



## **Finding a way to Basket:**

### **Effective spacing options in 3x3 Basketball**

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## Abstract

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<p>3x3 Basketball, a relatively new sport, has traditionally been viewed as a small sided game for 5x5 basketball. Created in 2010 and in 2017 made its way to an Olympic program, 3x3 basketball is still a unique and relative unknown sport. Despite its increasing popularity, there is still a lack of thorough research on 3x3 basketball, which has led to the emergence of this thesis topic. There are numerous unexplored areas within the realm of 3x3 basketball that are crucial for its ongoing development as a sport.</p> <p>The topic for this thesis was created to aid a Masters Programme thesis (Haaga-Helia Liikuntalan koulutus, liikunnanohjaaja YAMK), due to a fact that 3x3 basketball is a new sport and there has not been so many research done this thesis works as an analysis tool to create educational materials for 3x3 basketball coaching.</p> <p>The theoretical background of this work has focused on investigating the unique aspects of the sport, such as its rules and equipment, as well as the technical and physical requirements at various levels of the game. Clarifying the terminology and player roles has been crucial in helping the reader understand the research better.</p> <p>The purpose of this thesis is to examine the spacing options from the FIBA 3x3 World Tour 2022 final tournament and their effectiveness using video and statistics from the tournament games as a tool.</p> <p>Three of the best teams were chosen as target groups and five different spacing options were selected for this study. From those spacings the findings indicate that most effective spacing is Pusher, Shoulder, Corner but it was not the most used one and one of the target groups did not use this spacing even once. Most used spacing was Pusher, 45, Shoulder. Research findings align well with the statistics when compared, providing clear data with what spacings were the most effective for each team but in general as well.</p>
<b>Key words</b> 3x3 basketball, Effectiveness, Spacing

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## 1 Introduction

3x3 basketball is a new and quite unique game created. It has been its own sport for only 14 years and an Olympic sport for the past 7 years. There has not been many game analysis that gathers information from every aspect of the game. Due to the fact of the new sport, there is no full sport analysis done of 3x3 basketball, but the effective playing has been evaluated from physical and technical point of view. Tactical knowledge of 3x3 Basketball has been quite narrow in the past few years and 3x3 has been seen as a small sided game for a long time and as a tool for 5x5 basketball to teach certain technical & tactical demands of the sport of basketball. Most of the research done for 3x3 has been done as a small sided game research for 5x5 basketball.

Aim of this thesis is to open the game of 3x3 Basketball, what kind of differences there are compared to 5x5 basketball in rules, actual playing and to analyse the game of 3x3 basketball from efficiency point of view using video and statistics from Fiba World Tour 2022. The goal is to answer the following questions which kind of spacing options there is to use, how can they be effective and what is an effective offensive possession.

Currently 3x3 basketball is played all over the world. It has its own World Tour, World Championships all the way to regional divisions and junior divisions. It is still less supported game in many countries than 5x5 basketball, but the game is growing.

## 2 History of 3x3

The introduction of 3x3 as an official discipline occurred triumphantly in 2010 during the Youth Olympic Games in Singapore. Since then, it has flourished with the inception of annual city-based FIBA 3x3 World Tours and national-team FIBA 3x3 World & Continental Cups. On June 9th, 2017, 3x3 made its mark on the Olympic Program. First official Olympic games were played in Tokyo, Japan in 2021. Before that 3x3 has been seen as a small sided game for 5x5 basketball and as a tool to teach certain aspects of a game. (FIBA 2022)

The first World Cup was played in Rimini Italy in 2011 with the U18 category. The first ever adults World Cup was played in 2012 in Athens Greece. Between years 2012 to 2016 the tournament was played every two years and from 2016 to 2019 World Cup was played every year. Due to COVID-19 World Cup and many other tournaments were cancelled between years 2020 to 2021 but in late 2021 tournaments and competitions were played again and in 2022 the World Cup was played again. (FIBA 3x3 2023)

Since the year of 2012 the professional tour was launched (World Tour) where teams can earn prize money and represent cities. It contains regular season with certain number of Masters (tournaments) and Final. Teams qualify to the Final tournament-based on standings after regular season. (FIBA 3x3 2021)

### 3 Rules & Regulations

Basic rules of 5x5 basketball applies in 3x3 but some rules differ a bit from 5x5 basketball. In 3x3 basketball one game lasts a maximum of 10 minutes, or the game ends when any of the teams reach that 21-point mark. If there is a need for overtime the intermission between quarters is 1 minute and overtime is played until the first team has scored 2 points. This differs from 5x5 game where the game lasts 4x10minutes and if the game is tied after regular playing time, overtime is five-minute long quarter and those are played as many as needed until either team leads at the end of the quarter. (FIBA Basketball 2023) In both games game clock stops when referee whistles. After a basket clock will not stop in either game except in 5x5 the last 2 minutes of the 4<sup>th</sup> quarter the clock stops after every basket. (FIBA 3x3 2021)

Shot clock (offensive possession clock) in 3x3 is only 12 seconds, during that time offensive team needs to shoot the ball to the basket and if it hits the rim and offensive team gets the ball back (offensive rebound) the clock resets back 12 seconds. (FIBA 3x3 2021) In 5x5 shot clock is 24 seconds, and if after a shot offensive team gets an offensive rebound the clock resets to 14 seconds. Also, if a shot has been taken for example during the first five seconds of the offensive possession and same team gets the offensive rebound, clock also resets to 14 seconds, in these case offensive team will lose seconds from their offensive possession. (FIBA Basketball 2023)

Biggest difference between these sports comes from after a made basket. In 5x5 after a made basket, other team takes the ball outside of the baseline and passes it to a teammate who starts moving towards the other basket to play offense. In 3x3 after a made basket, opponent team takes the ball under the basket and starts playing offense, first they need to clear the two-point line before they can try for a scoring a basket. Shot clock starts immediately when the team touches the ball underneath the basket. (FIBA 3x3 2021)

#### 3.1 Rosters

The number of players allowed in 3x3 team is maximum of four, three players on the court and one substitute per team. Players are required a 3x3 license to play in any of the 3x3 events. (FIBA 3x3 2021) When in 5x5 teams are allowed to have maximum of 12 players on the team, five on the court and seven substitutes. Same goes to 5x5 but player cannot play both games with same license. (FIBA Basketball 2023)

### 3.2 Scoring

Scoring differs from 5x5 basketball. Inside the regular three-point line it is only one point when in 5x5 basketball it is 2 points and behind the three-point line it is two points when in 5x5 you get three points. During a free throw situation, it is only one shot for one point. (FIBA 3x3 2021) In 5x5 during free throw situation it player gets normally two free throws both for one point, unless it is a foul during a shooting situation and the player makes the basket, only one free throw is thrown. (FIBA Basketball 2023)

### 3.3 Fouls

Team fouls in one game is seven fouls for a team, after seventh foul every time a team commits a foul, opponent team will shoot one free throw. A player cannot foul out during a game because personal foul counts are kept on a team basis and not individually. (FIBA 3x3 2021) Compared to 5x5 basketball, in one quarter it is 5 team fouls and after the fifth foul, opponent team will shoot two free throws. Team fouls reset back to zero after every quarter, except overtime they will stay as they were when the fourth quarter ended. (FIBA Basketball 2023)

### 3.4 Court & Ball

Court is different from 5x5 basketball. In 3x3 basketball there is only half of the court in use (**Figure 1**). Lines of the court are the same as in normal basketball court except the end line on top is closer than 5x5 basketball courts half court line. All the measures of the court are the same otherwise, sidelines are 15 meters apart from each other and baseline is 15 meters long. Three point lines top (in 3x3 two point line) is 6,75 meters away from the baseline, circling around the court starting from baseline on the other side and ending on another side of the court on the baseline. Free throw line is 4,85meters wide and 5,8 meters from the baseline. (FIBA 3x3 2021)

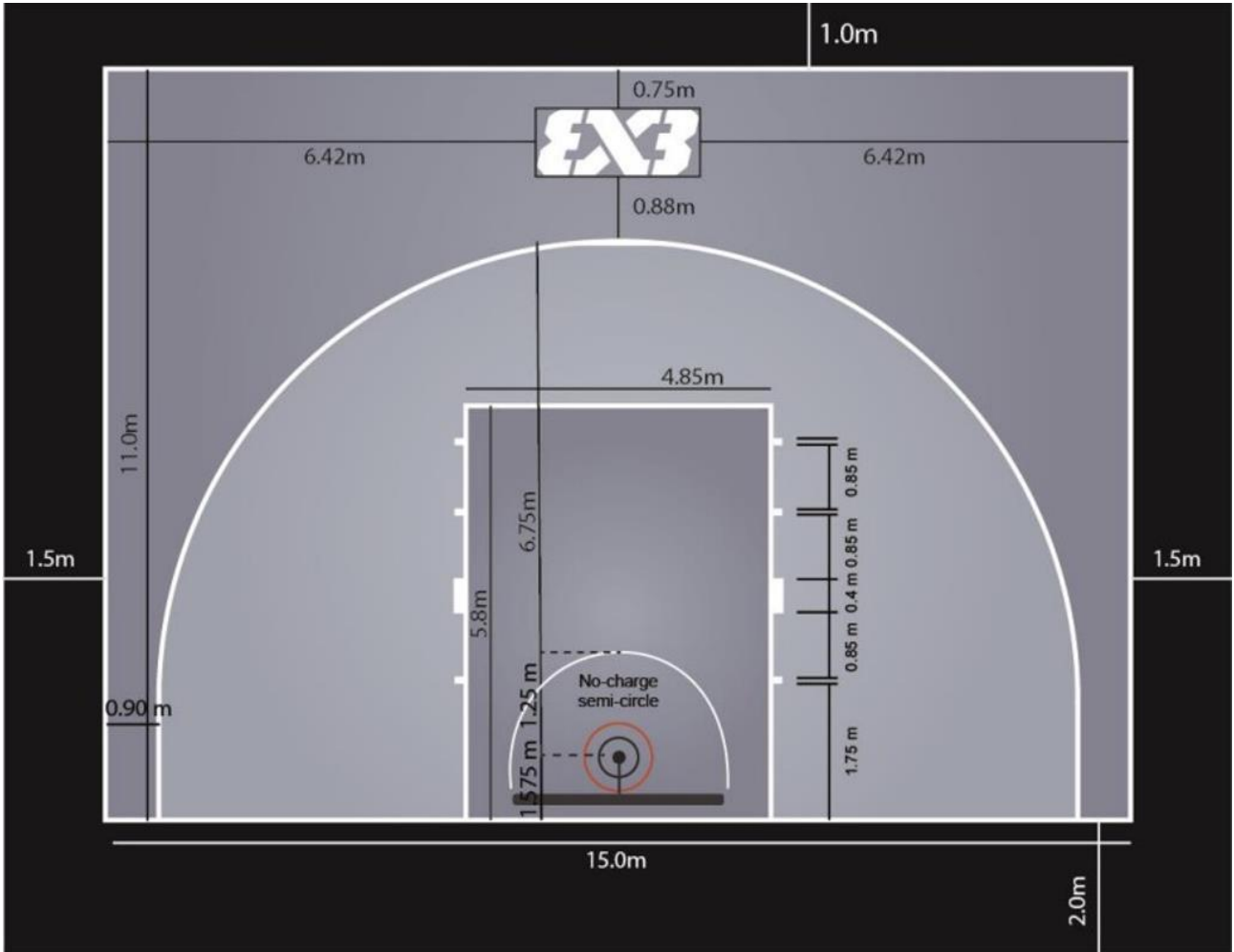


Figure 1. 3x3 Basketball court and measures (adaptive from (FIBA 3x3 2021))

The ball used in 3x3 is the same with both genders. The size of the ball is the normal women's game ball size (72.4 cm in circumference), but the weight is the men's ball weight (0.62 kg). The ball size and weight affect players playing because the game mode is so new, that adult players have not grown with this sport the same way they have in 5x5 basketball (FIBA 3x3 2021).



### **3.5 Vocabulary**

To understand the terminology in this analysis there is a need for basic vocabulary opening. There are lot more terms in basketball, but the list below are the terms used in this thesis;

#### **Pass**

When a person transfers the ball to another player in a short distance. (Di Matteo 2023)

#### **Layup**

Scoring technique used when going towards the basket. When you pick up the ball to your hands you can take 2 steps and jump and then you are required to shoot or pass the ball before you touch the ground again. (Di Matteo 2023)

#### **Drive**

Dribbling towards the basket with the mindset of trying to make a shot or a layup. (Di Matteo 2023)

#### **Steal**

When defensive player takes the ball away from offensive player, either from hand or intercepts a pass. (Di Matteo 2023)

#### **Turnover**

When offensive player is attempting to pass the ball to a teammate, but a defensive player intercepts the pass or when offensive player is driving towards the basket and defensive player steals the ball. (Di Matteo 2023)

#### **Shot**

Scoring tactic where ball releases from hand in a 75 degree angle. (Di Matteo 2023)

**Dead Ball**

Situation where the clock is stopped. This occurs after each successful field goal, free-throw attempt, after any official's whistle or if the ball goes out of bounds, then play is stopped. (Di Matteo 2023)

**Foul/Shooting foul**

Action made by a player that is against the rules but are not floor violations. They are penalized by a change in possession. If the violation of rules are done in a shooting situation it leads to a free throw opportunities. (Di Matteo 2023)

## 4 Special features

In 3x3 basketball there are a lot of differences compared to 5x5 basketball. Most people think that this is just streetball but that is not the case. The game is about a more physical and faster sport than normal basketball. Rules are the same but there are few special features that need to be considered. Contacts are harder and fouls are not called so easily which correlates straight to players needing to be stronger and have better control of their body in every situation on the court. (Dakaj 2023)

### 4.1 Physical Attributes

Physical attributes of a 3x3 player are a little more demanding than in 5x5 basketball. Players are required to be stronger in general to be able to play the sport at all. As mentioned earlier, contacts on the court are much harder and players can make contact to other players with much more power. Explosiveness of a player is another factor which can impact playing tremendously. On the court there is a lot more space where to move and if players can move explosive enough they always create something good for their team. The more explosive power they can provide on the court, they are more likely to be in command of the game and the ball. (Dakaj 2023)

Body control plays a huge role in 3x3 basketball. Contacts are harder so as mentioned above, players body control is weak, most likely he/she will not be effective on the court. The core and overall muscle balance is required to be successful on a 3x3 basketball court. (Bredt 2020)

In the 3x3 Small-Sided Games (SSG) research made by Sarah G. T. Bredt and others in Instituto de ciencias biológicas e da saúde universidade Federal de vicosa florestal Brazil about Physical and physiological demands of basketball small-sided games, the findings indicated experienced heightened physical demands due to defensive and time pressures, resulting in a greater variety of intense motor actions. Analysed game modes were 3vs3 Full Court (FULL), 3vs3 Half Court (HALF) and 3vs3 Reduced Shot Clock (RT). These results align with prior research, which observed increased exercise intensity, measured by time spent in various heart rate zones, when facing higher levels of opposition in 1vs1, 2vs2, 2vs1, and 3vs2 basketball SSG. While this study focused on athletes' physiological responses, the authors proposed that the elevated exercise intensity stemmed from heightened physical exertion to outmanoeuvred defenders in scenarios with increased opposition. This reasoning is supported by the increased frequency of feints observed in the 3vs3FULL, suggesting players needed to execute more manoeuvres to evade defenders and create scoring opportunities. Furthermore, the 3vs3RT elicited more frequent jumps,

transition sprints, and dribbles to the basket, alongside fewer defensive actions compared to the 3vs3HALF. These findings indicate that time pressure amplified rapid transitions, enabling offensive players to disrupt defenders' organized defense. Moreover, the increased number of jumps was likely attributed to more frequent ball possessions, driven by the shorter shot-clock in this SSG format. Consequently, the heightened frequency of ball possessions necessitated more shots on basket, thus requiring players to execute more jumps. (Bredt 2020)

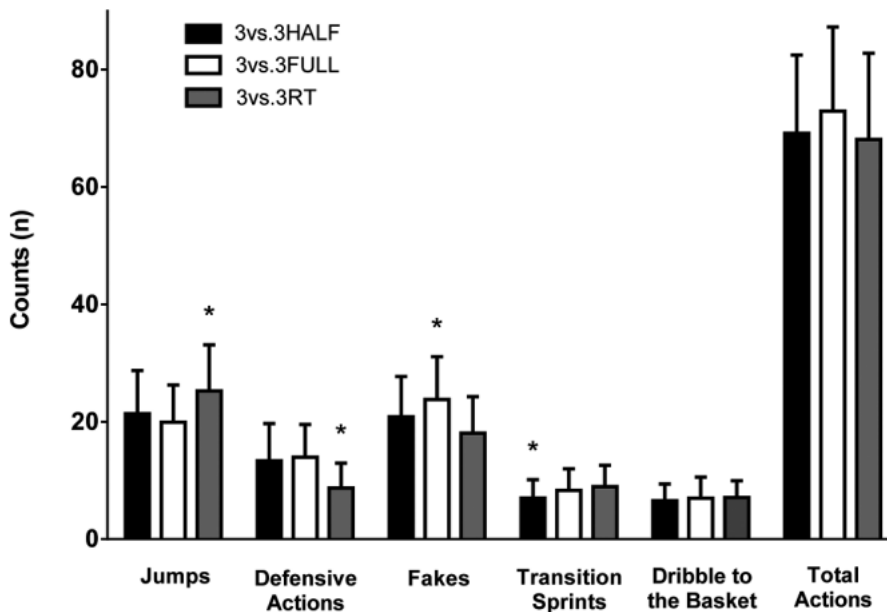


Figure 2. Motor skill count sheet (adaptive from (Bredt 2020))

## 4.2 Technical Attributes

The technical attributes of a player in 3x3 basketball are comparably vital to those of a traditional 5x5 player. While the fundamental structure of the game remains unchanged, superior ball-handling skills can significantly change the advantage towards one's team in terms of scoring. Moreover, decision-making becomes a great importance in this game format. The implementation of a shot clock difference from 5x5 player has smaller amount of time to react, leaving small room for error. Therefore, a deep understanding of the game becomes imperative. Given the accelerated pace of play in 3x3 basketball, excessive consideration on-court can quickly translate into lost opportunities or even crucial game outcomes. (Dakaj 2023)

Decision making is a big factor in basketball in general but in 3x3 basketball the decisions need to be made faster, since shot clock is shorter and game time is only 10minutes. One wrong decision might cost the basket in an offensive possession. (Dakaj 2023)

Finishing is a big skill to master on 3x3 basketball. As mentioned before, the contacts are harder, so players need to be able to control their bodies in mid-air and finish stronger to be able to even make baskets. (Figuera 2022)

With each player having more space to manoeuvre, the 3x3 game format could potentially encourage improved offensive spacing, leading to an increase in individual behaviours such as driving to the basket, and ultimately speeding up the pace of the game as players maintain possession more frequently. Previous research suggests that a larger playing area per player may hinder team cohesion while enhancing individual technical skills. (Figuera 2022)

In line with prior studies, there was a notable rise in the number of shots attempted in the 3x3 game format, consistent with the trend of increased shot attempts per player in smaller basketball formats. Notably, there was a significant increase in successful 6.75m (3-point shot) field goals made during 3x3 games. These findings align with previous research indicating that players tend to take more long-distance shots in 3x3 settings, potentially influenced by the unique scoring rules of the format. (Figuera 2022)

## 5 Player transitional Roles

Players need to be more aware of the situations than in a 5x5 game. Because the game is played in one basket only, every time when a player plays offense, they is a need to be ready to play defence immediately or otherwise opponents get a wide-open shot towards the basket. This requires the concept of tagging the closest player as soon as other team makes a basket or lose the ball. Ball is live right after the basket when the team playing defence touches the ball and the shot clock starts to move, so there is no time to set up the offense for a couple of seconds. Players are required to react immediately to space out and clear the ball outside the three-point line and start creating advantage. (Dakaj 2023)

### 5.1 Player Roles

In 5x5 basketball there are five main roles on the court: Point Guard, Shooting Guard, Small Forward & Center. Since in 3x3 basketball is played with three players on the court the role names are the same, but the players usually are more versatile with their roles. The game of basketball is evolving so need players as well, they're becoming stronger, faster, and more versatile, often defying traditional position descriptions. Many athletes now possess the ability to fulfil multiple roles on the team. In basketball, the concept of hybrid positions has emerged to accommodate these versatile players who can seamlessly transition between different roles on the court. Still every player has a unique role on the team and a team with a strong variation of player roles is the most likely to have better success during the games. (Under Armour 2021)

#### **Point Guard/Pusher/Playmaker**

Player in the team who starts the offense with the ball. He/she usually calls and runs the offense like a conductor and is the leader on the court. The primary responsibility of the point guard is to advance the ball up the court and initiate the team's offensive plays. This position demands a high level of expertise, particularly in passing and ball-handling skills. Serving as a direct conduit to the coach's strategy, the point guard must grasp and execute the team's game plan while remaining adaptable to the opposing defence's actions. Generally, the point guard is the shortest player on the court. Most point guards nowadays are more of a combo guards, a combination of point & shooting guard. (Under Armour 2021)

### **Shooting guard/Shooter**

The main objective of a shooting guard is to contribute points to the team. Revered as the team's top perimeter shooter, they must possess the ability to score using different techniques and excel in free throw shooting. Shooting guards are adept at ball handling and have decent passing skills. Often displaying strength and athleticism, they can penetrate the defence and score in the paint, while also exhibiting prowess in stealing the ball during defensive plays. Utilizing screens (opened in chapter spacing vocabulary) set by teammates, shooting guards are poised to take shots, distribute the ball, or make drives toward the basket. Typically, they are larger than point guards but smaller than small forwards in stature. (Under Armour 2021)

### **Small forward/Slasher/Wing**

This player is usually one of the more explosive and faster players of the team and creates advantages with his athletic skills to his/her team. The small forward holds the distinction of being the most adaptable and versatile player on the court, tasked with both scoring points and defending. They also serve as secondary rebounders behind the power forward and center positions. Small forwards are characterized by their aggressive and robust playstyle, possessing the height to operate effectively in the paint while also exhibiting finesse in ball handling and shooting. They must demonstrate proficiency in scoring from both the perimeter and inside the paint. Generally larger than shooting guards but smaller than power forwards, small forwards occupy a unique position on the team. (Under Armour 2021)

### **Power Forward/Wing**

Player who plays on the sides of the court at the start of offense. This player is not specifically a certain type of player, he/she can be for example shooter or a slasher or even an inside player. Most likely this player is explosive with his/her movements so he/she can create advantage with his athleticism. Known as the "enforcer," this player is essential for catching passes and converting shots near the basket. They excel as aggressive rebounders and shot blockers, utilizing their athletic quickness to navigate both offensive and defensive positions in the lane. Often positioned with their back to the basket, they are relied upon to score opportunistically in the paint, resembling centers in this aspect. However, they also boast a notable mid-range jumper. Taller than small

forwards yet smaller than centers, these players occupy a pivotal role on the court. (Under Armour 2021)

### **Center/Inside player/Post**

Player who is usually taller than everyone else on the team. This type of player plays closer to the basket and inside the three-point line. Usually towering over their teammates, centers are typically the tallest players on the team. Endowed with considerable strength and body mass, they excel in posting up offensively, adept at receiving the ball with their back to the basket and executing pivot moves to unleash an array of scoring options, including short jumpers, hook shots, bank shots, and powerful dunks. Renowned for their defensive prowess, centers are instrumental in protecting their own goal while also demonstrating high effectiveness in scoring. Moreover, they are responsible for securing rebounds and making precise passes to open teammates. (Under Armour 2021)

### **Combo guard**

A combination of Point Guard and Shooting Guard, A combo guard is adept at various facets of the game, capable of bringing the ball up the court, orchestrating plays, and distributing passes effectively. However, their versatility extends to scoring as well, as they possess the skills to excel in multiple scoring methods. Whether it's shooting from beyond the arc, driving to the basket with finesse, or knocking down mid-range jumpers, combo guards are a threat to score in diverse ways. (Under Armour 2021)

### **Point Forward**

Combination of a Guard and forward, the mix of length and strength of a forward combined with playmaking skills and explosiveness of a guard. A point forward combines the size and strength of a forward with the ball-handling and passing skills of a point guard. While primarily occupying the forward position, they possess the versatility to initiate the offense, bring the ball up the court, and create opportunities for their teammates akin to a point guard. In recent years, the concept of the point forward has gained traction as teams prioritize players who can seamlessly transition between multiple positions, thereby enhancing the versatility of their lineups. (Under Armour 2021)



## 6 Space & Time

In 3x3 basketball there is more space to use per player than in normal 5x5 basketball. Four people less on the court provides more opportunities to attack towards the basket and for the defence harder to provide help on the attacks. Lots of features are from 5x5 basketball in the spacings but need for improvisation is much more needed on the court of 3x3 basketball. (Erculj 2020)

Time is a lot different from 5x5 basketball. Game lasts only 10 minutes and the clock won't stop unless the referee whistles. So, games become more intense anyways because of this. (FIBA 3x3 2021)

### 6.1 Space

Most important thing is to create as much space as possible to have the possibility to drive towards the basket. Teams try to create small advantages from different types of actions and multiply that advantage immediately. In addition to different screening actions, cuts towards the basket are more effective than in normal 5x5 games. Difference from normal 5x5 is that there is only half court to use so transition playing and spacing changes a lot. (Ortega E. 2021)

In 3x3 basketball most of the shots are taken inside the 2point line (6,75 m), given the fewer defenders present, allowing more space for offensive players to drive and make close-range shots. This potentially leads to higher shot efficiency near the basket, as these shots typically demand less power and precision compared to long-distance attempts. Interestingly, female 3x3 basketball players demonstrate a higher success rate within this range compared to their 5v5 basketball counterparts, likely due to the increased opportunities for penetration and efficient scoring with fewer defenders. On the other hand, male 3x3 basketball players exhibit comparable performance to their 5v5 counterparts in this regard, influenced by the prevalence of scoring easier shots through fast breaks and early offensive plays in 5v5 basketball. (Erculj 2020)

1v1 playing is much more in use on 3x3 basketball, and players are required to attack their defender more actively so that teams can create some kind of advantage for a better shot. Most efficient teams use also different type of screen actions and handoff with the same idea of creating advantage for a good shot. (Erculj 2020)

### **6.1.1 Spacing vocabulary**

In this chapter the idea is to explain the context behind the different spacing places and the terminology of certain actions that can be made on the court. Terms introduced here are just short list of terms in basketball;

#### **Top**

Space on the top of the court. Usually referred on the middle of the court, outside 3point line and close to the half court line. (Di Matteo 2023)

#### **45/Wing**

Space on both sides of the court next to the top. (Di Matteo 2023)

#### **Shoulder/Elbow**

Both corners of the free throw line all the way to behind the three-point line. (Di Matteo 2023)

#### **Corner**

Both corners of the court next to the baseline. (Di Matteo 2023)

#### **Low & High post**

Low post is covered by both sides of the three second area around the block. High post is the area around the free throw line. (Di Matteo 2023)

#### **Screen/Off-ball screen**

Offensive player clears a path for another player by creating a stationary hold for a defensive player. (Di Matteo 2023)

**Ball screen**

Offensive player clears a path for a player with the ball by creating a stationary hold for a defensive player. (Di Matteo 2023)

**Handoff**

Player either dribbles towards another player and hands the ball off to the other player or another player cuts towards the ball handler and tries to get the ball from his/her teammates hands. Main idea is to give the ball from players hands to another instead of passing. (Di Matteo 2023)

**Cut/scoring cut**

When a player moves from point A to point B on court without the ball. Scoring cut is when a player is moving towards the basket without the ball with the intention getting the ball and to score. (Di Matteo 2023)

**Sealing**

Offensive player attempts to keep the defensive player behind his/her back and tries to create space or get the ball to his/her position. (Di Matteo 2023)

**Post Up**

Player trying to get open on the low or high post by sealing in front of the defence. (Di Matteo 2023)

**Weakside**

Side of the court where the ball is not handled. (Di Matteo 2023)

## Strong Side

Side of the court where the ball is. (Di Matteo 2023)

### 6.1.2 Different spacing options

There are a lot of different spacing options to use in a 3x3 basketball game. Basically, imagination and teams can try out a lot of different options. Underneath are listed of the most used ones so far on every level of 3x3 basketball;

#### Pusher, shoulder, shoulder

One of the most common starting floor spacing in 3x3 basketball. This spacing is known as Horns. Most of the teams are starting the offense from this positioning where a team has a pusher on top and two other players on the shoulders. From this spacing teams can create good scoring cut opportunities towards the basket after a pass. Lot of different types of actions can be used from horns, pass and off ball screen to other shoulder, pass and flare screen to pusher, immediate ball screen to pusher and off ball screen to ball screener immediately after.

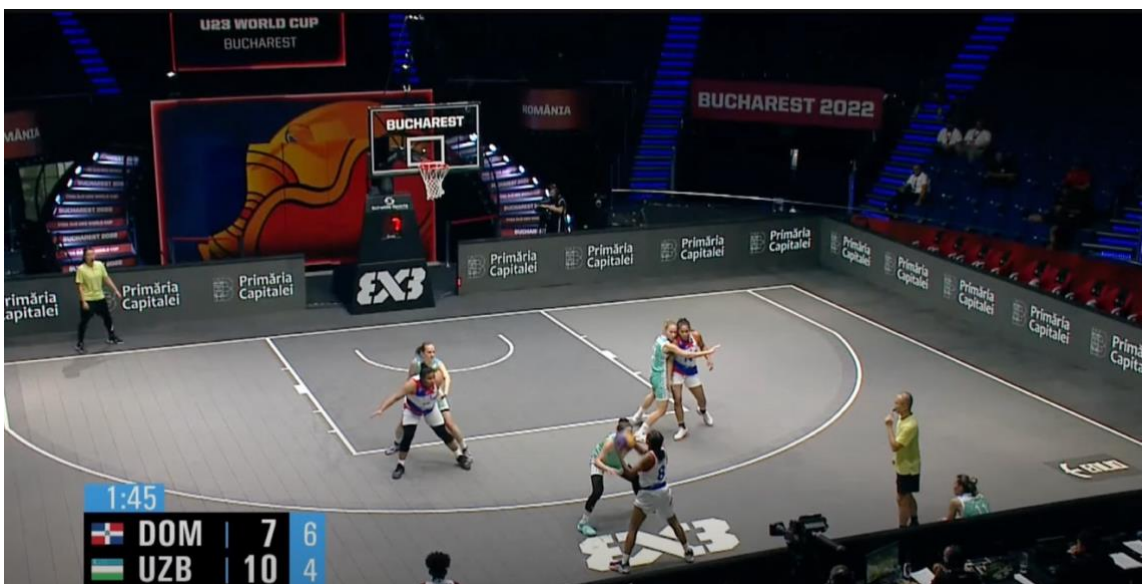


Figure 3. Horns spacing (Pusher, shoulder, shoulder) (adaptive from (FIBA 3x3 2022))

### Pusher, 45, 45

Another quite common floor spacing to start from. Pusher on top and two other players on both sides at the 45. Usually if a team has a good 1v1 player they can space out like this and allow the player to play from the top or pass to the 45 and play 1v1 from there. Most of the time in this spacing after a pass player cuts to the basket and can post up or immediately go set an off ball screen to the third player on the court on the other 45 position.



Figure 4. Pusher, 45, 45 spacing (adaptive from (FIBA 3x3 2022))

### Pusher, Shoulder, Corner

Floor spacing which is becoming more common while the game is evolving forward. From this spacing the usual start is a pass to the person on the shoulder and from that two most common actions are handoff from top and at the same time scoring cut from the corner. Other common option is go set an off ball screen to the player on the corner and corner player after using the screen cuts towards the basket or the screener slips (never sets the screen and goes to the basket) to basket and same time to the another player a handoff ball screen (gives the ball to the player coming from the corner and sets a ball screen at the same time) at the 45.



Figure 5. Pusher, Shoulder Corner spacing (adaptive from (FIBA 3x3 2022))

### Pusher, 45, Low Post

Floor spacing to use when a team has a strong inside player. Start of the spacing ball is passed from top to 45 and from there to low post. After the pass player from 45 either cuts towards the basket or sets a screen to the player on the top. Especially the screen action allows the paint to be open to play 1v1 closer to the basket and at the same time create space for a possible pass outside for a shot.



Figure 6. Pusher, 45, Low post spacing (adaptive from (FIBA 3x3 2022))

## Pusher, 45, Shoulder

Floor spacing to use when a team does not have a clear inside player. From this spacing teams are trying to create space for a good shooter or to a fast and explosive player. If the pusher is the good shooter or fast player, he usually opens the offense to 45 and the shoulder player tries to open him/her up with an off ball screen towards the opposite 45 and if the good shooter is on the 45 then the same action happens with a start pass to the shoulder.



Figure 7. Pusher, 45, Shoulder spacing (adaptive from (FIBA 3x3 2022))

## 6.2 Time

Time usage becomes a big factor in the game of 3x3. The rules forces players to be more active with shot selection. Shot clock on offense is only 12 seconds, so the time is limited. Even a second too long thinking might cost the team a good scoring opportunity. Decision making needs to be on a high level where to pass or attack all the time. If the team getting the possession after the basket dribbles the ball outside there is a huge possibility for rushing effect to run the offense and creating an advantage, compared to a quick pass outside the three point line when a team has 2 to 3 seconds more time to run different actions as a team and also for defence to be late to get an open scoring chance. (Figuera 2022)

Most teams try to create advantage as a team for an individual player on the court and if they are unsuccessful a player with the ball tries to create it by themselves without any advantage before.

This might create the effect of rushing on the court while performing actions and lead to poor shot attempts and those teams usually are struggling against their opponents on the court unless they have a player or players that are talented enough for shot creation that they can make tough shots against the defence. Team with the best amount of decision-making skill and technique most likely will be the most effective on the court. (Erculj 2020)

### **6.3 Effective Playing**

Every dead ball situation starts from the top and usually with a pass to either shoulder or to 45. After the pass there are multiple options where to choose; either a scoring cut towards a basket, cut to give space, off ball screen which usually leads to ball screen, ball screen or straight 1 versus 1 situation. Most of the effective playing happens on top of key playing 1 versus 1 after an advantage has been created or the ball stays on top and the player there tries to find a scoring pass for a cutter towards the basket. (Dakaj 2023)

If none of the actions have created an advantage it becomes a 1v1 situation and most likely the ball is on the top where the player tries to create a scoring chance out of nothing. The most common place on the court to play 1v1 is the wing (45/55) or top. Teams try to create advantage before catching the ball to either wing to attack towards the basket. Usually, it is planned to get the ball to best slasher on the team in these situations. (Dakaj 2023)

Corners of the court are not used fully on offense, when it is a dead ball situation one player might start from the corner but for the rest of the offense corners are most of the time empty. The shotclock is a factor that influences this a lot. Players need to cut corners with the movements on the court to create space faster. Most of the time from corners the shot is wide open, and it might create more space for the end of shot clock 1v1 if player/s move to the corners and are ready to shoot if they get the ball. On the court there is lot more space in use for effective playing due to the fact that there are less players on the court and help defence is almost non-existent. (Dakaj 2023)



## 7 Aim & Research Questions

The goal of this research is to analyse the effective playing through different spacing options of the teams in FIBA World Tour 2022 tournament based on the statistics and video provided by the 3x3 world tour organisation. Aim is to answer to questions:

- (1) what kind of spacings they have used and were they effective?
- (2) how to make the data relatable with every team?
- (3) what is considered a successful attempt?

Three of the best teams were chosen for this study: UB (SRB), Antwerp (BEL) & Liman (SRB) from the whole World Tour 2022 statistics (**appendix 1**) and analysis is done from their games played in the final tournament in Abu Dhabi December 10<sup>th</sup> to 11<sup>th</sup> 2022.

Start of the analysis first there was a need to pick up five different starting spacing options, which required background search from every level of 3x3. The chosen five were: 1 pusher, shoulder, shoulder (Horns), 2 Pusher, 45, 45, 3 Pusher, Shoulder, Corner, 4 Pusher, 45 Low Post and 5 Pusher 45, Shoulder.

After the selection of the spacings were done, next point of interest was how to make the efficiency data relatable with every team, so the efficiency analysis was narrowed to dead ball situations (clock is stopped when the game starts/continues). In dead ball situations the ball always starts at the top from the 3x3 Logo (visible in **Figure 1**). From those situations it was visible to see the starting spacing of the offense.

Last area of the authors interest was what is a successful attempt, it had to be made simple and narrow successful attempt to a situation what lead to a basket or a shooting foul. Unsuccessful attempts lead to a missed shot or a turnover. Effectiveness of the actions were analysed through video provided by Fiba 3x3 World Tour in their Youtube channel.

## 8 Research Methods

Research methods that were used were video analysis from video provided by Fiba 3x3 World Tour on their Youtube channel free for everyone to watch and statistical analysis from the statistics provided by the Fiba 3x3 World Tour organisation. Idea was to watch every game from the target teams and mark down the spacings they used on paper. After every game was watched count the numbers together and count percentages. After the numbers were counted compare them to statistics and how well they supported the results. In stats there were all the shots and turnover marked from every situation, so it is not 100% accurate to compare but it gives a good insight and support for this analysis.

Every team had at least two games during the final tournament and all of them were filmed by Fiba 3x3 to their Youtube channel. This does not give enough valuable data for every team, but it shows the effectiveness of teams and how successful they were with their actions to score a basket.

### 8.1 UB (SRB)

UB was ranked 1<sup>st</sup> before the final tournament, and they also had played the most games. UB won the tournament. Reason for their winning could have been analysed multiple different ways but from the efficiency point of view they were the most effective with their offensive attempts from the three teams selected. As a team UB averaged 21.2 points per game (ppg), 80 % for their 1 point shot (1pt) 49/61, 41 % for their 2-point shots (2pt) 20/49, 17/23 Free Throws (FT) with 74 % accuracy and 5.6 turnovers per game (topg) (Abu Dhabi Final: Stats 2024)

The players who played for UB during the whole 2022 World Tour, from these five players the four players who played in the final tournament are: Nemanja Barac, Marko Brankovic, Dejan Majstrovic & Strahinja Stojacic. The fifth player Jianghe Chen did not make the final tournament roster. Every player individual statistics are visible in **Appendix 2**.

Table 1 UB Spacing efficiency

Spacing option	Attempts	Made	Shooting fouls	Percentage
Pusher, Shoulder Shoulder	14	7	2	64%
Pusher, 45, 45	2	0	0	0%
Pusher Shoulder, Corner	0	0	0	0%
Pusher, 45, Low post	1	1	0	100%
Pusher, 45, Shoulder	26	12	2	53%
<b>Total</b>	43	20	4	53%

Success percentage of 53 is a good percentage, over half of the attempts lead to basket. UB had most success with the Pusher, Shoulder, Shoulder with a 64 percentage but their most used spacing was Pusher, 45, Shoulder and success percentage of 53.

## 8.2 Antwerp (BEL)

Antwerp was ranked 2<sup>nd</sup> in the tour after UB. They had a good tour and played the second most games right behind UB. On the final tournament they fell short on the semifinals and lost the tournament there. Final standing in the tournament was 4<sup>th</sup> place. They were still quite effective on their offense at dead ball situations, and they were able to provide lot of good scoring chances. As team Antwerp averaged 19.3ppg, 37/61 1pt shots (61 %), 11/34 2pt shots (32 %) 18/21 FT (86 %), 3.3topg (Abu Dhabi Final: Stats 2024)

In Antwerp there was in total during the season six players who played for the team but in the final tournament these four players were in the roster; Nick Celis, Bryan De Valck, Dennis Donkor & Thibaut Vervoort. The other two players were Caspar Augustijnen & Rafael Bogaerts.

Table 2. Antwerp spacing efficiency

Spacing option	Attempts	Made	Shooting Foul	Percentage
Pusher, Shoulder Shoulder	8	3	1	50%
Pusher, 45, 45	3	2	0	67%
Pusher, Shoulder, Corner	6	3	0	50%
Pusher, 45, Low post	1	1	0	100%
Pusher, 45, Shoulder	18	8	0	44%
<b>Total</b>	36	17	1	50%

From the data is visible that Antwerps success rate with actions is 50 %, half of the possessions lead to basket and other half to a missed shot or turnover. In total this percentage is decent but would need to be better. Most used spacing for them was Pusher, 45, Shoulder with 18 attempts and 8 times they made a basket (44 %). Most successful spacing option was Pusher, 45, 45 with 67% success but they only used it 3 times and made 2 baskets from it. Pusher, shoulder, shoulder was the second used option with 8 attempts and in total 4 of those lead to a successful attempt (50%). Pusher, Shoulder, Corner had a success percentage of 50 as well but they used this spacing only 6 times and made 3 baskets out of it.

### 8.3 Liman (SRB)

Liman was ranked 3<sup>rd</sup> before the final tournament and in the final tournament they lost the first two games and was dropped out of the tournament ending in the 12<sup>th</sup> place which was last place in the tournament. Lot of things was left to consideration, what could have they done better. One of things is their effectiveness on the offense. In a dead ball situation lot of times, it showed that they were not organised, and they just had to throw something up and the statistics support this. As a team they averaged 14ppg, 13/22 1pt shots (59 %), 4/25 2pt shots (16 %), 7/12 FT (58 %) & 5.5topg. (Abu Dhabi Final: Stats 2024)

In Liman's roster there were five players playing for them during the 2022 World Tour. The four players selected to the final tournament were; Stefan Kojic, Miroslav Pasajlic, Aleksandar Ratkov & Mihailo Vasic. Fifth player who were left out of the roster was Nebojsa Kilijan. Player statistics are visible in **appendix 4**.

Table 3. Liman spacing efficiency

Spacing option	Attempts	Made	Shooting Foul	Percentage
Pusher, Shoulder, Shoulder	8	2	0	25%
Pusher, 45, 45	0	0	0	0%
Pusher, Shoulder, Corner	5	3	1	80%
Pusher, 45, Low post	2	0	0	0%
Pusher, 45, Shoulder	4	0	0	0%
<b>Total</b>	19	5	1	32%

Liman was not able to capitalize from their offensive possessions effectively with their actions and their tournament ended after two games. Only 19 attempts in 2 games are quite a small number of attempts especially when they only were able to get 6 successful attempts. Most used spacing option was Pusher, Shoulder, shoulder with 8 attempts but only 2 were successful (25 %). From Pusher, shoulder, corner spacing they were the most successful, but they only used it 5 times and with those 5 attempts they made 3 baskets and one led to a shooting foul (80 %).

## 9 Results

In conclusion of the analysis, UB had the most attempts in the tournament but were also the most effective from the attempts. Their tactical playing style worked out the best and is one of the reasons why they won the tournament and the whole World Tour in 2022. UB's shooting percentages can be seen from the statistics (**Appendix 2**) and they are way above average around the court. Shooting chart is not visible but the percentages support the fact that their spacing options were quite well executed. UB used mostly two different spacing models: Pusher, shoulder, shoulder & Pusher, 45, shoulder and with both spacings they were able to make a basket or a shooting foul over 50 % of the time. They were the best organised team in the tournament and knew how to create an advantage from the situations during the game.

From statistics we can see that as a team UB shot the ball well with 49/61 1pt shots (80 %), 20/49 2pt shots (41 %) & 17/23 FT (74 %) (**Appendix 2**). Compared to two other teams they had the most shots in the whole tournament. Their best player was Strahinja Stojacic with a 6.6ppg, 19/23 1pt (83 %), 3/14 2pt (21 %), 8/14 FT (57 %), 1.6 topg stat line. He also took the most shots from the team, but everyone else took almost the same amount of shots and they made over 50% of their shots in total. This shows that good spacing & time usage concludes to good shot selection and there for with better percentage of making a basket.

Antwerp was able to be effective in the tournament but were not effective enough to win the tournament. They mostly used two different spacing starts Pusher, shoulder, shoulder & pusher, 45, shoulder but from the results we can see pusher, 45, shoulder was not the best spacing option for them when they were only able to make a basket 8 times from 18 attempts (44 %). They could have used a spacing that were more effective for example Pusher, Shoulder, Corner which they used only 6 times but made 3 baskets out of it (50 %) or Pusher, 45, 45 which they used 3 times and made 2 baskets out of it (67 %).

Shooting percentages for the whole team were average on the tournament and statistics support the spacing usage success quite well. 1point shot percentage 61 % and 2point percentage 31 % are good enough percentages to win games, but some of the shots selected were not the best, leading to a unsuccessful attempt for a basket. Antwerp's best player from statistic point of view was Dennis Donkor with a 6.3ppg, 6/12 1pt (50 %), 5/15 2pt (33%), 9/9 FT (100 %), 0.8topg stat line but the most shots were taken by Nick Celis with 31 in game shots + 6 free throws with shooting percentages of 56% 1-point shots, 50% 2 point shots & 67% Free throws. As we can see Dennis shot quite low percentage of 2point shots when Nick Celis shot well above average percentage. Usage of both players were successful, but Dennis could shoot the ball less behind the 2-point line. (**Appendix 3**).

From Liman's spacing usage is visible that they were not effective. All the spacings used for them were not successful. Most of their starting spacings were wrong spacing selections. Only 19 attempts in 2 games are quite a small number of attempts especially when they only were able to get only 6 successful attempts. From Pusher, shoulder, corner spacing they were the most successful, but they only used it five times and with those five attempts they made three baskets and one led to a shooting foul. This spacing were their most successful one and they should have used it more during the tournament.

Their shooting percentages were poor as well as a team, 1pt shots (59 %), 2pt shots (16 %) and 7/12 FT (58 %). Statistical point of view their best player was Miroslav Vasic with a 4.5ppg, 5/10 1pt (50%), ½ 2pt (50 %), 2/2 FT (100 %) and 2.0topg statistical line but he did not take the most shots in a team. Collectively the whole team shot poorly behind the 2point line, only 16 %, this percentage is not close to good. Average team makes close to 30 % of their shots.

Table 4. Total spacing efficiency

Spacing	Attempt	Made	Shooting foul	Percentage
Pusher, shoulder, shoulder	30	12	3	50%
Pusher, 45, 45	10	2	0	20%
Pusher, Shoulder, Corner	11	6	1	63%
Pusher, 45, Low post	6	2	0	33%
Pusher, 45, Shoulder	48	20	2	45%
<b>Total</b>	105	42	6	45%

In total there were 105 attempts from the three teams with these five spacing options and 48 of them led to a successful attempt. Overall the percentage of 45 success is decent, but not good. If teams want even better effectiveness, the percentage should over 50 %. Liman's ineffectiveness, lowers the percentages a little, but they also had the lowest amount of attempts during the final tournament.

From the spacings selected for this research the most used spacing was Pusher, 45, Shoulder with 48 attempts and 22 times it led to a successful attempt (45 %). Success rate is close to decent but overall, the most popular one with the three teams selected for the research. UB used it the most on their team. The most successful spacing was Pusher, Shoulder Corner with 11 attempts and 7 successful ones (63 %). From the three teams UB did not use this spacing even once.

There are lot of spacing options where to choose from, and only 5 spacings were chosen for this research but the fact that who can use the space and time the most effectively is the key element in this sport. 3x3 Basketball is a fast tempo game and how teams use their space and time on offense is important part of their effectiveness. UB were the best in capitalising their attempts and there for, won the tournament.



## 10 Conclusion

The game of 3x3 basketball is still relatively new. It has been an Olympic sport since 2017 and first introduced in 2010 as its own sport. There was need for research for special features in 3x3 basketball due to the fact that there has not been quite much research done from 3x3 basketball specifically. Aim of the analysis was to open different spacing options and to see which ones are the most effective.

During theoretical background research there came an issue of lack of resources. The newness of the sport challenged the process and there for reduces credibility of the research. But from the resources available the author was able to find the important information needed. Spacing and time usage have not been analysed from 3x3 point of view but from 5x5 small sided game point of view. In theory we are talking about the same thing but practically speaking this changes the analysis to certain level.

This research was done only from dead ball situations, which narrows the data quite much. In a 3x3 game there are quite many dead ball situations, there are more situations played back-to-back which makes the start of offense from under the basket and the spacing and time usage totally different compared to for example 5x5 basketball where you start playing offense on a different basket then the opponent.

The whole research progress in total was successful. Aim was to analyse spacing usage and answer the following questions:

- (1) what kind of actions they have used and were they effective?
- (2) how to make the data relatable with every team?
- (3) what is considered a successful attempt?

The most used spacings that were used were: 1 pusher, shoulder, shoulder (Horns), 2 Pusher, 45, 45, 3 Pusher, Shoulder, Corner, 4 Pusher, 45 Low Post and 5 Pusher 45, Shoulder. From these five the most used one was Pusher, 45, Shoulder with 48 attempts and 22 were successful ones, effectiveness percentage of 45 %. Second most used was Pusher, shoulder, shoulder with 30 attempts and 15 were successful with a effectiveness percentage of 50 %. Third used was Pusher, shoulder corner with 11 attempts and 7 were successful, percentage of 63 %. Fourth was Pusher, 45, 45 with 10 attempts, 2 of them were successful so 20 % effectiveness. The less used was Pusher, 45, Low post with 6 attempts, from those 2 were successful (20 % effectiveness).

The data was made relatable with every team by narrowing it down to only dead ball situations. Every team had different amount of dead ball situations and in one game there is no guaranteed that a team have as many dead ball situations as the other team. Also, there is no guaranteed that a team gets any dead ball situations in one game.

A successful attempt for a team was a made basket or the situation led to a shooting foul. This was the easiest question to answer, because the game is about making baskets and best possible outcome of an offensive possession is a basket. If the situation led to a shooting foul, this gave the team an opportunity to score points from the free throw line and this was only marked as a successful one if the player made the free throw.

In conclusion the most effective spacing was Pusher, Shoulder, Corner with a 63 % success. The number of attempts with this spacing was lower than the two most used spacings.

This research provided valuable data for future research. This data can be used to analyse offensive effectiveness even further, observe the offensive screen usage and analysing the offense after a steal. In this the analysis limited only for the starting spacing and the end result from it, not what happened during the offensive possession. Another option is to analyse the offensive effectiveness from live situations (after a basket is made by opponent), how fast the offensive team was able to clear the ball outside of the two-point line and what kind of spacing was created during the situation. As mentioned earlier there has not been so much research done from 3x3 basketball perspective, but from small sided game for 5x5 basketball has been done many. Still many sees 3x3 as a tool for teaching certain aspects of the game of basketball and that is correct. Still, it is its own sport nowadays and an Olympic sport as well. So, more research is going to be done only from 3x3.

This research can be used in action as a tool to analyse a team's spacing effectiveness. Coaches can get clear data of how well the actions inside of the spacing are used and what adjustments needs to be done to get the effectiveness percentage higher. This analysing tool can be used to any spacing that the coach provides even if its outside of these five selected for this research.

Game of 3x3 basketball is evolving all the time and for example in 5x5 basketball teams are shooting more three-point shots than compared to ten years ago. In 3x3 basketball players are attacking the basket more but it is possible that the same trend is coming to 3x3 at some point as well.

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# Appendices

## Appendix 1. FIBA 3x3 World Tour 2022 Statistics

Team	GP	W	L	W%	PTS	PPG	REB	STL	BLK	SA	SHAL	SALPG	HDR	HOLPG	1PTM	1PTA	1PT%	2PTM	2PTA	2PT%	FTM	FTA	FT%	FTAS	KAS	DRV	DR%	DRK	DR%	DRB	DR%	REBPG	OREB	OREB%	TO	TOPG	PAPG	TY	TPPG	TA	TRAPG	POSGP	ZPTA/RGA
Abu Dhabi	41	34	7	83%	829	20.2	29	0.69	572.0	14.0	373	9.1	368	521	71%	165	505	33%	131	170	77%	57	172	33%	145	30	25	1	615	15.0	178	437	190	4.6	15.7	267	6.5	301	7.3	32.4	0.45		
Antwerp	33	19	14	58%	602	18.2	10	0.60	361.2	10.9	322	9.8	302	516	59%	115	383	30%	70	101	69%	31	153	20%	21	42	4	497	15.1	165	332	146	4.4	17.0	250	7.6	229	6.9	33.8	0.43			
Liman	31	10	21	32%	586	18.9	13	0.64	375.0	12.1	246	7.9	292	414	71%	109	389	28%	76	117	65%	43	121	37%	4	22	2	462	14.9	152	310	140	4.5	17.3	223	7.2	237	7.6	32.8	0.48			
Vienna	29	21	8	72%	560	19.3	18	0.65	364.0	12.6	200	6.9	204	304	67%	140	450	31%	76	106	72%	35	67	52%	109	4	19	1	388	13.4	144	244	96	3.3	14.9	177	6.1	203	7.0	31.8	0.60		
Riga	27	21	6	78%	534	19.8	17	0.62	331.1	12.3	198	7.3	230	364	63%	113	386	29%	78	111	70%	32	93	34%	4	16	1	462	17.1	152	310	100	3.7	16.0	181	6.7	196	7.3	34.4	0.51			
Amsterdam	27	19	8	70%	495	18.3	11	0.60	297.0	11.0	199	7.4	255	409	62%	101	353	29%	38	69	55%	26	107	24%	7	11	2	427	15.8	128	299	105	3.9	16.0	177	6.6	186	6.9	33.7	0.46			
Sekai	24	14	10	58%	454	18.9	10	0.63	286.0	11.9	181	7.5	210	328	64%	93	290	32%	58	97	60%	35	82	38%	18	20	3	361	15.0	121	240	123	5.1	17.8	163	6.8	183	7.6	33.5	0.47			
Ulaanbaatar	22	10	12	45%	392	17.8	9	0.61	239.1	10.9	131	6.0	211	370	57%	71	216	33%	39	54	72%	15	62	24%	2	12	1	312	14.2	113	199	100	4.5	18.2	139	6.3	140	6.4	33.0	0.37			
Princeton	16	9	7	56%	311	19.4	6	0.65	202.2	12.6	124	7.8	159	270	59%	54	149	36%	44	57	77%	16	42	38%	3	14	0	215	13.4	62	153	81	5.1	17.8	108	6.8	109	6.8	33.8	0.36			
Lusanne	16	7	9	44%	274	17.1	6	0.58	158.9	9.9	125	7.8	119	202	59%	58	210	28%	39	58	67%	16	59	38%	7	20	1	222	13.9	80	142	71	4.4	17.8	101	6.9	110	6.9	32.8	0.51			
Omaha	14	7	7	50%	251	17.9	6	0.59	148.1	10.6	106	7.6	111	188	59%	51	189	27%	38	51	75%	16	40	35%	6	4	1	194	13.9	58	136	60	4.3	17.8	92	6.6	97	6.9	33.7	0.50			
Utrecht	14	8	6	57%	228	16.3	4	0.54	123.1	8.8	123	8.8	133	242	55%	37	148	25%	21	35	60%	8	25	36%	15	25	2	234	16.7	73	161	67	4.8	17.4	74	5.3	94	6.0	34.6	0.38			
Jeddah	13	3	10	23%	213	16.4	1	0.61	129.9	10.0	102	7.8	114	197	58%	39	123	32%	21	27	78%	5	35	14%	4	8	1	170	13.1	42	128	68	5.2	19.2	93	7.2	72	5.5	31.5	0.38			
Bulgaria	10	5	5	50%	174	17.4	3	0.58	105.9	10.1	115	11.5	94	152	62%	34	124	27%	12	26	46%	8	39	31%	18	26	1	166	16.6	54	112	58	5.8	17.1	77	7.7	70	7.0	35.2	0.45			
Paris	8	4	4	50%	143	17.9	1	0.58	82.9	10.4	65	8.1	57	103	55%	34	120	28%	18	25	72%	8	21	24%	5	12	2	112	14.0	42	70	51	6.4	18.6	59	7.4	55	6.9	36.4	0.54			
Marijampole	8	2	6	25%	141	17.6	0	0.52	73.3	9.2	59	7.4	66	111	59%	22	118	19%	31	43	72%	17	30	19%	4	5	1	138	17.3	41	97	48	6.0	19.1	59	7.4	66	8.3	37.9	0.52			
Cebu	9	1	8	11%	128	14.2	1	0.49	62.7	7.0	56	6.2	72	120	60%	21	113	19%	14	30	47%	7	27	16%	5	7	1	132	14.7	43	89	50	5.6	19.1	64	7.1	61	6.8	34.0	0.48			
Beijing	6	4	2	67%	118	19.7	3	0.66	77.9	13.6	57	9.5	57	92	62%	24	70	34%	13	16	81%	5	27	15%	1	12	2	93	15.5	28	65	43	7.2	18.7	44	7.1	39	6.5	36.0	0.43			
Warsaw	7	2	5	29%	109	15.6	1	0.53	57.8	8.3	36	5.1	37	72	51%	28	113	25%	16	21	76%	8	16	12%	2	6	0	103	14.7	32	71	41	5.9	18.1	57	8.1	51	7.3	34.1	0.61			
Doha	7	1	6	14%	95	13.6	0	0.53	50.4	7.1	40	5.7	46	85	54%	20	80	25%	9	15	60%	1	14	19%	3	4	0	88	12.6	24	64	39	4.7	20.1	50	7.1	35	5.0	30.3	0.48			
Sanaa	6	2	4	33%	91	15.2	2	0.49	44.6	7.4	37	4.5	43	80	54%	16	80	20%	16	24	67%	7	9	14%	0	4	0	78	13.0	27	51	22	3.7	19.2	42	7.0	41	6.8	33.2	0.50			
Ulsanmilya	5	1	4	20%	85	17.0	1	0.61	51.8	10.4	36	7.2	45	79	57%	17	49	35%	6	11	55%	4	13	22%	0	1	0	51	10.2	15	36	18	3.6	20.2	40	8.0	30	6.0	30.6	0.38			
Washington DC	4	2	2	50%	77	19.3	1	0.59	45.4	11.4	28	7.0	31	64	48%	13	48	31%	16	18	89%	6	7	15%	4	2	0	55	13.8	17	38	12	3.0	18.5	27	6.8	30	7.1	34.0	0.43			
NY Harlem	4	2	2	50%	73	18.3	2	0.64	46.7	11.7	30	7.5	35	64	55%	15	41	37%	8	9	89%	2	13	13%	1	2	1	54	13.5	22	32	17	4.3	19.3	21	5.3	26	6.5	32.3	0.39			
San Juan	5	1	4	20%	69	13.8	1	0.52	35.9	7.2	33	6.6	49	85	58%	6	35	17%	8	12	67%	3	11	16%	1	5	0	74	14.8	24	50	35	7.0	19.4	45	9.0	34	6.8	32.8	0.29			
Taipei	4	2	2	50%	68	17.0	1	0.54	36.7	9.2	34	8.5	34	63	54%	12	44	27%	10	18	56%	6	17	12%	4	1	0	50	12.5	16	34	17	4.3	18.5	29	7.3	29	7.3	34.0	0.41			
Melbourne	4	2	2	50%	68	17.0	1	0.54	36.7	9.2	34	8.5	34	63	54%	12	44	27%	10	18	56%	6	17	12%	4	1	0	50	12.5	16	34	17	4.3	18.5	29	7.3	29	7.3	34.0	0.41			
Lublin	4	0	4	0%	67	16.8	0	0.57	38.2	9.6	32	8.0	42	56	75%	8	48	17%	9	13	69%	5	9	13%	3	0	0	37	14.3	20	37	27	6.8	21.5	33	8.3	29	7.3	34.8	0.46			
Saitama	3	1	2	33%	51	17.0	1	0.62	31.6	10.5	15	5.0	20	36	56%	13	41	33%	5	5	100%	2	7	0%	1	0	0	43	14.3	12	31	13	4.3	19.3	22	7.3	22	7.3	31.0	0.53			
Hamburg	3	1	2	33%	51	17.0	1	0.62	31.6	10.5	15	5.0	20	36	56%	13	41	33%	5	5	100%	2	7	0%	1	0	0	43	14.3	12	31	13	4.3	19.3	22	7.3	22	7.3	31.0	0.53			
Manila	3	1	2	33%	48	16.0	1	0.67	32.2	10.7	29	9.7	27	40	68%	8	26	31%	5	6	83%	2	14	9%	3	2	1	34	11.3	12	22	19	6.3	20.7	17	5.3	16	5.3	29.7	0.39			
Erlangen	3	1	2	33%	45	15.0	1	0.52	17.4	7.8	18	6.0	23	49	47%	5	24	21%	12	14	86%	4	8	6%	3	1	0	34	13.3	16	18	17	5.7	19.0	21	7.0	23	7.7	33.3	0.33			
Zakao	2	0	2	0%	36	18.0	0	0.49	17.6	8.8	9	4.5	16	33	48%	9	39	23%	2	2	100%	0	4	0%	1	0	0	40	20.0	23	17	7	3.5	21.7	12	6.0	8	4.0	40.5	0.54			
Dresden	2	0	2	0%	35	17.5	0	0.60	21.0	10.5	15	7.5	19	30	63%	7	22	32%	2	6	33%																						