FOOTBALL CLUBS GOALKEEPERS DISTRIBUTION COMPETENCE

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Abstract: Much of the existing goalkeeper (GK) research is based around GK's performance but not with a match analysis theme. Research has focused on physiology, psychology and injury prevention. Performance analysis based GK research will significantly increase the standards of GK performance by increasing the knowledge we have of a GK's match demands. As a consequence of this lack of knowledge surrounding GK's distribution performance the aim of this study was to increase the understanding of GK's performance through their distribution performance and to see if the level in which they compete influences this. The subjects used in this study were all professional GK's from the same club, they were all the first choice GK's from the clubs 4 most senior teams. The study analysed the GK's distribution performances through Distribution Location, Type, Success and Outcome data. Results found that there were significant differences ($P<0.05$) in the GK's Location, Type and Success of distributions. This research has found that the GK's did indeed perform differently and that GK's do truly perform to better standards as their level of competition increases, this is shown by performing simpler tasks to a near perfect standard and performing more difficult taskswell.

Key Words:- Distribution, Goalkeeper, Football, Success, Performance

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Introduction :-

In Football the Goal Keeper (GK) position is completely unique to any other player. Shilton(1988, p84) stated that the GK has one main job, which is to stop goals being scored in their goal. One of the greatest difficulties facing a GK is that one mistake can cost their team success, whereas being successful is expected. GK's require a special level of mental strength for this as other players in the team can make a mistake, but this alone is not likely to result in conceding a goal. Therefore almost every situation in which the GK is called into play is a high pressure event, as its potential a match losing situation. Traditionally GK research has been based around GK's performance but not with a match analysis theme, research has focused on physiology, psychology and injury prevention. Performance analysis based GK research will significantly increase the standards of GK performance by increasing the knowledge we have of a GK's matchdemands.

Penalties are the area of GK match analysis, which have received the most research, again due to a variety of sport science disciplines being interested in the area. Psychologists Jordet, Hartman and Sigmundstad, (2009) Biomechanics Scurr and Hall,

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(2009) and Physiologists Masters, van der Kamp and Jackson, (2007). Whilst these can be classed as performance analysis studies they tend to analyse the penalty taker as much as the GK. Hughes and Wells, (2002) looked at 129 penalties taken from the FIFA World Cup finals and finals of the European Champions League, much of this study was aimed at penalty taking success not GK penalty saving performance. Following on from this study was research by Bornkamp, Fritsch, Kuss, and Ickstadt, (2009) who examined which German GK was the best penalty saver. This was conducted by reviewing data of all penalties in the Bundesliga between 1963 and 2007. The results found that one GK out performed all the others, however overall differences between GK's were not greatlydistinguishable.

However the penalty only represents a very small proportion of a GK's demands and in many games is not required. Di Salvo, et al (2008) reviewed the distances covered at different velocities between GK's during the first and second halves of games. There were no significant differences between distances covered in the first and second halves. However they concluded that the high-intensity actions carried out by GK's are very decisive in the final result of games. A greater analysis of the GK position was conducted by İhsan (2006), this study used 6 performance indicators (PI) to assess GK's holistic performance and rated their efficiency in the 2002 FIFA World Cup. GK's attributes were highlighted by Kasap and Kasap (2005) who stated that one of the basic yet vital expectations of a GK is to "Insert the ball with positive passes," more commonly known as distribution. As a consequence to the lack of knowledge surrounding GK distribution performances the aim of this study is to increase the understanding of GK's distribution performance by analyzing the distribution performances of GK's who play at different competition levels.

Method:-

Participants:-

The subjects used in this study were all professional GK's at Villarreal Football Club. All GK's trained full time, typically 5 days a week and have 1 game at the weekend. The first choice GK was used from each team, these teams are named A, B, C and JA. The A GK plays at the highest level (La Liga, UEFA cup and the national team) this GK was the only GK not to have been in the Villarreal youth academy. The B team GK plays 1 league below in the SegundaDivisión. The C team GK plays in the TerceraDivisión. The JA GK played in the Valencian community league for under19's.

Equipment:-

In total 10 randomly chosen league games were analysed for each GK, taken from their team's league competition. The games of the A and B teams were provided by Villarreal Football Club on DVD's, these were recordings from televised footage. The C and JA teams were recorded by a HD digital camcorder (Sony, HDRXR155EB) placed on a tripod and operated by the teams video analyst from the same fixedposition each game.

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The games were digitised and analysed using Sportscode (version 8) software. The full 90 minutes plus any extra time of each game was analysed.

Pitch Divisions:-

The traditional 9 zone pitch division shown in Figure 1 was chosen in accordance with Grehaigne, et al, (2001). This system provides suitable accuracy whilst it is also the

standardised way in which a coach would divide a pitch when coaching and therefore the way in which a GK is taught to view distributionoptions.

Figure 1. The 9 zone pitch division

Procedures:-

GK analysis was conducted one GK at a time. The process started with the 10 games from the A team GK followed by the 10 games of the B, C and finally the JA GK. The pre-test was conducted before any results were recorded, the purpose of this was to ensure harmony between all equipment and procedures, whilst this ensured the template created for the analysis would be suitable to collect the data required.

Analysis and Statistical treatment of data:-

To determine differences between variables a chi-squared (χ^2) test was used. The level of significance was set at $P<0.05$ the treatment of data was performed with SPSS(V18).

Reliability study:-

A reliability study was conducted on the results from the pre test analysis. This was implemented by an intra-observer study. The first part of the test was conducted on DVD video from the game footage supplied for the A and B teams. The second part of the test used video camera footage from the C and JA GK games. Tests were redone 4 weeks later to reduce any retention of game knowledge and ensure that the results recorded were noted as seen and not through memory. The tests were designed to look at Overall % Error. Each of the tests scored less then3%.

Results:-

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DistributionLocation:-

Each of the 4 GK's distributions of the ball were significantly differently ($\chi^2 = 114.28$, P<0.05) to the other GK's, Table 1 shows the number of distributions each GK made to each zone. Each zone is different except for zone 4 where the B and C GK performed the same number ofdistributions.

Table 1.All 4 GK's distributions into each of the zones.

GK	ZONES									Total (n)
	1	2	3	4	5	6	7	8	9	
A	12	38	18	25	64	21	11	28	5	222
B	46	58	39	28	40	25	6	15	12	269
C	43	48	50	28	53	59	14	22	9	326
JA	54	30	39	39	33	18	2	6	1	292
Total (n)	155	174	146	120	192	123	33	71	27	1109
Mean	38.8	43.5	36.5	30.0	47.5	30.8	8.3	17.8	6.8	
SD ($\pm$)	18.4	12.2	13.4	6.2	13.8	19.1	5.3	9.5	4.8	

By looking at the distributions of the GK's there are distinctive patterns in their distribution choices. The A GK made the majority of his distributions through the centre of the pitch, these are zones 2, 5 and 8, with most of his distributions to zone 5, the centre of the pitch. The B team GK is similar however much more defensive as he distributes through the centre of the pitch, however most of his distributions are to zones 2 which is the zone directly in front of his goal. The C team GK clearly makes fewer distributions to the left side of the pitch zones 1, 4 and 7. He distributes to the remaining zones evenly however he distributes less frequently to these furthest zones (8 and 9). The JA GK's distribution is uneven and erratic with no distinctive pattern although he noticeably makes few distributions to the furthest zones 7, 8 and9.

Type of Distribution:-

Kicks were by far the most favored type of distribution. Statistical analysis results conducted on the type of distribution shows that there was a significant difference between the GK's types of distributions ($\chi^2 = 15.157$, P<0.05), it should be noted that the 1 occasion the B team GK used their head as a distribution has been excluded from this analysis to satisfy the χ^2 required assumptions. Figure 2 shows the occasions each type of each distribution was used. It shows that the C team GK has the greatest number of kicked distributions (n=274), which equated to being 83.7% of hisdistributions.

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This confirms that kicks are the most common method of distribution, as each GK had between 75% and 83% of their distributions made in this way.
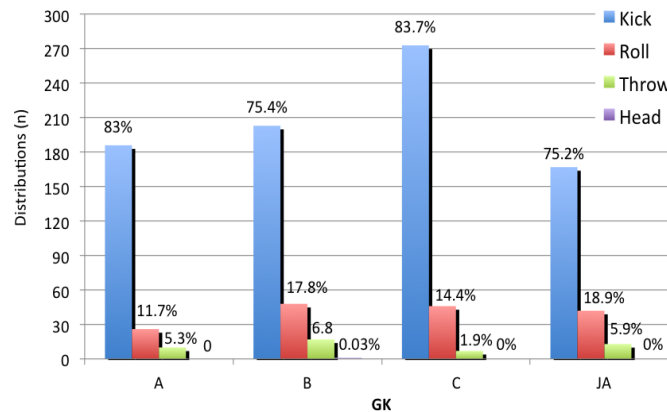
Success of distribution:-

Figure 2 showed that kicks were by far the most occurring distribution, however it is important that the success of each distribution is considered, as this is an important factor to distinguish the best performing GK. When distribution analysis was repeated including only successful distributions there were significant differences between the GK's. The A team GK was significantly the most successful with their Rolls and Throws (χ^2 = 16.622,P<0.05).
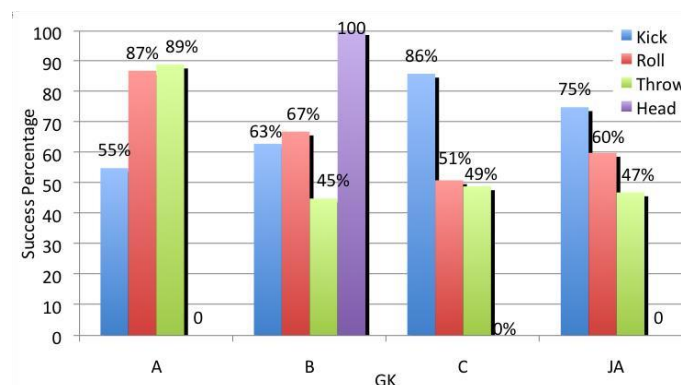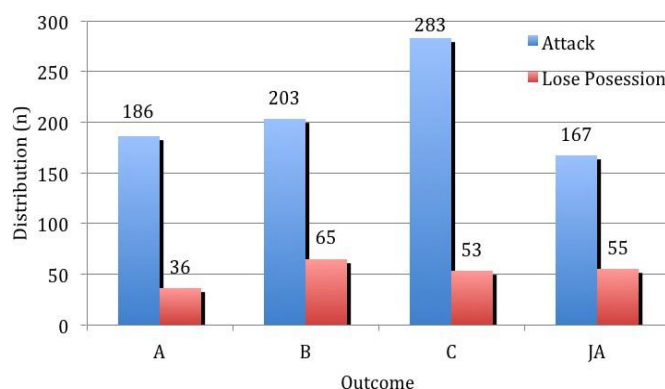

Figure 3.The success percentage of distributions.

Distributions Outcome:-

The final part of the analysis looked at the outcome of the GK's distributions. The results in figure 4 show that all of the GK's outcomes produced much more attacks (successful distributions) then unsuccessful distributions. All the GK's had a similar number of their distributions returned. However the outcomes between the GK's distributions were not significant (χ^2 = 11.845, P>0.05)

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The most common event is an attack being initiated, this is the preferred outcome for all GK's as more attacking opportunities create more chances to score and win games.

Discussion:-

The aim of this study is to increase the understanding of distribution performance between GK's playing at different competition levels, as this is an area of GK research that had been neglected. This analysis can also be used as a method in the future for comparing and rating potential GK's against the incumbent. This research found a number of differences between the GK's performances. It is believed these exist due to individual GK characteristics, this is further supported by the findings of İhsan (2006) who determined that GK performances are largely due to individual characteristics. However in the instances where no difference was observed in GK's performances justification can be due to the different outfield players that play in each team, as their position on the pitch and movements unquestionably influence a GK's distribution in that area.

Distribution Location:-

Each GK made a significantly different number of distributions to each of the zones (χ = 114.228, P<0.05). This shows that each GK significantly distributed the ball to a different zone a different number of times. This would be expected, as no four GK's are likely to produce similar performances of distributions over a number of games, this matches the finding of Kasap and Kasap (2005) who also studied the performances of a number of GK's.

However due to the lack of research in this area these results provide the first insight into the GK differences.

By exploring the distribution pattern in Table 1 it can be seen that the A teams GK clearly favours distributions thought the central zones (2, 5 and 8) with a clear preference for zone 5. This GK also equally distributes the ball to each side of the pitch, as zones 1 and 3 have a similar number of distributions, this is also true for zones 4 and 6 and zones 7 and 9. As this is the GK playing at the highest level, it suggests that the GK plans in advance his distributions, or that they are tactically predetermined. The B team GK also portrays the same traits, as many of his distributions are centrallydistributed, however they are slightly more defensive in his distribution as the majority of the distributions are in the zones closest to him and relatively few distributions are made to the furthest zones.

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Again this GK equally distributes the ball to the wider zones, suggesting that his distributions are also tactically planned. This GK plays in the league below the A team GK, which is still a very high level. These two distribution performances are very similar and suggest that GK's playing at a high level are well trained and able to execute distribution choices learnt from their training. This is also a suggested method of distribution by the Football Association (2010, 15) who identifies this tactic in their level 2 handbook for goalkeepercoaching.

In contrast the C team GK has a very different distribution pattern, distributions were made evenly to zones 1, 2, 3, 5 and 6 This pattern of distribution is what anecdotally would be expected of a less proficient GK as these are the zones where there are less opposition players and a successful distribution is more likely. This GK makes few distributions to zones 7-9, however this was the only GK to directly set up a goal from a long distribution, which suggests that the C team GK strategically restricts long distribution to occasions where there is a high chance of success. This strategy worked to his advantage as he had the highest percentage of successful kicked distributions, which shows an understanding of team and individual tactics. The JA GK is the youngest (17 years), least experienced and least physically developed GK.

This is a possible justification for his lack of structure and discipline in distributions. Table 1 shows a lack of long distributions, this could be for physiological reasons, as it requires the greatest amount of strength to achieve a distribution into the final zones. Additionally when looking at the distributions of this GK it does not appear that any pre-planned tactics were implemented. However this GK trains 5 times a week and has an experienced GK coach, therefore it is more likely that distribution tactics have been designed, however it was not visible because the GK was not capable of implementing them, possibly due to unpredicted or unexpected outfield player movements, fatigue or lack of confidence.

When distributions are combined the most distributed to zone is zone 5, the centre of the pitch, however it was found that this is one of the least successful zones to distribute the ball to, as possession is often lost here from GK distributions. The reason for this is that there are many players from both teams in and around zone 5 all trying to win the ball, which makes gaining possession very difficult. However GK's favour this zone for many reasons, firstly it allows the ball to be contested in a neutral zone. This means if their teammate wins the ball they have a chance of developing an attack, whereas if they lose the ball they have adequate time and opportunities to defend before an attack can be made.

Secondly this zone is central on the pitch there is a reduced risk of the ball going out of play from a bad distribution, which would be noted as a GK error. This analysis was taken one stage further as the χ^2 test make it possible to see if there was any statistical significance between the zones GK's favoured most and least, comparisons between the expected values and residual values found that none of the GK's favoured the same zone, however remarkably the A, C and JA GK's all had zone 9 as their least distributed tozone.

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Type of Distribution:-

There were four observed types of distribution, Kicks, Rolls, Throws and Head. Headed distributions are very uncommon and were performed by only 1 GK, this only represented 0.003% of their distributions. There was a significant difference ($\chi^2 = 15.157$, P<0.05) between all the types of distribution that the GK's performed, this combined with distribution location results suggest a low probability that results are due to random chance and that the GK's distributions are specific to each individual. Figure 2 shows that the most common distribution is a kick, this was expected due to game rules and the number of dead ball situations, where the only option is a kick. The A and C GK's use the kick 83% and 83.7% of their distributions respectively, only a 0.7% difference, whilst the B and JA GK's use the kick as 75.4% and 75.2% of their distributions respectively a 0.2% difference.

The next most favoured distribution for all the GK's was a Roll. GK's often trust their throw rather than their kick. Wesson, (2002, p35) explains this by showing that the ball can be quite accurately rolled or thrown to a colleague. A roll is often favoured as it can be played fast, accurately and allows the ball to be easily controlled by the receiving player, this is extremely advantageous in counter attacks. None of the GK's executed rolls into zones 7-9, this is because the roll is only used as an accurate short-medium distance distribution, if it were applied over a long distance accuracy would be compromised. This indicates that the roll is used as a method to get the ball to a teammate, usually a defender who will progress forward with the ball, either by dribbling or passing.

Success of Distribution:-

To fully distinguish the GK's it's important the success of their distributions is analysed. A significant difference ($\chi^2 = 22.62$, P<0.05) exists in the success of each GK's distributions. Luxbacher and Klein, (2002) state that a preferred distribution to a receiving player would be to their feet and Klein (2002, p107) show that this is preferable to a longer distribution which does not go their feet thereby requiring more effort to control the ball. The A team GK was significantly ($\chi^2 = 16.622$, P<0.05) better at successful rolled and thrown distributions. This would be expected, as the GK playing at the highest level, should have the greatest accuracy, especially over short and medium distances. Figure 2 shows The B, C, and JA GK's had high percentages of rolled and kicked distributions, but did not perform as well, unexpected as the roll and throw are statistically easier distribution types. Therefore the other GK's would have been expected to perform better then the A team GK, as they had more opportunities to create success from traditionally easier distributions. This result is testament to the A team GK as he had the best roll and throw record with lessdistributions.

Distributions Outcome:-

The final part of the distribution section looked at the outcome of the GK's distributions. This is arguably one of the most important aspects of the GK's performance, as good distribution can create scoring opportunities but a mistake can lead to conceding a

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goal. The ability to score goals when possession is regained in defensive positions would appear crucial to success in international soccer. Carling, Williams and Reilly 2005, p25) stated this finding highlights the important role played by the GK in initiating offensive play through effective distribution of the ball. There was no significant difference found between the outcomes of GK distributions ($\chi^2 = 11.845$, $P>0.05$). The results in figure 4 show that all of the GK's outcomes produced much more attacks (successful distributions) then anything else, again testament to the selection of these GK's as the first choice for their team. All the GK's had a similar number of their distributions returned, there could be many different reasons for this. It should be noted that only one of the distributions from the C team GK set up a goal, this is not a common tactic coached in football played by these teams, however the C team GK should be acknowledged for his accomplishment in setting up a goal from a distribution.

Conclusion:-

There are clearly significant differences in the GK's performances, this is due to the numerous options and events that occur in a football match. However for significant differences to exist each GK needed to display some consistent patterns in their performance, which were different to the other GK's. This research has found that the GK's did indeed have their own performances, and these differences match what anecdotally would be expected of a GK playing at their respective level. It was also shows that GK's do truly perform to better standards as their level of competition increases, this is performed by doing the simpler tasks to a near perfect level and more complex tasks well. The fact that each GK plays at a different level is important, as they will be playing against opposition of varying ability, therefore the games at different levels have different demands for GK's. Furthermore as GK's progresses through their career and become more experienced they will receive different coaching, as a result they learn how to perform tactics in game situations, as they progress this becomes entrenched in their performances.

These results support the findings of Oberstone, (2010) who suggested that GK's performance levels could be grouped, this study has found that 2 distinct groups exist. The first group for the A and B GK's who performed at a higher level. The second group of the C and JA GK's who performed to a lower level. The results from thisstudy back up this statement as they show the differences in GK distribution performance are the factors of the level that a GK's plays at. A great example of this showed the A team GK played many distributions into advanced areas of the pitch and was reasonably successful at this. Whereas the B and C GK's played less advanced distributions, whilst also playing successfully into wide positions where there are less players. This suggests that the A team GK is able to successfully make decisions as to the best times for a long distribution. The JA GK played very short distributions so that they were received by his defence and recorded as successfully distributed, however this lead to a veryfewdirect attacks. These are trademark actions of GK's playing to their strengths and following the pattern of play as their performance level dictates.

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