.6% in Pop) and the rest 30.5% by some other athlete.

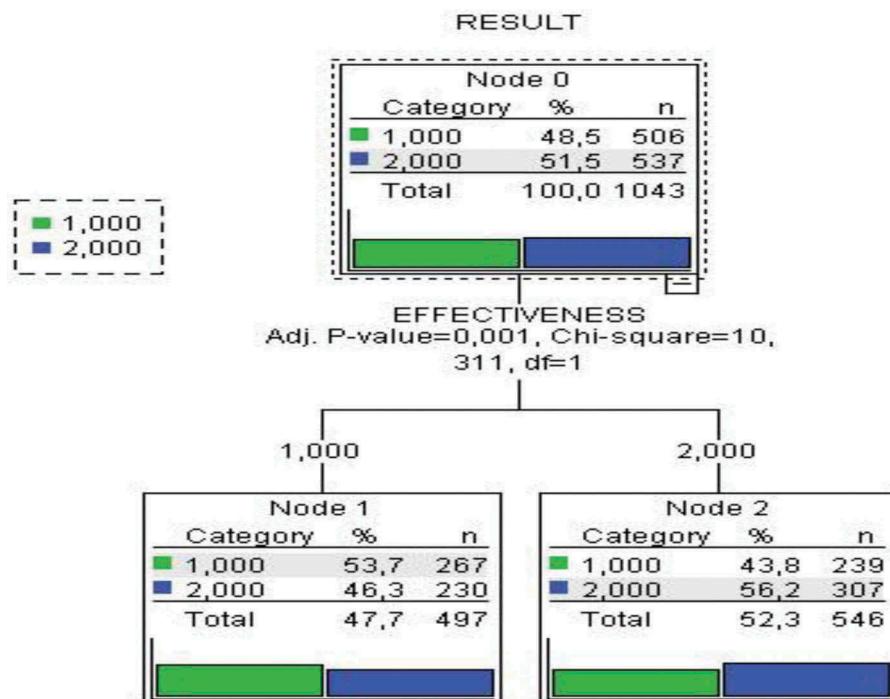
In order to determine the effect of the attack's effectiveness (positive or negative) on the result of the game (win or loss) Crosstabulation Analysis was used with chi-square distribution. It was found that there are statistically significant differences as regards the effectiveness between winners and losers ( $\chi^2 = 10.31$ ,  $p = 0.001$ ). The correlation coefficient phi showing the intensity of the relationship between the two variables was,099 ( $p = 0.001$ ) (Figure 1).

To be more specific, we analysed 1043 situations of High Pick and Roll, 506/1043 (48.5%) for the team which won the game and 506/1043 (51.5%) for the team which was defeated. Teams in the offence with a positive efficacy after a High Pick and Roll were the 47.7% ( $n = 497$ ) of the sample and the winners shot with 53.7% in these offences. Teams in offence with negative efficacy were 52.3% ( $n = 546$ ) of the sample and in this occasion, losers had the 56.2% of these offensive plays (Figure 2 near here). Teams that finally won the game had more plays with positive efficacy and less with negative efficacy in contrast with the teams who lost the game.

In order to determine the effect of the defence's approach against Pick and Roll on the final result (win or loss), Crosstabulation Analysis was used with chi-square distribution. It was observed that there are no statistically significant differences between winners and losers as regards the type of defence used ( $\chi^2 = 7.02$ ,  $p = 0.426$ ). The Cramer's V coefficient was,082 ( $p = 0.426$ ). In other words, the



**Figure 1.** Offence's effectiveness in relation to the game result.



**Figure 2.** Growing method: CHAIID tree is describing the frequency result of Pick and Roll (%) according to the effectiveness (positive–negative).

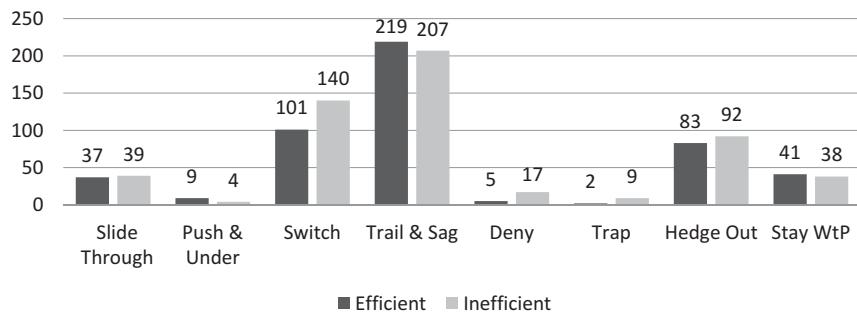
final result was not affected by the way that the defence team played against Pick and Roll.

Crosstabulation Analysis was also used regarding the effect of the defence's approach on the efficacy of the offence (positive or negative). It was observed (Figure 3) that there are statistically significant differences regarding the way of defending in relation to the efficacy ( $\chi^2 = 17.93, p = 0.01$ ) while using Trail and Sag (efficient), as well as while using Switch, Deny and Trap (inefficient). The Cramer's V coefficient was,131 ( $p = .01$ ).

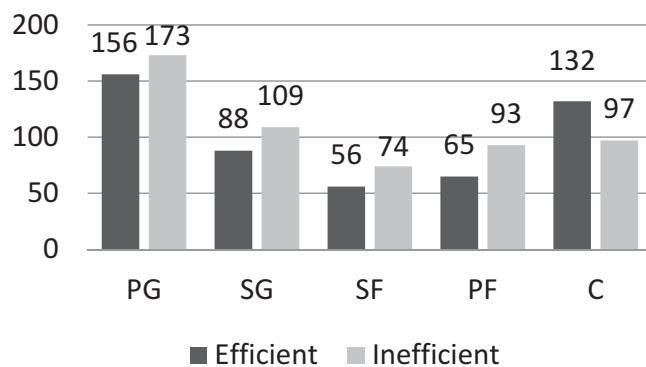
In order to determine if there are differences regarding the player who executed the final action in the efficacy of the offence, Crosstabulation Analysis revealed statistically significant differences ( $\chi^2 = 13.64, p = 0.009$ ). The Cramer's V coefficient was,114 ( $p = .009$ ). To be more specific, it was observed that the significantly greater number of offensive actions taken by the team's tallest player (Centre) contributed to a positive efficacy (Figure 4).

Furthermore, in order to determine if there are differences regarding the player who executed the final action in the result (win or loss) Crosstabulation Analysis showed statistically significant differences ( $\chi^2 = 9.95, p = 0.04$ ). The Cramer's V coefficient was,098 ( $p = .04$ ). Specifically, it was observed that more attacks were executed by the tallest players of the winners (Centres) than those of the losers (Figure 5).

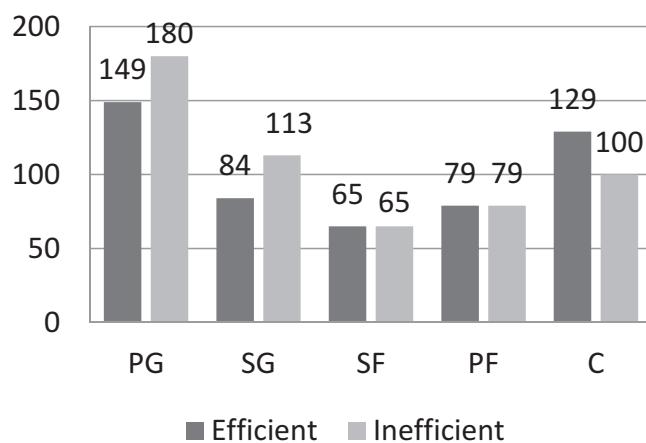
Centres were also the ones with the greater active participation in the Pick and Roll (82.16%,  $n = 857$ ) followed by the Point Guards (60.97%,  $n = 636$ ).



**Figure 3.** The defence's approach in relation to the effectiveness of the offence.

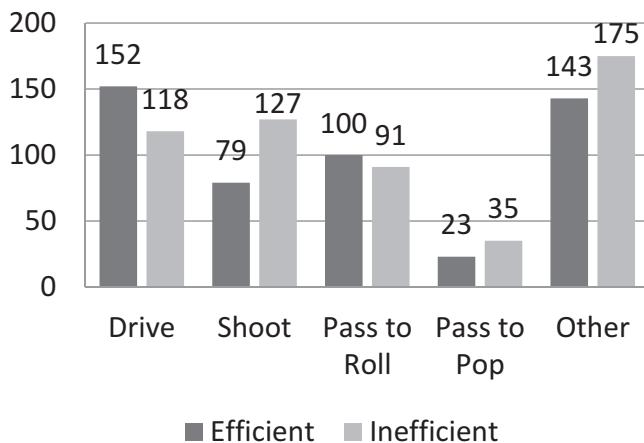


**Figure 4.** The effectiveness of the attack in relation to the position of the player who shot.



**Figure 5.** Player's position in relation to the result of the game (win–loss).

Furthermore, the athlete pairs that executed the Pick and Roll seems that they did not have a significant impact on the efficacy of the attack ( $\chi^2 = 8.1, p = 0.41$ ). The Cramer's V coefficient was,088 ( $p = .41$ ) Similarly, the cooperating pair in the Pick and Roll had no effect on the final result either ( $\chi^2 = 9.1, p = 0.33$ ). The Cramer's V coefficient was,093



**Figure 6.** Attack's result in relation to the effectiveness of the High Pick and Roll.

( $p = .33$ ). The pair that cooperated the most on the Pick and Roll, as it is obvious, was the Point Guard with the Centre (48.8%,  $n = 508$ ) and the pair with the second biggest participation was that of the Shooting Guard with the Centre (18.6%,  $n = 194$ ).

In order to determine the effect of the mean of execution of the attack in its efficacy (positive or negative) Crosstabulation Analysis showed statistically significant differences ( $\chi^2 = 19.33, p = 0.001$ ). The Cramer's V coefficient was 136 ( $p = .001$ ). Most of the attacks finished with a Drive were successful, while most of the attacks finished with a Shot by the ball handler were inefficient. In other words, the Drives ended positively most of the time, while the shots ended negatively (Figure 6).

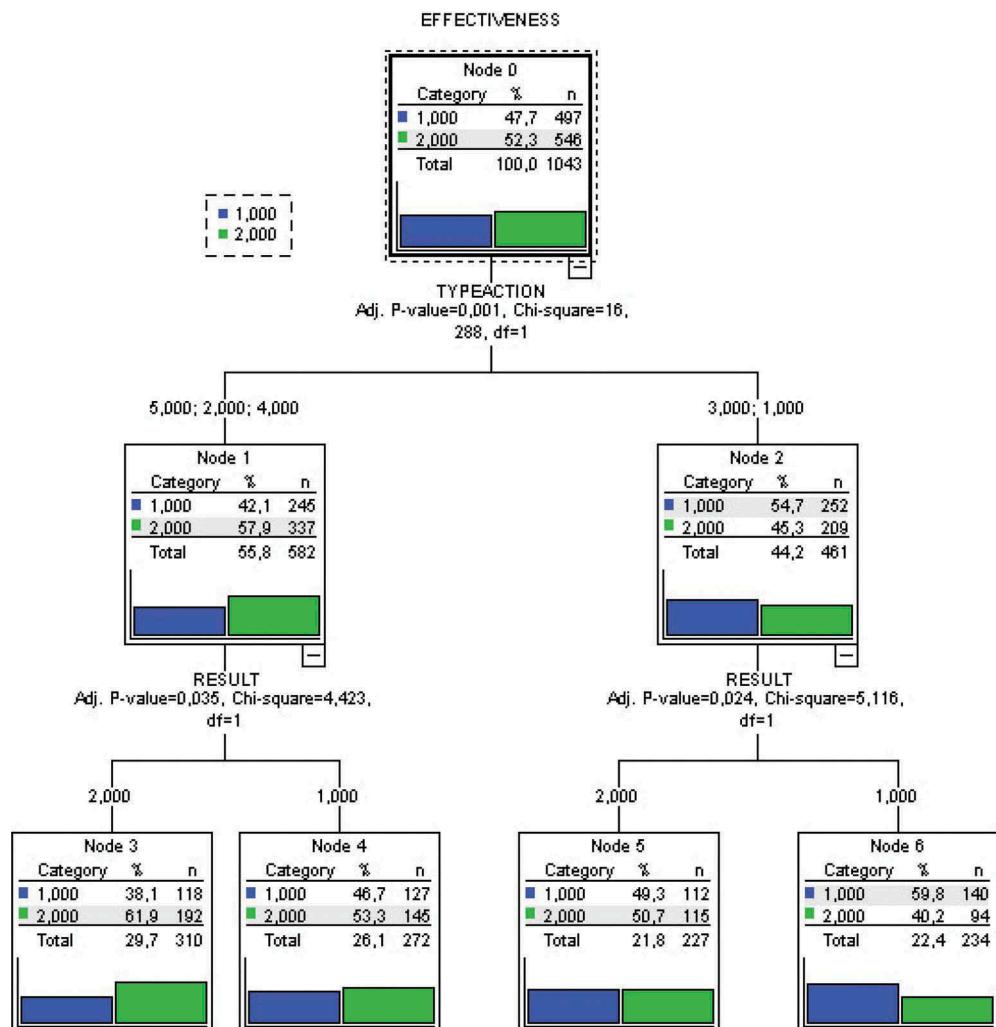
As mentioned before, 497 plays had positive efficacy (47.7%) and 546 plays had negative efficacy (52.3%). In 44.2% ( $n = 461$ ) plays the Ball Handler did a Drive and Passed to Roll. These two plays showed a positive efficacy of 54.7%. Other choices, such as Shoot, Pass to the Pop and Pass to a third player constituted 55.8% of the total High Pick and Roll and resulted in a negative efficacy of 57.9%. Considering these two categories, the type of the attack's result after a High Pick and Roll showed statistically significant differences in efficacy ( $\chi^2 = 16.288, p = .001$ ).

As far as the Drive and the Pass to Roll are concerned, these plays also showed differences in the game's final outcome (win or loss) ( $\chi^2 = 5.116, p < .05$ ). This outcome also observed at the other three offensive choices (Shoot, Pass to Pop, Pass to a third player) ( $\chi^2 = 4.423, p < .05$ ), where the team that lost the game executed more High Pick and Roll with a negative effectiveness (Figure 7 near here).

On the contrary, the Pick and Roll result did not significantly affect the result of the game ( $\chi^2 = 4.66, p = 0.324$ ). The Cramer's V coefficient was .067 ( $p = .324$ ).

#### 4. Discussion

The aim of this study was to examine the effectiveness of the High Pick and Roll in relation with the reaction of the team in defence. The study also investigated the total impact of this offensive strategy on the final result of the game. The processes and the analysis of the data provide several useful conclusions. Pick and Roll is the main



**Figure 7.** Growing method: CHAID tree describing frequency result of effectiveness (%) according to the type of action and result.

instrument of partial tactic used in basketball (Suárez-Cadenas, Courel-Ibáñez, & Cárdenas-Vélez, 2017). Therefore, it would be important for coaches to have knowledge of these conclusions. This knowledge also helps the organisation and planning of the teaching and training procedure (Hughes, 1996).

The three defensive plays mostly used against the High Pick and Roll were Trail and Sag, Switch and Hedge Out. Probably, because all the rest create empty spaces for the offensive players, mainly in the central zone, where High Pick and Roll is performed, which means a higher probability for the attacking team to score. Similar results were observed in Gómez et al. (2015) study. It was revealed that after the most Pick and Roll situations the defender of the ball handler follows him and does not change. Furthermore, plays such as Deny and Trap are mostly selected to defend against the Side Pick and Roll and plays such as Slide Through and Push and Under are selected

when the ball handler is not a competent shooter, something which is rare on the top level.

Every time a Pick and Roll is performed the defence must decide which offensive element should stop and which to leave. The offence, on the other side, tries to exploit the space created by the defence, to make a move. That is why in defence plays such as Slide Through and Push and Under the percentage of Shots is greater than that of the Drives. On the other hand, in Trail and Sag the percentage of the Drives is greater than that of the Shots. In Switch the attempts were more balanced because the offence tries to find a mismatch for a better advantage. In defence plays by Deny, Trap and Hedge Out most offensive actions were executed by a third player. This happens because the defending players try to cover the empty space in the paint and leave a player free to shoot. Usually this player is the one to execute the final attempt.

This research found out that, after a High Pick and Roll 45.7% of the offensive actions were executed by the ball handler, 23.9% by the screener and the rest 30.5% by some other player. In other words, this cooperation has as main objective to free the ball handler. Similar percentages were also found by Marmarinos et al. (2016).

It was also found that winners had significantly more successful attempts and less unsuccessful than the losers. Marmarinos et al. (2016) came also to the same conclusion, when he found that the efficacy of the Pick and Roll explained a small but significant percentage in the final classification of the teams in the Euroleague Championship for the season 2012–2013. Victory was determined by the positive efficacy in Pick and Roll while defeat by the negative efficacy.

On the other hand, statistical analysis showed that the winners and the losers had not a statistically significant difference regarding the defence's reaction on High Pick and Roll. That means that there was no particular approach chosen by the winners or the losers that affects the outcome of the game. Polykratis et al. (2009) came to the same conclusion.

Nevertheless, the way that the High Pick and Roll is dealt with significantly affects its efficacy. In particular, Trail and Sag is not an efficient defensive play, since, this way, most High Pick and Roll are successful. On the other side, most High Pick and Roll defended by Switch, Deny and Trap were not successful. These are the four ways of defending that significantly affect the efficacy of the High Pick and Roll. On the contrary, Polykratis et al. (2009) found a statistically significant difference only in the case of the Switch where most High Pick and Roll defended by Switch were successful.

In regard to the position of the player executing the attempt, only the Centres were able to substantially affect the efficacy of the High Pick and Roll, since most of their attempts were successful. Other than the efficacy of the High Pick and Roll, the centres' final attempts after a High Pick and Roll also affect positively the outcome of the game. In other words, if the Centre receives the ball after a High Pick and Roll, there are more probabilities that the attempt will be successful. This is a fact that the winning teams exploited as they had more attempts by these players than the losing teams. This particular conclusion agrees with Polykratis et al. (2009), who also claims that the winning teams had more attempts by their Shooting guards and Power Forwards while the losing teams by their Point Guards and Small Forwards.

Centres are the players with the biggest participation followed by the Point Guards. This happens because the Centres are tall and massive players, which means that they

can set a dynamic screen. Furthermore, their aim is to draw the tall defender of the opponent away from the basket, in order to create an empty space in the paint. On the other hand, Point Guards are better ball handlers and usually they are the most capable players in quick decision-making to look for the best possible choice. Gómez et al. (2015) found that in most cases the screener was the Centre whereas the dribbler was an Outside player.

Regarding the pair of players, which executes the High Pick and Roll, it seems that it does not significantly affect its efficacy, as well as the outcome of the game. In most cases the High Pick and Roll is performed by the Point Guard and the Centre (48.8%) and this happens for the above reasons. Polykratis et al. (2009) & (2010)) came to the same conclusion.

Regarding the way the High Pick and Roll end, it seems that it does not significantly affect the outcome of the game, but it affects its efficacy. The most successful ending is by a Drive while taking a Shot is less successful. This conclusion agrees with the one of Marmarinos et al. (2016), who also found that the ball handlers' Drives are more successful than their Shots.

Drive and Pass to Roll offensive options are proved to be effective most of the times. However, the other options (Shoot, Pass to Pop and Pass to a third player) are not as effective as the Drive and Pass to Roll. Considering that in the first case most of the High Pick and Roll executed by the team which won the game, while in the second most of the High Pick and Roll executed by the team that lost the game, the final outcome of the game is affected.

Conclusively, the main aim of this research was to find the difference in the effectiveness of the offence after the High Pick and Roll in regard to the defence's reaction and its effect on the game's final result. Regarding these two questions, firstly the efficacy of the offence is obviously affected by the defence's approach and secondly the efficacy of the High Pick and Roll in the game is decisive for the final result, since the winning teams had more successful High Pick and Roll and less not successful ones than the losing teams.

In this research data were found, which are useful for every coach. Beyond the data about the game, the conclusions that emerged could help with the training procedure in order to produce a focused plan, since there are data which indicated the result of the most cases when a High Pick and Roll is performed. For example, when the defence's reaction in High Pick and Roll were Trail & Sag, most of the offensive plays were successful. Therefore, a basketball coach should include in the training plan all the other defensive options which are more effective than the Trail & Sag and teach his players to read and to estimate the defence's reaction in order to have more successful offensive actions. The Pick and Roll appears to be an offensive combination increasingly used in basketball nowadays, and the consequences of a High Pick and Roll can directly affect the basketball game as substantiated by this research.

## Disclosure statement

No potential conflict of interest was reported by the authors.



## References

- Christoforidis, C., Papadimitrou, K., Taxildaris, K., Aggelousis, N., & Gourgoulis, V. (2000). Evaluation of free shot contribution in winning a basketball game during European championships. *Exercise and Society Journal of Sports Science*, 24, 68–72.
- Garefis, A. (2008). Comparison of offensive technical-tactical actions in high-level basketball with respect to gender and game outcome. *Doctoral thesis*. AUTH. Thessaloniki.
- Garganta, J. (2009). Trends of tactical performance analysis in team sports: Bridging the gap between research, training and competition. *Revista Portuguesa De Ciencias Desporto*, 9(1), 81–89.
- Gómez, M. A., Battaglia, O., Lorenzo, A., Lorenzo, J., Jiménez, S., & Sampaio, J. (2015). Effectiveness during ball screens in elite basketball games. *Journal of Sports Sciences*, 33(17), 1–9.
- Grehaigne, J.-F., & Godbuout, P. (2013). Collective variables for analyzing performance in team sports. In T. McGarry, P. O'Donoghue, & J. Sampaio (Eds.), *Routledge handbook of sports performance analysis* (pp. 101–114). London: Routledge.
- Hollins, L. (2003). The screens and various options. *FIBA Assist Magazine*, 5, 6–13.
- Hughes, M., Dawkins, N., David, D., & Mills, J. (1998). The perturbation effect and goal opportunities in soccer. *Journal of Sports Sciences*, 16, 20–21.
- Hughes, M. D. (1996). Notational analysis. In T. Reilly (Ed.), *Science and soccer* (pp. 343–361). London: E. & F.N. Spon.
- Karl, G. (2003). Pick n' Roll. *Records of proceedings of SEPK International Seminar*. Thessaloniki, 1–19. 10.
- Karypidis, A., Mavridis, G., Tsamourtzis, E., & Rokka, S. (2010). The effectiveness of control offense, following an outside game in European championships. *Inquiries in Sport & Physical Education*, 8(1), 99–106.
- Lamas, L., Junior, D., Santana, F., Rostaiser, E., Negretti, L., & Ugrinowitsch, C. (2011). Space creation dynamics in basketball offence: Validation and evaluation of elite teams. *International Journal of Performance Analysis in Sport*, 11, 71–84.
- Lames, M., & McGarry, T. (2007). On the search for reliable performance indicators in game sports. *International Journal of Performance Analysis in Sport*, 7(1), 62–79.
- Lorenzo Calvo, J., Menéndez García, A., & Navandar, A. (2017). Analysis of mismatch after ball screens in Spanish professional basketball. *International Journal of Performance Analysis in Sport*, 17(4), 555–562.
- Marmarinos, C., Apostolidis, N., Kostopoulos, N., & Apostolidis, A. (2016). Efficacy of the “Pick and Roll” offense in top level European basketball teams. *Journal of Human Kinetics*, 51/2016, 121–129.
- Muñoz, V., Serna, J., Daza, G., & Hileno, R. (2015). Influencia del bloqueo directo y el uno contra uno en el éxito del lanzamiento en baloncesto. *Apunts. Educación Física y Deportes*, 119(1), 80–86.
- Nunes, H., Iglesias, X., Daza, G., Irurtia, A., Caparrós, T., & Anguera, M. T. (2015). Influencia de pick and roll en el juego de ataque en baloncesto de alto nivel. *Cuadernos de Psicología del Deporte*, 16(1), 129–142.
- Nunes, H. P., & Iglesias, X. (2010). Análisis del bloqueo directo (II). *Clinic: Revista Técnica de Baloncesto*, 23(86), 38–40.
- Polykratis, M., Tsamourtzis, E., Karypidis, A., Mavridis, G., & Christodoulos, A. (2009). Pick n' Roll efficacy and variations between the national teams of Greece and USA in the semi-finals of Mundobasket 2006 in Japan. *Inquiries in Sport & Physical Education*, 7(1), 63–71.
- Polykratis, M., Tsamourtzis, E., Mavridis, G., & Zaggelidis, G. (2010). Relation of effectiveness in Pick n' Roll application between the National Greek Team of and its opponents during the Men's World Basketball Championship of 2006. *Journal of Physical Education and Sport*, 29 (4), 57–67.
- Remmert, H. (2003). Analysis of group-tactical offensive behavior in elite basketball on the basis of a process orientated model. *European Journal of Sport Science*, 3(3), 1–12.

- Suárez-Cadenas, E., Courel-Ibáñez, J., & Cárdenas-Vélez, D. (2017). La toma de decisiones en baloncesto. Una propuesta de árboles decisionales para la enseñanza del bloqueo directo [Decision – Making in basketball. A proposal of decision trees for teaching pick and roll]. *Acción Psicológica*, 14(1), 43–56.
- Tsitskaris, G., Theoharopoulos, A., Galanis, D., & Nikopoulou, M. (2002). Types of shots used at the Greek National Basketball Championship according to the division and position of players. *Journal of Human Movement Studies*, 42, 43–52.
- Vaquera, A., García-Tormo, J. V., Gómez Ruano, M. A., & Morante, J. C. (2016). An exploration of ball screen effectiveness on elite basketball teams. *International Journal of Performance Analysis in Sport*, 16, 475–485.
- Wang, J., Liu, W., & Moffit, J. (2009). Skills and offensive tactics used in pick-up basketball games. *Perceptual and Motor Skills*, 109(2), 473–477.
- Zamora, P., Hidalgo, G., Cárdenas, D., & Ocaña, F. (2007). *Análisis de las variables de ataque del bloqueo directo en la liga ACB* (pp. 90). Cáceres: En IV Congreso Ibérico desde la base a la élite deportiva.