



INVESTIGATION OF THE EFFECTS OF 4-POINT SHOOTING RULES APPLIED IN BIG 3 BASKETBALL ORGANIZATION ON COMPETITION RESULTS IN NBA PLAY-OFFS

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Abstract:

The increasing physical characteristics and defensive performances of basketball players pushed the offensive players to play away from the rim. Developing technology and the development of training techniques and methods also affected the shooting performances of the players positively. The players have to shoot three-point shots from long distance because of the defensive pressure. This paper was inspired by the game rules of the Big 3 organization, which was held in the city of Charlotte in the United States. In this study, if the 4-point shot circles in the Big 3 organization were implemented in NBA Playoffs, we investigate the player's 4-point shots attempts, 4-point shots made, 4-point play types, 4-point shots shooting times and the effects of 4-point shots on match scores in NBA Play-offs. The research group consists of 373 three-point shots from 28-32 feet of 16 teams in the 2017-2018 NBA Playoffs, including statistics and match images from the NBA official website (www.nba.com). As a result, if the 4-point shot circles in the Big 3 organization were implemented in NBA Play-Offs, players would play with 32% a total shot of 106/373 in 4-point shots. It was observed that the most important factors for the players' use of 4-point shooting were due to the decrease in the shot clock, the early offense and the inability of the teams to organize anything in the offense.

Keywords: Big 3, NBA, four-point shot

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1. Introduction

Shooting is the most important skill in basketball (Wissel, 2009). There are three different type of scoring options in basketball. Free throw shot is one point, shooting from the front of the three-point line is two points and shooting behind the three-point line is three points. Over the years basketball changed and the rules have been changed a lot until today. In the early years of basketball, there is no three-point shot on the basketball court. In 1980 NBA introduced 3-point field goal (Oliver, 2004).

At the end of the 1979-1980 season, teams had averaged less than three 3-point attempts per game (Mather, 2016). The Boston Celtics player Chris Ford is credited with making the first official N.B.A. 3, on opening night against the Houston Rockets. Each team wound up with one in the game (Mather, 2016).

At the end of 2017-2018 NBA season, teams head averaged 28.08 3-point attempts and 10.10 3-point made per game. These are the all-time records of the most three-point attempts and most three-point made in one season according to data from the company of Systems Analysis and Program Development (SAP), (NBA, 2018). The three-point shooting attempt has been increased %903 from 1979-1980 season according to the 2017-2018 season (NBA, 2018).

The first ever 4 point line used in ABA League. A 4-Point Field Goal is scored on field goals made from behind the division Line (Chichester, 2016). Beginning in 2017, the Globetrotters (2016) will debut basketball's first-ever 4-point line, a move that comes six years after the team unveiled the 4-point shot to worldwide acclaim. The 4-point line will be located 30 feet from the basket – 6 feet, 3 inches beyond the top of the NBA's current 3-point line. The Globetrotters previously used a four-point circle, two on each side of the court, to designate a four-point shot since they first introduced it in 2010. In fact, during the 2015-2016 season, Golden State Warriors player Stephen Curry broke all sorts of NBA 3-point records, he would have shot 43.2 percent (16-for-37, with 64 points scored) from the new Globetrotters 4-point line.

Stephen Curry breaks the single season three-point field goal made record in 2015-2016 season with 402 three-point field goal made and he shoots the ball %45.4 from the three-point line (NBA, 2016). The media start to talk about the possibility of four-point shooting rule for NBA basketball after Stephen Curry's deep threes (Samar, 2018). In 2017, the Big 3 organization introduces the first ever four-point circles. There are three circles on the court and a player's foot has to be touching any part of one of those circles when he rises and fires for the bucket to count for four points (Attila, 2018). The Philadelphia 76ers understands the benefits of 3-point shooting. That is why they have a 4-point line in their practice courts (Cohen, 2018).

The three-point shot becomes more popular and more valuable, the teams start to play with players that can shoot the ball from long range, can handle the ball and have court vision players on the basketball court. The players like Kevin Durant, LeBron James and Giannis Antetokounmpo are the modern players can play all

positions, 1-2-3-4-5 position today's NBA game. Today's game more perimeter players are playing on the basketball court.

2. Literature Review

We investigate the past research papers about the four-point shooting rule and four-point shooting. We did not find any research papers. This paper will be the first paper of four-point shooting rule and analyze the effects of four-point shooting to the game of basketball.

3. Material and Methods

We investigated the effects of the four-point shots to the game results of all NBA Play-Offs games from www.nba.com. The www.nba.com has categorized the shots by distance. We analyzed the three-point attempts from 28-32 feet. The shooting attempts of the games are showing with 10-15 seconds in highlights. These highlights were analyzed by shot distance, shot type, shot clock, shot made, shot missed are included in this research paper. We add plus one point to the game results for every three-point shot made from 28-32 feet distance. All shots made from 28-32 feet distance counted as four points to the score sheet.

4. Results

As shown in Table 1 jump shot is the most preferred shot with 229 times in NBA Play-Offs Games by players. Pull-up jump shot is the second most preferred shot with 103 times. Step back jump shot is the third in the list with just 11 times. Floating jump shot, jump bank shot and turnaround jump shot with two times. The least preferred shots are driving floating bank jump shot and turnaround fadeaway bank jump shot with one time.

Table 1: The frequencies and the percents of the play types of the three-point shots from 28-32 feet

Valid	Frequency	Percent
Driving Floating Bank Jump Shot	1	.3
Fadeaway Jump Shot	5	1.3
Floating Jump shot	2	.5
Jump Bank Shot	2	.5
Jump Shot	229	61.4
Pullup Jump shot	103	27.6
Running Jump Shot	9	2.4
Running Pull-Up Jump Shot	8	2.1
Step Back Jump Shot	11	2.9
Turnaround Fadeaway Bank Jump Shot	1	.3
Turnaround Jump Shot	2	.5
Total	373	100.0

As shown in Table 2 the players shoot the ball 212 times from 28 feet. The players shoot the ball just nine times from 32 feet.

Table 2: The frequencies and percents of shot distances of the four-point shots

Shot distance	Frequency	Percent
28 feet	212	56.8
29 feet	83	22.3
30 feet	46	12.3
31 feet	23	6.2
32 feet	9	2.4
Total	373	100.0

As shown in Table 3 the players shoot four-point shots most in the fourth quarter with 107 attempts. The players have shot just six four-point attempts in extra periods of NBA Play-Offs.

Table 3: The frequencies and percents of the four-point shots include periods

Period	Frequency	Percent
1	89	23.9
2	78	20.9
3	93	24.9
4	107	28.7
5	6	1.6
Total	373	100.0

As shown in Table 4 the players scored 62 four-point shots with assist and 44 four-point shots without an assist.

Table 4: The frequencies and percents of the assisted and no assisted made & miss four-point shots

Asist	Frequency	Percent
Made shot, No assist	44	11.8
Made shot, Assisted	62	16.6
Missed shot	267	71.6
Total	373	100.0

Table 5: The four-point field goal attempts and field goal made by players

Player Name	SA	SMade	SMiss	Player Name	SA	SMade	SMiss
Abdel Nader	1		1	Joel Embiid	3		3
Al Horford	1		1	Jonas Jerebko	1		1
Alex Abrines	1	1		Jordan Clarkson	2		2
Anthony Davis	2	1	1	Jordan Crawford	2	1	1
Aron Baynes	1		1	Jose Calderon	3		3
Bojan Bogdanovic	11	3	8	Josh Richardson	2		2
Bradley Beal	5	2	3	JR Smith	13	2	11
Bryn Forbes	2		2	Jrue Holiday	1		1
Carmelo Anthony	1		1	Kevin Durant	15	6	9
Chris Paul	5	1	4	Kevin Love	5	2	3
CJ McCollum	1		1	Khris Middleton	2	1	1
CJ Miles	4	2	2	Klay Thompson	11	4	7
Cory Joseph	1		1	Kyle Korver	9	3	6
Damian Lillard	7	1	6	Kyle Lowry	14	5	9
Danny Green	2		2	Lance Stephenson	5	2	3
Dario Saric	3	1	2	LeBron James	22	8	14
Darren Collison	1		1	Malcolm Brogdon	1		1
Davis Bertans	1		1	Manu Ginobili	2	1	1
Delon Wright	2	1	1	Marco Belinelli	2	1	1
DeMar DeRozan	4		4	Marcus Morris	2		2
Donovan Mitchell	9	3	6	Marcus Smart	10		10
Draymond Green	6	2	4	Nick Young	5		5
E'Twaun Moore	1		1	Nikola Mirotic	5	2	3
Eric Bledsoe	1		1	Otto Porter Jr.	1		1
Eric Gordon	15	6	9	Patty Mills	4		4
Ersan Ilyasova	1		1	Paul George	3		3
Fred VanVleet	4	2	2	Quinn Cook	1		1
George Hill	5	1	4	Rajon Rondo	1	1	
Gerald Green	2		2	Ricky Rubio	1		1
Ian Clark	4	2	2	Robert Covington	4	2	2
Jamal Crawford	2		2	Royce O'Neale	1		1
James Harden	15	5	10	Rudy Gay	1	1	
Jaylen Brown	8	3	5	Russell Westbrook	4		4
Jayson Tatum	3		3	Ryan Anderson	4	1	3
Jeff Green	2		2	Shane Larkin	1		1
Jeff Teague	2		2	Stephen Curry	41	19	22
JJ Redick	7		7	Terry Rozier	15	3	12
Joe Ingles	4	1	3	Tony Snell	1		1
				Victor Oladipo	6		6

Abbreviations: SA: Shot Attempted, SMade: Shot Made, SMiss: Shot Miss

As shown in Table 4 Stephen Curry shoots the ball 41 times from four-point shot distance, and he makes 19 of them. LeBron James has 22 shot attempts from the field, and he makes eight of his shots. Four players shoot the same number of 15 attempts, Kevin Durant and Eric Gordon make six of them, James Harden make five and Terry Rozier makes three of his shots. Jaylen Brown hits three four-pointers in just eight

attempts, Kyle Korver and Donovan Mitchell make three four-point shots in nine shot attempts and Bojan Bogdanovic has made three of his eleven shot attempts. Marcus Smart missed all of his 10 shots, JJ Redick missed all of his seven shots, and Victor Oladipo missed all of his six shots.

Table 6: NBA Play-Offs Game Scores and after the four-point field goal made scores of Western Conference First Rounds

Match-Up		Game Date	Regular Score	4-Point Score	Series Score	4-Point Series Score
MIN	HOU	2018-04-15	101 - 104	101 - 104	MIN 1 HOU 4	MIN 1 HOU 4
HOU	MIN	2018-04-21	105 - 121	105 - 121		
HOU	MIN	2018-04-23	119 - 100	119-100		
MIN	HOU	2018-04-25	104 - 122	104-125		
UTA	OKC	2018-04-15	108 - 116	109-116	UTA 2 OKC 4	UTA 2 OKC 4
UTA	OKC	2018-04-18	102 - 95	102 - 95		
OKC	UTA	2018-04-21	102 - 115	102 - 115		
OKC	UTA	2018-04-23	96 - 113	97-113		
UTA	OKC	2018-04-25	99 - 107	99 - 107		
OKC	UTA	2018-04-27	91 - 96	91-97		
NOP	POR	2018-04-14	97 - 95	97 - 95	NOP 4 POR 0	NOP 4 POR 0
NOP	POR	2018-04-17	111 - 102	112-102		
POR	NOP	2018-04-19	102 - 119	102-120		
POR	NOP	2018-04-21	123 - 131	124-131		
SAS	GSW	2018-04-14	92 - 113	93-116	SAS 1 GSW 4	SAS 1 GSW 4
SAS	GSW	2018-04-16	101 - 116	101-117		
GSW	SAS	2018-04-22	90 - 103	90 - 103		
SAS	GSW	2018-04-24	91 - 99	92-99		

Abbreviations: MIN: Minnesota Timberwolves, HOU: Houston Rockets, UTA: Utah Jazz, OKC: Oklahoma City Thunder, POR: Portland Trail Blazers, NOP: New Orleans Pelicans, SAS: San Antonio Spurs, GSW: Golden State Warriors

Notes: 1. The schedule is included only the games with four-point made. 2. The scores in '()' described overtime periods.

As shown in Table 6 the NBA Western Conference First Round of Play-Offs Game scores are changed in some games, but the series scores are not changed.

Table 7: NBA Play-Offs Game Scores and after the four-point field goal made scores of Eastern Conference First Rounds

Teams		Game Date	Regular Score	4-Point Score	Series Score	4-Point Series Score
WAS	TOR	2018-04-14	106 - 114	106 - 114	WAS 2 TOR 4	WAS 2 TOR 4
WAS	TOR	2018-04-17	119 - 130	120-130		
TOR	WAS	2018-04-20	103 - 122	104-123		
TOR	WAS	2018-04-22	98 - 106	99-107		
WAS	TOR	2018-04-25	98 - 108	98-110		
TOR	WAS	2018-04-27	102 - 92	103-92		

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IND	CLE	2018-04-15	98 - 80	99-80	IND 3 CLE 4	IND 3 CLE 4
IND	CLE	2018-04-18	97 - 100	97-101		
CLE	IND	2018-04-20	90 - 92	91-95		
CLE	IND	2018-04-22	104 - 100	104 - 100		
IND	CLE	2018-04-25	95 - 98	95 - 98		
CLE	IND	2018-04-27	87 - 121	88-121		
IND	CLE	2018-04-29	101 - 105	103-105		
MIA	PHI	2018-04-14	103 - 130	103 - 130	MIA 1 PHI 4	MIA 1 PHI 4
PHI	MIA	2018-04-19	128 - 108	129 - 108		
MIA	PHI	2018-04-24	91 - 104	91 - 104		
MIL	BOS	2018-04-15	99-99 (107 – 113)	99-99 (107 – 113)	MIL 3 BOS 4	MIL 3 BOS 4
MIL	BOS	2018-04-17	106 - 120	106 - 120		
BOS	MIL	2018-04-22	102 - 104	105-105		
BOS	MIL	2018-04-26	86 - 97	86 - 97		
MIL	BOS	2018-04-28	96 - 112	96 - 112		

Abbreviations: WAS: Washington Wizards, TOR: Toronto Raptors, IND: Indiana Pacers, CLE: Cleveland Cavaliers, IND: Indiana Pacers, MIA: Miami Heat, PHI: Philadelphia 76ers, MIL: Milwaukee Bucks, BOS: Boston Celtics

As shown in Table 7 the NBA Eastern Conference First Round of Play-Offs Game scores are changed in some games but the series scores are not changed.

Table 8: NBA Play-Offs Game Scores and after the four-point field goal made scores of Western Conference Semi-Finals Rounds

Teams		Game Date	Regular Score	4-Point Score	Series Score	4-Point Series Score
UTA	HOU	2018-04-29	96 - 110	96-110	UTA 1 HOU 4	UTA 1 HOU 4
UTA	HOU	2018-05-02	116 - 108	116 - 108		
HOU	UTA	2018-05-04	113 - 92	114-92		
HOU	UTA	2018-05-06	100 - 87	101-88		
UTA	HOU	2018-05-08	102 - 112	102 - 112		
NOP	GSW	2018-04-28	101 - 123	102-123	NOP 1 GSW 4	NOP 1 GSW 4
NOP	GSW	2018-05-01	116 - 121	120-124		
GSW	NOP	2018-05-06	100 - 87	101-88		
NOP	GSW	2018-05-08	104 - 113	104-114		

As shown in Table 8 the NBA Western Conference Semi-Finals of Play-Offs Game scores changed in some games, but the series scores are not changed.

Table 9: NBA Play-Offs Game Scores and after the four-point field goal made scores of Eastern Conference Semi-Finals Rounds

Teams		Game Date	Regular Score	4-Point Score	Series Score	4-Point Series Score
CLE	TOR	2018-05-01	105-105 (113 – 112)	106-105 (114-112)	CLE 4 TOR 0	CLE 3 TOR 1
CLE	TOR	2018-05-03	128 - 110	129-110		
TOR	CLE	2018-05-05	103 - 105	106-105		
TOR	CLE	2018-05-07	93 - 128	94-129		

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PHI	BOS	2018-04-30	101 - 117	101 - 117	PHI 1 BOS 4	PHI 1 BOS 4
PHI	BOS	2018-05-03	103 - 108	103 - 108		
BOS	PHI	2018-05-05	89-89 (101 – 98)	89-89 (101 – 98)		
BOS	PHI	2018-05-07	92 - 103	92 - 103		
PHI	BOS	2018-05-09	112 - 114	114-115		

As shown in Table 9 the NBA Eastern Conference Semi-Finals of Play-Offs Game scores are changed in some games and the Cleveland Cavaliers – Toronto Raptors series scores changed 4-0 to 3-1 for Cleveland Cavaliers. Toronto Raptors will win by one in the first game of the round if NBA has the Big-3 four-point shooting rule.

Table 10: NBA Play-Offs Game Scores and after the four-point field goal made scores of Western Conference Finals

Teams		Game Date	Regular Score	4-Point Score	Series Score	4-Point Series Score
GSW	HOU	2018-05-14	119 - 106	119 - 106	GSW 4 HOU 3	GSW 4 HOU 3
GSW	HOU	2018-05-16	105 - 127	105 - 127		
HOU	GSW	2018-05-20	85 - 126	86-128		
HOU	GSW	2018-05-22	95 - 92	95-93		
GSW	HOU	2018-05-24	94 - 98	94-99		
HOU	GSW	2018-05-26	86 - 115	90-118		
GSW	HOU	2018-05-28	101 - 92	102-93		

As shown in Table 10 the NBA Western Conference Finals of Play-Offs Game scores changed in some games, but the series scores are not changed.

Table 11: NBA Play-Offs Game Scores and after the four-point field goal made scores of Eastern Conference Finals

CLE	BOS	2018-05-13	83 - 108	83 - 108	CLE 4 BOS 3	CLE 4 BOS 3
CLE	BOS	2018-05-15	94 - 107	95-107		
BOS	CLE	2018-05-19	86 - 116	86-117		
BOS	CLE	2018-05-21	102 - 111	103-111		
CLE	BOS	2018-05-23	83 - 96	85-96		
BOS	CLE	2018-05-25	99 - 109	100-110		
CLE	BOS	2018-05-27	87 - 79	87 - 79		

As shown in Table 11 the NBA Eastern Conference Finals of Play-Offs Game scores changed in some games, but the series scores are not changed.

Table 12: NBA Play-Offs Final Game Scores and after the four-point field goal made scores

CLE	GSW	2018-05-31	107-107 (114-124)	108-109 (117-127)	CLE 0 GSW 4	CLE 0 GSW 4
CLE	GSW	2018-06-03	103 - 122	105-127		
GSW	CLE	2018-06-06	110 - 102	115-102		
GSW	CLE	2018-06-08	108 - 85	111-85		

As shown in Table12 the NBA Play-Offs Eastern Conference Finals Game scores changed in some games but the series scores are not changed. Golden State Warriors

will win the first game of the series by one in regular time if the NBA has the Big-3 four-point shooting rule.

5. Conclusion

In the NBA, coaches want from their players to shoot more three-point shots compared to previous years. The pace and space game force to players play early offense and run & gun game. Players do not waste too much time to find the open teammate or do not wait for the right time to shoot the ball. When they feel, they can shoot the ball without blocking defense they shoot it. Teams average 96.93 pace (The number of possessions per 48 minutes for a team or player) per game in 2017-2018 NBA Play-Offs Games, which is the most of all time in NBA Play-Offs Games. Playing in NBA today, players have to run the floor, push the ball on offense, ability to play multiple positions at the offensive and defensive sides and the most important is shoot the ball well behind the three-point line.

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