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Is the inside pass a performance indicator? Observational analysis of elite basketball teams

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IS THE INSIDE PASS A PERFORMANCE INDICATOR? OBSERVATIONAL ANALYSIS OF ELITE BASKETBALL TEAMS

KEY WORDS: Pass, Reception, Notational analysis, Match analysis.

ABSTRACT: The purposes of this study were: 1) to analyse the influence of inside pass on the basketball offensive success and 2) to detect the influence of both passer and receiver location, and the receiver immediate action on successful inside pass. The sample was 1324 attack phases of nine games of the 2012 Euroleague Playoff. All recorded matches were analysed by four observers. Observational methodology was used through a follow-up, ideographic, and multidimensional design approach. An *ad-hoc* instrument was developed in order to obtain behaviour systematic registration. For the first aim, analysed criteria were: 1) offensive effectiveness, 2) shooting zone, 3) total points scored by attack phase, 4) possession duration and 5) number of passes. For the second one: 1) passer location, 2) receiver location, and 3) immediate receiver action were registered for each inside pass attack. Multirater *k* free index (Randolph, 2005) was used to measure inter-observers agreement, obtaining a value over .84 in each case. In addition, intra-observers reproducibility was evaluated at the end of the observation process by calculating Cohen's Kappa, obtaining a minimum value of .90. For statistical data analysis, Mann-Whitney *U* test, crosstabs, Chi-square and multinomial logistic regression were carried on. The finding results show that a) those attack phase in which inside pass is done are more effective and achieve a larger amount of points, and b) passer location and immediate receiver action determinate a successful inside pass, being the outside pass with an inside reception the most effective option. These results suggest to consider the inside pass as a performance indicator in basketball.

Performance analysis is one of the most recent popular topics in Sport Sciences (O'Donoghue, 2010, Sampedro and Prieto, 2012). It is well known that to discover performance indicators are one of the keys to success in interaction sports (Hughes & Bartlett, 2002), providing coaches information about how best to cope performance demands (Carling, Reilly and Williams, 2009). Focusing on technical and tactical analysis in basketball we found that pass and reception, has been one of the most studied actions because of its influence on the success of the game, both individually and collectively.

Referring to pass and reception individual skills needed, Trninić, Perica, and Dizdar, (1999) suggested that a good passer should master technical skills to perform a good pass and should have an accurate selection pass. Furthermore, the receiver should have the ability to move continuously without the ball in order to get clear areas on the court in where receive it and, once acquired the ball, it is needed to know how to play in multiple positions on offence. From a collective point of view, teams that are expert in the use of pass and reception achieve a controller style of play (Trninić, Dizdar and Luksić, 2002), obtaining a better collective performance by giving more number of passes per attack phase, performing a less number of turnovers by reducing risk passes, increasing the number of assists, and even allowing less number of inside passes in defence (Álvarez, Ortega, Gómez and Salado, 2009; Gómez, Lorenzo, Sampaio, Ibáñez and Ortega, 2008; Ibáñez, García, Feu, Lorenzo and Sampaio, 2009). In addition, pass and reception performance contributes to the success of the team throughout the season (Ibáñez, Sampaio, Feu, Lorenzo, Gómez and Ortega, 2008; Sampaio, Drinkwater and Leite, 2010).

However, there is a lack of studies focused on the spatial performance criteria of the pass and reception, specifically about inside passes (Alvarez et al., 2009). If we support on literature, we found that passer location, receiver location and immediate receiver action should affect on inside pass success, mainly due to the following keys: 1) one offensive aim is to make shots from near the basket (Cárdenas, Piñar, Sánchez and Pintor, 1999; Ibáñez, García, Feu, Parejo and Cañadas, 2009; Tavares and Gomes, 2003); 2) a player who receive the ball close to the basket generates imbalance for the opponents, providing a better offensive play (Ortega, Cárdenas, Sainz de Baranda and Palao, 2006); 3) to move the ball around the perimeter generates free inside areas (Cárdenas and Alarcón, 2010; Fernández, Camerino, Anguera and Jonsson, 2009; Sautu, Garay and Hernández Mendo, 2009); and 4) a shot preceded by a pass has a great guarantee of success (Ibáñez, García, Feu, Parejo, et al., 2009).

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Therefore, the purposes of this study were: 1) to analyse the influence of inside pass on the basketball offensive success and 2) to detect the influence of both passer and receiver location, and receiver immediate action on successful inside pass.

Method

The sample was 1324 attack phases of nine basketball 2012 *Euroleague Playoff* games. To ensure equal representation from the classified teams, a minimum of two and a maximum of three matches of each team were sampled. Observational methodology was used (Anguera and Blanco, 2003), through a follow-up, ideographic and multidimensional design approach (Anguera, Blanco and Losada, 2001). An *ad-hoc* instrument was developed in order to obtain behaviour systematic registration. A group of three experts, who accumulated more than 10 years of experience in basketball coaching, established and defined a total of four criteria for the first aim and three for the second, constituting a field formant with following final list of configurations:

1. Objective: Inside pass influence on offensive success:
   - 1.1. Offensive effectiveness (success – failure).
   - 1.2. Shooting zone (two points area – three points area).
   - 1.3.Total scored points by attack phase; free throws were not considered.
   - 1.4. Possession duration (total possession time frontcourt possession time).
   - 1.5. Number of passes on the frontcourt.
2. Objective: Importance of passer and receiver locations and receiver immediate action on inside pass successful:
   - 2.1. Passer location (3 points area – 2 points area); passes from paint zone were not considered.
   - 2.2. Receiver location (high post – low post).
   - 2.3.Receiver immediate action (shoot – pass).

During four weeks, four observers were trained following the stages suggested by Anguera (2003). A total of 12 sessions of one hour and a half were established, accumulating a minimum of 18 hours of experience per observer. Then, using an Excel sheet, each observer registered a total of 82 attack phases in order to calculate an inter-rater reliability through multirater *k* free index (Randolph, 2005). The obtaining values were all over .84, considered as "almost perfect" (Landis and Koch, 1977, p.165). To ensure consistency of data obtained, intra-observers evaluation at the Cohen's Kappa, obtaining a minimum of .90, considered also as "almost perfect" (Landis and Koch, 1977, p.165).

The Kolmogorov-Smirnov normality test was performed for the investigated variables. Mann-Whitney *U* test was used in order to discover existing differences among attack phases in which inside pass is done and those in which is not. Relationships between categorical variables were analysed through cross-tabulations, recurring to the adjusted standardised residuals (ASRs), considering values >1.96. Chi-square were calculated to check whether there were any statistically significant associations, considering $p > .05$. Multinomial Logistic Regression was performed to assess the strength of the influencing variables on predicting inside pass success.

Results

Descriptive results of the game show that inside pass (N = 226) appears in 16.7% of attack phases, with a mean of 12 per teams. Table 1 shows Mann-Whitney *U* test results, crosstab analysis and chi-square comparison between attacks with and without inside pass. Table 2 indicate multinomial logistic regression model ($\chi^2_{(11)} = 20.430$, $p < .01$) which predicts successful inside pass only in terms of passer zone, receiver zone and receiver immediate action.

	Mean		SD		SE		sig. (b)
Category	**W/o**	**With**	**W/o**	**With**	**W/o**	**With**	
Scored Points	.68	.84	1.097	1.040	.033	.071	.038*
Frontcourt possession	10.33	11.26	5.262	3.988	.160	.275	.016*
Total possession duration	13.28	14.64	5.920	4.359	.178	.297	.010*
Number of passes	2.02	2.82	1.593	1.502	.048	.102	.000**

Category	**Average**		**ASRs**	**sig. (b)**
	With	**W/o**	**With**	
Offensive Effectiveness	49.8%	63.3%	3.7	.000**
Shooting zone: Paint	40.4%	84.5%	10.0	.000**
Shooting zone: 2 pints	17.1%	3.9%	-4.2	.000**
Shooting zone: 3 points	42.2%	11.6%	-7.2	.000**

* Significant differences ($p < .05$).

** Strong significant differences ($p < .01$).

Table 1. Mann-Whitney U *test results (above), crosstab analysis and Chi-square comparison (below) between attacks with and without inside pass.*

Passer location / receiver location / receiver immediate action	B	SE	Sig.	Exp (B)	CI 95% Inf.	CI 95% Sup.
2 points pass / high post reception / shoot	-.58	1.02	.570	.560	.076	4.144
2 points pass / high post reception / pass	-.69	1.07	.518	.50	.061	4.091
2 points pass / low post reception / shoot	-1.44	.907	.112	.236	.040	1.398
2 points pass / low post reception / pass	-.58	1.02	.570	.560	.076	4.144
3 point pass / high post reception / shoot	-2.22	1.06	.037*	.109	.014	.872
3 point pass / high post reception / pass	-1.07	1.00	.287	.343	.048	2.457
3 point pass / low post reception / shoot	-2.02	.906	.026*	.133	.023	.788

* Significant differences ($p < .05$).

Table 2. Multinomial logistic regression model which predicts inside pass successful only in terms of passer location, receiver location and receiver immediate action.

Discussion

The descriptive results of the use of inside pass throughout the game is heterogeneous. On the one hand and according with our findings, Sautu, Garay and Hernández Mendo (2009), analysed 11 matches from 2001-2002 ACB league, and found that inside passes appeared in 17.2% of attack phases. On the other hand, Álvarez et al. (2009), analysed 1045 half-court game phases form men's Olympic Games, and found than inside pass was used in a 30.9% of cases. Those differences suggest that competition type and teams' level should affect on the use of inside pass. About limitations of the study, there is a lack of analysis of the defensive actions.

Results about the influence of inside pass on the basketball offensive success show the following relevant conclusions:

• Attack phases in which inside pass is performed are more effective, obtaining a larger account of points (up 23.5%) and being more effective (up 13.5%). Those results agree with Cárdenas' et al. (1999) findings, and confirm those ones obtained by Álvarez et al. (2009), who established that defense is less effective when an inside pass is performed during the offense. In short, we agree with Ortega et al. (2006) who stated that a player who receives the ball close to the basket generates imbalance for the opponents, facilitating the offence play.

• To perform an inside pass is necessary to develop attacks with a greater amount of possession duration and number of passes. We agree with Cárdenas et al. (1999) that stated that inside pass involves such a high difficulty previous actions on the frontcourt, which purpose is to create spaces that encourage reception at positions close to the basket. In addition, these results uphold to Trninić, Dizdar, and Luksić, (2002) who suggested that teams that are expert in the use of pass and reception achieve a controller style of play.

• The paint is the shooting zone commonest in attack phases with inside pass. The high percentage of efficiency that players obtain from areas near the basket (Ibáñez, García, Feu, Parejo et al., 2009; Mexas, Tsitskaris, Kyriakou and Garefis, 2005; Tavares and Gomes, 2003), coupled with the more depth of play detected in winning teams, (Alarcón, Piñar, Estévez-López and Ureña, 2012) explain this trend to shoot taking advantage of once the ball is in the inside positions.

Results from multinomial logistic regression model indicate that passer location and immediate receiver action affected significantly on inside pass success. In this sense, to pass the ball from 3 points area is more effective. This approach agrees with other authors, who establish that to move the ball around the perimeter generates free inside areas (Cárdenas and Alarcón, 2010; Fernández et al., 2009; Sautu, Garay and Hernández-Mendo, 2009). About the receiver's immediate action we find that, once the ball is on the inside teams trend to shoot, taking advantage of this favourable situation. In future researches, it could be interesting to analyse the offense continuity through sequential analysis.

To conclude, the results support to take into consideration the inside-pass as a performance indicator. In addition, we can assert that an outside pass with inside reception (Cárdenas et al., 1999) has a great guarantee of success shot.

¿ES EL PASE INTERIOR UN INDICADOR DE RENDIMIENTO? ESTUDIO OBSERVACIONAL EN BALONCESTO DE ÉLITE

PALABRAS CLAVE: Pase, Recepción, Análisis notacional, Análisis del juego.

RESUMEN: Los objetivos de este estudio fueron: 1) analizar la influencia del pase interior en el éxito del ataque y 2) detectar si la localización espacial de pasador y receptor, y la acción motriz inmediata del receptor afectan sobre el rendimiento del pase interior. Cuatro observadores analizaron un total de nueve partidos de Playoff de la Euroliga 2012, obteniendo un total de 1324 fases de ataque. Se utilizó la metodología observacional a través de un diseño de seguimiento, ideográfico y multimiensional. Se elaboró un instrumento *ad-hoc* para lograr un registro sistemático de las conductas de juego. Para el primer objetivo se incluyeron los siguientes criterios para cada fase de ataque: 1) eficacia ofensiva, 2) zona de lanzamiento, 3) total de puntos anotados en la fase de ataque, 4) tiempo de posesión y 5) número de pases. Para el segundo objetivo se analizó, en aquellas fases de ataque con pase interior: 1) localización espacial del pasador, 2) localización espacial del receptor y 3) acción inmediata del receptor. Se comprobó la fiabilidad interobservadores mediante el índice *multirater k free* (Randolph, 2005), obteniendo un valor por encima de .84 en cada variable. Al final del proceso se evaluó la concordancia intraobservadores mediante el Kappa de Cohen, obteniendo un valor mínimo de .90. Para el análisis estadístico se calcularon la *U* de Mann-Whitney, tablas de contingencia, Chi-cuadrado y regresión logística multinomial. Los resultados obtenidos muestran que 1) aquellas fases de ataque en las que se realiza el pase interior resultan más efectivas y obtienen una mayor cantidad de puntos, y 2) la localización espacial del pasador y la acción inmediata del receptor resultan determinantes en la eficacia del pase interior, siendo el pase exterior con recepción interior la opción con mayores garantías de éxito. Éstos resultados sugieren la consideración del pase interior como un indicador de rendimiento en baloncesto.

É O PASSE INTERIOR UM INDICADOR DE RENDIMENTO? ESTUDO OBSERVACIONAL NO BASQUETEBOL DE ELITE

PALAVRAS-CHAVE: Passe, Recepção, Análise de notação, Análise de jogo.

RESUMO: Os objetivos deste estudo foram: 1) analisar a influência do passe interior no sucesso do ataque e 2) detectar se a localização espacial do passador e do receptor, bem como a ação motora imediata do receptor afetam o rendimento do passe interior. Quatro observadores analisaram um total de nove jogos nos playoffs da Euroliga 2012, obtendo um total de 1324 fases de ataque. Utilizou-se a metodologia observacional através de um delineamento de monitorização, ideográfico e multidimensional. Foi elaborado um instrumento *ad-hoc* para o registo sistemático de comportamentos de jogo. Para o primeiro objetivo foram incluídos os seguintes critérios para cada fase do ataque: 1) eficácia ofensiva, 2) zona de lançamento, 3) total de pontos marcados na fase de ataque, 4) tempo de posse e 5) número de passes. Para o segundo objetivo foram analisadas nas fases de ataque com passe interior: 1) localização espacial do passador, 2) localização espacial do receptor e 3) acção imediata do receptor. Verificou-se a fidelidade inter-observadores através do índice *multirater k livre* (Randolph, 2005), obtendo-se um valor superior a .84 em cada variável. No final do processo avaliou-se a concordância intra-observadores através do Kappa de Cohen, obtendo-se um valor mínimo de .90. Para a análise estatística, foram calculados o *U* de Mann-Whitney, tabelas de contingência, Qui-quadrado e regressão logística multinomial. Os resultados mostram que 1) aquelas fases de ataque nas quais se realiza o passe interior são mais eficazes, obtendo-se um maior número de pontos, e 2) a localização espacial do passador e a acção imediata do receptor são determinantes na eficácia do passe interior, sendo o passe exterior com a recepção interior a opção com maiores garantias de sucesso. Estes resultados sugerem a consideração do passe interior como um indicador de rendimento no basquetebol.

References

Alarcón, F., Piñar, M. I., Estévez-López, F. and Ureña, N. (2012). Offensive game style differences between the first and the last classified in the Spanish amateur league (EBA league). *Kronos*, *19*(*1*), 22-29.

Álvarez, A., Ortega, E., Gómez, M., Salado, J. and Salado, J. (2009). Study of the defensive performance indicators in peak performance basketball. *Revista de Psicología del Deporte*, *18*(Suppl.), 379-384.

Anguera, M. T. (2003). La observación. In C. Moreno (Ed.). *Evaluación psicológica. Concepto, proceso y aplicación en las áreas del desarrollo y de la inteligencia* (pp. 271-308). Madrid: Sanz y Torres.

Anguera, M. T. and Blanco. A. (2003). Registro y codificación en el comportamiento deportivo. In A. Hernández Mendo (Coord.). *Psicología del Deporte (Vol. 2). Metodología* (p. 6-34). Buenos Aires: EF, Deportes.

Anguera. M. T., Blanco. A. and Losada. J. L. (2001). Diseños observacionales. cuestión clave en el proceso de la metodología observacional. *Metodología de las Ciencias del Comportamiento*, 3(*2*), 135-160.

Cárdenas, D. and Alarcón F. (2010). Conocer el juego en baloncesto para jugar de manera inteligente. *Wanceulen E.F. Digital, 6*, 52-72.

Cárdenas, D., Piñar, M. I., Sánchez, M. and Pintor, D. (1999). Análisis del juego interior en baloncesto. *Motricidad, 5,* 87-110.

Carling, C., Reilly, T. and Williams, M. A. (2009). *Performance assessment for field sports*. Oxford: Routledge.

Fernández, J., Camerino, O., Anguera, M. T. and Jonsson, G. (2009). Identifying and analyzing the construction and effectiveness of offensive plays in basketball by using systematic observation. *Behavior Research Methods, 41*(3), 719-730. doi: 10.3758/BRM.41.3.719

Gómez, M. Á., Lorenzo, A., Sampaio, J., Ibáñez, S. J. and Ortega, E. (2008). Game-related statistics that discriminated winning and losing teams from the Spanish Men's Professional Basketball Teams. *Collegium Antropologicum, 32*(2), 451-456.

Hughes, M. and Bartlett, R. (2002). The use of performance indicators in performance analysis. *Journal of Sports Sciences, 20,* 739 – 754. DOI: 10.1080/026404102320675602

Ibáñez, S. J., García, J., Feu, S., Lorenzo, A. and Sampaio, J. (2009). Effects of consecutive basketball games on the game-related statistics that discriminate winner and losing teams. *Journal of Sports Science and Medicine, 8*(3), 458-462.

Ibáñez, S. J., García, J., Feu, S., Parejo, I. and Cañadas, M. (2009). Shot efficacy in the NBA: A multifactorial analysis. *Cultura, Ciencia y Deporte, 10,* 39-47.

Ibáñez, S., Sampaio, J., Feu, S., Lorenzo, A., Gómez, M. Á. and Ortega, E. (2009). Basketball game-related statistics that discriminate between teams' season-long success. *European Journal of Sport Sciences, 8*(6), 369-372. doi: 10.1080/17461390802261470

Landis, J. R. and Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, *33*, 159-74.

Mexas, K., Tsitskaris, G., Kyriakou, D. and Garefis, A. (2005). Comparison of effectiveness of organized offences between two different championships in high level basketball. *International Journal of Performance Analysis in Sport, 5*, 72-82.

O'Donoghue, P. (2010). *Research Methods for Sports Performance Analysis*. New York: Routledge.

Ortega, E., Cárdenas, D., Sainz de Baranda, P. and Palao, J. M. (2006). Analysis of the final actions used in basketball during formative years according to player's position. *Journal of Human Movement Studies*, *50*(4), 421-437.

Randolph, J. J. (2005). Free-marginal multirater kappa: An alternative to Fleiss' fixed-marginal multirater kappa. Paper presented at the *Joensuu University Learning and Instruction Symposium 2005*, Joensuu, Finland, October 14-15th, 2005. (ERIC Document Reproduction Service No. ED490661)

Sampaio, J., Drinkwater, E. J. and Leite, N, M. (2010). Effects of season period, team quality, and playing time on basketball players' game-related statistics. *European Journal of Sport Science*, *10*(2), 141-149. doi: 10.1080/17461390903311935

Sampedro, J. and Prieto, J. (2012). El efecto de marcar primero y la ventaja de jugar en casa en la liga de fútbol y en la liga de fútbol sala de España. *Revista de Psicología del Deporte, 21*(2), 301-308.

Sautu A., Garay, J. and Hernández Mendo, A. (2009). Observación y análisis de las interacciones indirectas en el baloncesto ACB. *Cuadernos de Psicología del Deporte*, *9*, 69.

Tavares, F. and Gomes, N. (2003). The offensive process in basketball – a study in high performance junior teams. *International Journal of Performance Analysis in Sport*, *3*(1), 34-39.

Trninić, S., Dizdar, D. and Luksić, E. (2002). Differences between winning and defeated top quality basketball teams in final tournaments of European club championship. *Collegium Antropologicum, 26,* 521-531.

Trninić, S., Perica, A. and Dizdar, D. (1999) Set of criteria for the actual quality evaluation of the elite basketball players. *Collegium Antropologicum*, *23*(2), 707-721.