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ABSTRACT

International Basketball Federation (FIBA) is an association that control basketball sports worldwide. One of the events that have been created by FIBA since 1953 was the FIBA Women's Basketball World Cup and the World Cup of 2018 was chosen as the sample. The main objective of this study was to identify and compare the game plan used by both winning and losing teams in FIBA Women's Basketball World Cup 2018. This study conducted to analyse the tactical evaluation in attacking and defending used based on the chosen performance indicators. There were 18 performance indicators involved (successful free throw, unsuccessful free throw, successful passing, unsuccessful passing, successful block, unsuccessful block, defensive rebound, offensive rebound, foul, rebound, assist, crossover, steal, inside pass, turnover, shooting 3-points and shooting 2-points). All videos (N=40) have been observed used Longomatch software to quantify the data. The reliability and validity testing outcome ($R > 0.8$ and the total error (%) = $< 10\%$) render the instrument reliable and the data valid. Independent T-test used to test the hypothesis and the outcome showed that seven indicators had significant differences between winning and losing. The significant indicators were successful free throw, $t(76.53) = 3.58$, $p = 0.001$, defensive rebound, $t(78) = 5.78$, $p = 0.001$, foul, $t(78) = -2.63$, $p = 0.01$, rebound, $t(78) = 4.63$, $p = 0.001$, assist, $t(78) = 5.51$, $p = 0.001$, fast break, $t(78) = 3.13$, $p = 0.002$, and finally shooting 2-points, $t(78) = 5.06$, $p = 0.001$. Other performance indicators noted to have no significant difference between both groups ($p > 0.05$). This study's findings provide evidence on selected performance indicators that verify an effective strategy to gain points in match games.

Keywords: *performance indicators, women basketball*

INTRODUCTION

Basketball has dramatically grown in popularity and has become one of the most demanding female sports (Conte & Inga, Scoring Strategies Differentiating between Winning and Losing Teams during FIBA EuroBasket Women 2017, 2018). The International Basketball Federation, known as FIBA, which is Fédération Internationale de Basketball, is an international federation that held an international basketball competition and governing most of the basketball matches around the world. The association was established in Geneva on 18 June 1932, after two years of being recognized by the International Olympic Committee (IOC) and Fédération Internationale de Basketball Amateur. As a result of this, women basketball has seen an increase in demand, which has piqued the interest of certain analysts to delve deeper into the physical and mental performance of women basketball players. Women basketball, as men basketball manifest a high demand in effort intensity divided accompanied with limited recovery time and high physiological need make it even more interesting (Conte, et al., 2015) (Scanlan, Dascombe, Reaburn, & Dalbo, 2012). Apart from that, the tactical and technical performance of women's basketball games is thoroughly examined to develop effective playing strategies, which will ultimately improve the overall performance outcome (Bazanov & Rannama, 2015) (Leitch, Gomez, & Woods, 2017).

Based on previous findings, fast-break games have proven to be beneficial, increasing demand and allowing teams to gain more opportunities to score points. As a result, winning teams have favoured fast-break games over losing teams by a significant margin. (Ortega, Palao, Gomez, Lorenzo, & Cardenas, 2007). Furthermore, the past study recognized that the possession of the ball for an inside pass action leads the team to a successful outcome was one of the most effective alternative gameplay (Courel-Ibanez, McRobert, Toro, & Velez, 2016). Previously conducted research has also identified turnovers and rebounds as factors that distinguish between winning and losing teams in women's basketball (Leitch, Gomez, & Woods, 2017). Increasing opportunities of turnover amplify the chances for the opponents to steal the ball, simultaneously performing a fast break for defending (Conte & Inga, 2018). Similarly, offensive rebounds known as a second chance action, for the offensive team to have a scoring chance. Maintaining a competent offensive pattern especially during the third quarter is one of the factors which enable the winning team to continue to lead the game. A prowess defensive teams also determine the superiority on the field of play (Mikolajec, Maszczyk, & Zajac, 2013).

According to a previous study, the primary source of disagreements stemmed from the lack of readily available basketball-specific information rather than other sports (Blanco, Salmeron, & Gomez-Haro, 2018). The scarcity limits the performance due to a lack of resources as a reference. Hence, the present study was conducted to reduce the scarcity limitation of information regarding women's basketball thus, able to shed more light regarding valuable information and be one of the sources of need for references purposes to others. The present study looks at the differences in terms of attacking and defending performance indicators between winning and losing FIBA Women's Basketball World Cup 2018 teams.

Procedures

Sampling

Purposive sampling was opted for as the present study sampling method. Videos of FIBA Women's Basketball World Cup 2018 were chosen based on the target population. All 40 videos (N=40) of matches were watched directly from the sources to avoid any copyright issue, the data were quantified, and performance indicators of the match were analyzed. Each indicator was highlighted to identify the most important performance indicator that performs in the game and lead to either win or lost the game.

Instrumentation

Notational analysis was conducted as the main instrumentation for the present study. The Test-Retest method was carried out to determine the reliability and the error value of the instrument (Mukaka, 2012). Based on the reliability testing, it notified r value ($r > 0.8$) and the error value was less than 10% which indicates the instrumentation is reliable and the data render to be valid. A software, Longomatch (version 1.1.3, by Fluendo (2014-2015)) used to aid the data quantification process by measuring the frequency of performance indicators between both winning and losing teams. This software output was then exported out to other software such as Microsoft Excel and SPSS, which allowed further processing of the data.

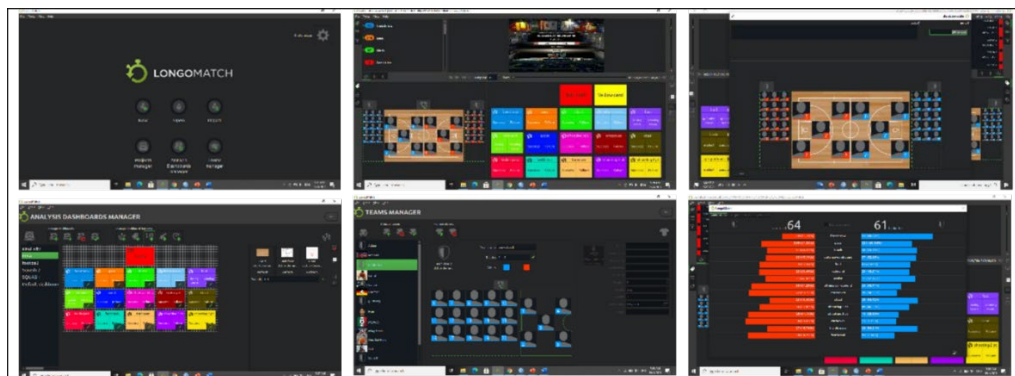


Figure 1: Longomatch software interface

Data collection procedures

All videos have been selected from the official page of FIBA Women's Basketball World Cup 2018 through the post-match schedule attached with a link of every match on YouTube (Games of the FIBA Women's Basketball World Cup 2018 - FIBA.basketball, n.d.). All these post-matched videos were observed directly from the sources to avoid any copyright issues. The video quality was set at the highest definition to give clarity towards the observation thus reducing or minimizing any error in the quantification process. The performance indicators observed were:

Table 1: Performance indicators observed

Performance indicators	Definitions
Successful free throw	Shoot the ball to the hoop and gain a-point
Unsuccessful free throw	Failed to shoot the ball and gain no-point
Successful passing	A pass remains in the same team as the player passing the ball
Unsuccessful passing	A player failed to receive the ball when passing by mistake or opposition possession
Successful block	A defensive player successfully prevents a goal attempt from an offensive player
Unsuccessful block	The defensive player failed to prevent goal attempt from an offensive player
Rebound	The player gains control of the ball after a shot when missed
Defensive rebound	The defender gains possession after the opponent missed a shot
Offensive rebound	Offensive player missed free throw attempt and regain again possession of the ball after
Foul	A violation that occurred due to contact of unsporting behaviour from the opponent resulting in a penalty
Assist	Attributed to a player who makes a pass to another player that scores without needing to make any extra moves to score
Crossover	Dribbling technique to create space towards the scoring area
Steal	A player that validly takes the ball away from the opponent possession
Inside pass	Passing inside the opponent area to score
Fastbreak	The Team attempt to throw the ball up quickly to score before the defender has time to set up
Turnover	Team lose control in a ball possession towards the opponent before their team make a shot
Shooting 3-points	A goal made from beyond the 3-points line which refers to the designated area surrounding the goal area
Shooting 2-points	Shooting the ball anywhere inside the 3-points line

Later, a frequency table was constructed as a mechanism for gathering the data from the beginning to the end of the game. The Longomatch software summarises the value and helps in organizing the data from the sample outcome. Every set and every match of the game was watched thoroughly, and the data were automatically recorded with the aid of the software based on the selected performance indicator. Afterwards, the software gives results for every selected variable and the data then divided into two conditions which were winning and losing teams. Furthermore, a random video was replayed twice to ensure the reliability and validity of the instrument were controlled.

Data Analysis

Independent Sample T-test for IBM, SPSS (version 25) used to seek any for any disparity of these variables between winning and losing team. Descriptive analysis (mean \pm SD) opted to describe all data referring to the present study as the strategies used by winning and losing teams. The statistical significance was set at alpha ($p < 0.05$).

RESULT

The (mean \pm SD) of all performance indicator data was as mentioned in Figure 2 and Table 2.

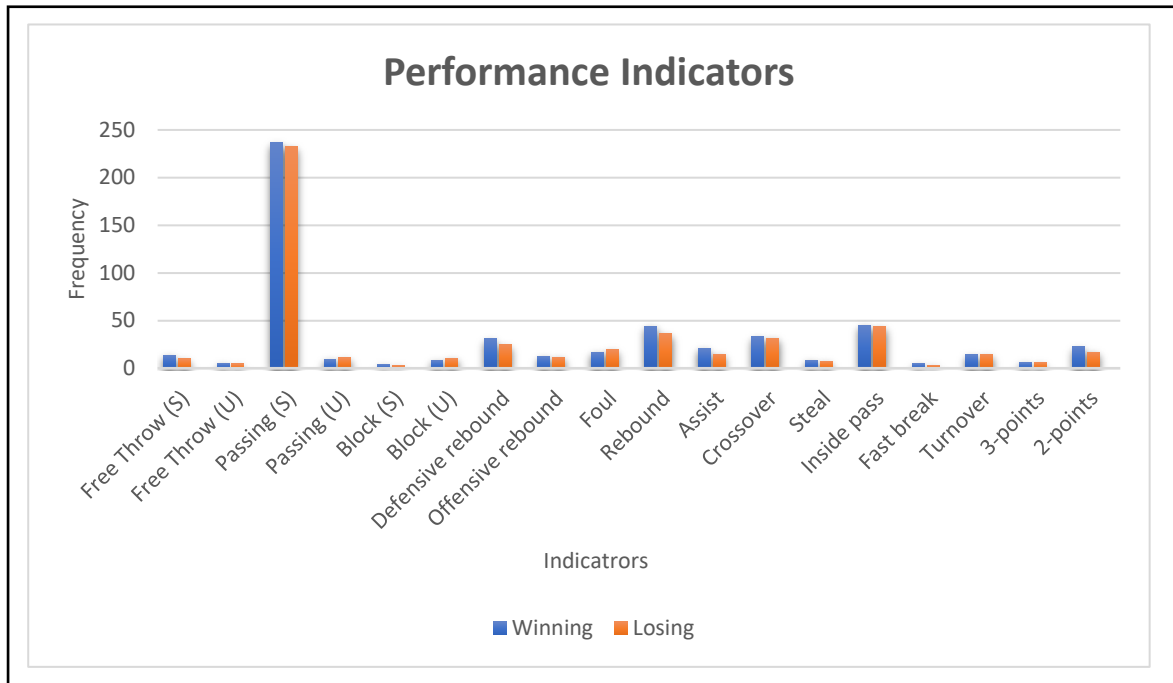


Figure 2: Mean \pm SD for winning and losing team performance indicators

Table 2: Descriptive and inferential value for winning and losing performance indicators

Performance indicators	Team	Mean	SD	t value	Sig.
Successful free throw	Winning	13.63	5.067	3.578	0.001*
	Losing	9.83	4.408		
Unsuccessful free throw	Winning	5.18	3.434	0.850	0.398
	Losing	4.58	2.854		
Successful passing	Winning	236.68	18.978	1.421	0.159
	Losing	232.13	7.050		
Unsuccessful passing	Winning	9.53	3.896	-1.609	0.112
	Losing	10.93	3.885		
Successful block	Winning	3.95	3.404	1.275	0.206
	Losing	2.98	3.438		
Unsuccessful block	Winning	8.43	4.511	-1.702	0.093
	Losing	10.38	5.669		
Defensive rebound	Winning	31.23	5.767	5.779	0.001*
	Losing	24.68	4.257		
Offensive rebound	Winning	12.63	3.887	1.051	0.297
	Losing	11.55	5.174		
Foul	Winning	16.85	4.136	-2.630	0.010*
	Losing	19.23	3.939		
Rebound	Winning	43.85	7.553	4.625	0.001*
	Losing	36.23	7.188		
Assist	Winning	21.03	4.979	5.509	0.001*
	Losing	14.90	4.966		
Crossover	Winning	32.93	6.615	0.820	0.415
	Losing	31.60	7.795		

Steal	Winning	8.63	2.108	1.988	0.050
	Losing	7.58	2.591		
Inside pass	Winning	44.80	8.247	0.727	0.469
	Losing	43.40	8.961		
Fast break	Winning	5.13	2.483	3.130	0.002*
	Losing	3.43	2.374		
Turnover	Winning	14.08	4.382	-0.467	0.641
	Losing	14.55	4.701		
Shooting 3-points	Winning	6.23	2.741	0.106	0.916
	Losing	6.15	3.520		
Shooting 2-points	Winning	22.65	5.082	5.604	0.001*
	Losing	16.85	5.162		

* indicating significant difference ($p < 0.05$)

Based on the descriptive value, the winning team show a higher figure indicating performing more actions compared to the losing team with a difference of (16.19%) for successful free throw, (6.15%) for an unsuccessful free throw, (0.97%) for successful passing, (14%) for successful block, (11.71%) for a defensive rebound, (4.47%) for the offensive rebound, (9.52%) for the total rebound, (17%) for assist, (2.1%) for crossover, (6.48%) for a steal, (1.59%) for inside pass, (19.86%) for a fast break, (0.64%) for 3-point shooting, and (14.68%) for 2-points shooting. As for the losing teams, there were several indicators noted to be slightly higher compared to the winning team with a difference of (6.84%) for unsuccessful passing, (10.37%) for unsuccessful blocking, (6.6%) more on foul, and (1.64%) for turnover. Inferential analysis was conducted to seek differences between groups.

Emanate from the descriptive result, the data were further tested using independent sample t-test method and seven indicators showed a significant difference between group. The indicators are successful free throw, with winning ($M = 13.63$, $SD = 5.08$) and losing ($M = 9.83$, $SD = 4.41$), $t(76.53) = 3.58$, $p = 0.001$, mean difference = 3.8 ($\eta^2 = 0.14$), defensive rebound, with winning ($M = 31.23$, $SD = 5.767$) and losing ($M = 24.68$, $SD = 4.257$), $t(78) = 5.78$, $p = 0.001$, mean difference = 6.550 ($\eta^2 = 0.3$), foul, with winning ($M = 16.58$, $SD = 4.136$) and losing ($M = 19.23$, $SD = 3.939$), $t(78) = -2.63$, $p = 0.01$, mean difference = -2.375 ($\eta^2 = 0.081$), rebound, with winning ($M = 43.85$, $SD = 7.553$) and losing ($M = 36.23$, $SD = 7.1888$), $t(78) = 4.63$, $p = 0.001$, mean difference = 7.625 ($\eta^2 = 0.216$), assist, with winning ($M = 21.03$, $SD = 4.979$) and losing ($M = 14.90$, $SD = 4.966$), $t(78) = 5.51$, $p = 0.001$, mean difference = 6.125 ($\eta^2 = 0.28$), fast break, with winning ($M = 5.13$, $SD = 2.483$) and losing ($M = 3.43$, $SD = 2.374$), $t(78) = 3.13$, $p = 0.002$, mean difference = 1.7 ($\eta^2 = 0.112$), and finally shooting 2-points, with winning ($M = 22.65$, $SD = 5.082$) and losing ($M = 16.85$, $SD = 5.162$), $t(78) = 5.06$, $p = 0.001$, mean difference = 5.8 ($\eta^2 = 0.247$). Other performance indicators noted to have no significant difference between both groups ($p > 0.05$).

DISCUSSION

The objectives of the present study were to seek differences in terms of playing performance indicators between winning and losing teams during FIBA Women's Basketball World Cup 2018. According to the findings of the study, only seven of the 18 performance indicators in question show a statistically significant difference, namely the successful free throw, defensive rebound, foul, total rebound, assist, fast break and 2-points shooting. Other indicators do not show any significant difference between both groups.

In any invasion structure game, a good decision-making skill throughout the play is a priority to gain points, additionally, sound technical and tactical play is a must to gain advantages upon the opponent. Based on the result, a successful free throw shows a significant difference with a 16.19% tilt toward the winning team. This demonstrates that the ability to score free points is a technical ability that every player should possess. Additionally, previous studies also revealed that winning teams made a greater number of successful free throws than losing teams. Hence, losing groups doubtlessly fouled more during shooting and permit winning groups to endeavour these free throws (Conte & Inga, Scoring Strategies Differentiating between Winning and Losing Teams during FIBA EuroBasket Women 2017, 2018). This happened by more foul done by the losing team, as evident by the present study, which showed a significant difference in foul done by both teams with where it was clear that the losing team conduct 6.6% more foul action compared to the winning. This is the major source of free-throw especially for the winning team as documented that successful free throws comprise about 20% of the total points scored throughout the game.

The next in line showing a significant difference was defensive rebound where it can be seen winning team to perform 4.47% more compared to losing team. Previous research has also revealed that the winning team has a higher number of defensive rebounds, demonstrating that they can maintain control of the game by collecting all of the shots to the hoop that were not scored by the opponents, allowing them to launch a counter-offensive immediately after receiving the ball. A fast attacking game unable the opponent to regroup and deploy their countermeasure (Sampaio & Janeira, Statistical analyses of basketball team performance: understanding teams' wins and lossess according to different index of ball possession, 2003) (Sampaio, Godoy, & Feu, Discriminative power of basketball game-related statistics by level of competition and sex, 2004) (Sampaio, Janeira, Ibanez, & Lorenzo, 2006). The authors observed winning team display a great playing skills also emphasized a greater interpretation and collaboration between players during the game (Russo, Miglietta, & Izzo, 2011) (Trinic, Dizdar, & Luksic, 2002).

Fast break and rebound indicating a significant difference between groups where the winning team noted to perform 0.64% more fast-break compared to the losing team and control 9.52% more rebound compared to the losing team. The winning team indicated high fast break situations than the losing team due to the opportunities that fast break have for easy shots near the basket. High practical in attacking to gain control of the ball lead to an outstanding result of winning team won high in rebound comprising both defensive and offensive rebound control (Evangelos, Alexandros, & Nikolaos, 2005). However, offensive rebound does not reach any statistically significant difference as offensive rebounds were detected as excessive shooting percentages and number of involuntary shooting fouls (Angel, Evangelos, & Alberto, 2006). Shooting 2-points notified to have a significant difference between groups where the winning team showed 14.62% supremacy compared to the losing team. The frequency of 2-points in possession of the ball was found high in the winning team than the losing team. This is a shred of evidence that the superior ability of a successful shooting increases the chances of winning any match tremendously. Moreover, losing teams obtained high in ball possession but showed poorly in performing structured ball possessions after the altered game strategies. Hence, foul can be developed through the presence of shooting due to the consequences that happened most in losing team rather than winning team. Also discussed was the fact that shooting far away from the hoop can help lessen the likelihood of losing possession of the ball while using the effective defensive technique. (Conte & Inga, Scoring Strategies Differentiating between Winning and Losing Teams during FIBA EuroBasket Women 2017, 2018).

The last significant variable was assisting. The winning team perform 17% more compared to the losing team. Increasing the use of passing can influence the timing in ball possession. From that, the chances to score increase due to high in assist towards the scoring area and quality of inside pass near the basket happened. This form of a strategy used by winning team that spend the lesser duration in dribbling than passing because it clearly can develop a high demand to achieve point (Ibanez, Garcia-Rubio, Rodriguez-Serrano, & Feu, 2019)(Stavropoulos & Foundalis, 2005)

CONCLUSION

In a nutshell, superior control of technical and tactical characteristics of a playable to determine the skewness of the outcome as portrayed by the winning team performance and outcome. It revealed that having effective critical thinking leads to problem-solving when their approach altered due to the diverse environment that affects the team to win the match. This study's findings provide evidence on a specifically chosen performance indicator towards scoring strategies which were successful free throw, total rebound, defensive rebound, foul, assist, fast break and, shooting 2-points. The aid of performance analysis able to help coaches accurately guide the decision-making procedure thus increasing the chances of victory.

Contribution of Main author and Co – authors

Muhamad Noor bin Mohamed – Corresponding author and mainly in designing the study, controlling the reliability of the instrument used, preparing and finishing the write up and the other author's contribute in quantifying the data.

Ainul Ashykeen binti Zainal - designing the study, controlling the reliability of the instrument used and contribute in quantifying the data.

Mardiana binti Mazaulan- designing the study, contribute in quantifying the data and, preparing and finishing the write up

Noor Azila Azreen binti Md Radzi - contribute in quantifying the data and preparing and finishing the write up

Muhamad Safiq bin Saiful Annur - controlling the reliability of the instrument used, preparing and finishing the write up

Conflict of Interest

This paper is a side project of an undergraduate student, there should not be any conflict of interest. The paper mainly consists of data taken from videos uploaded to common sharing platforms, where most of the quantification is made directly from the sources without any downloading involved to avoid any breach of copyright.

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