

# AN AHP/ANP MULTICRITERIA METHODOLOGY TO ESTIMATE THE VALUE AND TRANSFER FEES OF PROFESSIONAL FOOTBALL PLAYERS\*

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## ABSTRACT

This paper presents a new methodology based on AHP and ANP (Saaty, 1980, 1996) to estimate the value and transfer fees of professional football players. The paper extends the AHP multicriteria methodology proposed by Moreno-Jiménez et al. (2010) for estimating the value of these sportsmen. The new approach multiplicatively combines the (intrinsic) value of the player (estimated by means of AHP through a hierarchy that includes technical, sportive and socio-cultural criteria) with a corrector factor, which reflects economic and business aspects. This factor, which modifies the value of the player by increasing or decreasing it as a percentage, is obtained in two different ways. The first is by means of AHP and considers the four (independent) actors associated with any economic transaction - the market, the player, the seller and the buyer; the second supposes dependencies among these actors and is calculated by means of ANP. The proposed methodology has been applied to estimate the value and transfer fee of the Spanish footballer David Villa.

Keywords: Multicriteria Valuation, AHP, ANP, Value, Transfer fee, Football Player.

## 1. Introduction

The transfer fee of a player is usually determined through a process of negotiation between the three actors directly implicated in the transaction: *the selling club, the buying club and the player*. This negotiation takes place within the context of the current economic climate (*the market*). In general, there are very few occasions in which a scientific approach has been used to facilitate the aforementioned negotiation process. However, it is very often the case that when clubs seek financing they have to present the accounts of the business and the assets include the estimated value of the players under contract to the club. This paper proposes a multicriteria methodology, based on AHP and ANP, which allows the scientific assessment of the value of a professional football player and the determination of the transfer fee that might be demanded and paid in the market. The methodology simultaneously considers the tangible and intangible aspects in the valuation of a player (AHP) whilst taking into account the interdependencies of the actors implicated in the negotiation (ANP). The intangible aspects are evaluated by a group of qualified experts representing different interests within the world of professional football.

## 2. Multicriteria Valuation. Value and Price

The term 'valuation' is generally understood as the determination or estimation of the price of an asset. This is a traditional economic definition based on the paradigm of substantive rationality and is exclusively concerned with the tangible aspects of the asset. Since the mid 1970's and the more recent

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development of new decisional paradigms (Moreno-Jiménez, et al., 1999; 2001; Moreno-Jiménez, 2003) valuations may take both tangible and intangible aspects into account.

The economic valuation of intangible aspects and their incorporation (along with the tangible aspects) into formal models that aid decision making processes is an issue of undoubted interest in the field of multicriteria decision making (Aznar et al., 2009). Nowadays, valuations are closely related to the knowledge that participants are able to contribute to the resolution of the problem. Once the attributes relevant to the process of valuation are set, we measure the relationship and intensity of these attributes in each of the alternatives or assets that are being considered. The value of the asset in question is then determined from these relationships and the values that are already known.

Although value and price are two terms that are usually used indiscriminately, they are not the same. Value refers to the profit or benefit that is received from a good whilst price refers to how much it costs to buy. As Warren Buffer (1930) suggested, price is what is paid and value is what is obtained. This is the definition that will be adhered to in this work. With regards to its analytical relationship, *Price* will be based on *Value* which will be corrected by means of a *Factor* that reflects the economic criteria that influence the negotiation process between the four actors implicated in the process of buying and selling a football player: the market, the player, the selling club and the buying club.

$$\text{Player transfer fee (Price)} = \text{Value of player} * \text{Corrective Factor} \quad (1)$$

### **3. Multicriteria estimation of the value of a football player**

A basic model for the valuation of professional footballers can be seen in Aznar and Guijarro (2008). Three attributes (goals per game, years played at optimum level and image rights) and six actors (experts?) valued the player Mackay, using goal programming to determine the relative importance of the factors (the players). This was a very simple application of AHP in the valuation context, but not a true methodology for the valuation of professional footballers (among other shortcomings, it lacks a scientific analysis of the relevant aspects of the problem).

In the first four months of 2010, a research team made up of Professors Aznar, Estruch and Guijarro from the University of Valencia and coordinated by the author of this paper developed a new methodology for the valuation of professional footballers (Moreno-Jiménez et al., 2010). The new model, based on the work of Aznar et al. (2009), involves three stages: the first two use a multicriteria approach (AHP) to determine the priorities relative to the players that are being compared, whilst the third stage employs a comparative method for the estimation of the monetary value associated with the priority of the player that is being valued.

The monetary value was estimated by a group of eleven experts from different areas of the world of football. In the first stage, the experts decide on the attributes relevant to the six subcriteria suggested by the coordinator of the research team with respect of the position of the player in question (in this case, a striker), in order to determine the (intrinsic) value of that player. The hierarchical model contemplates two criteria and each one has three subcriteria (see Figure 1). The two criteria are: C1. *Technical-Sporting* and C2. *Socio-Cultural*. The subcriteria for C1 are: SC1.1. *Aptitudes*, SC1.2. *Physical aspects*, and SC1.3. *Attitudes*. These subcriteria reflect the cognitive, psychomotor and affective aspects associated with human beings (Bloom et al., 1956). The subcriteria for C2 are: SC2.1. *Internal relationships*, SC2.2. *External relationships*, and SC2.3. *Personal characteristics*.

In the second stage, each of the experts (they do not have to be the same as the initial group) compares, for each of the subcriteria (six in our example), the player that is being valued with a series of similar players (playing in the same position and fulfilling equivalent roles) that have recently been transferred (if this is not possible, older transfers would have to be used with the fees updated). The subcriteria priorities in this second stage are those obtained in the previous stage with the complete group of experts (11 in our case); these priorities reflect an integral vision of the world of football.

The third stage is the estimation of the value of the player. The experts correct the known transfer fees of the market associated with previous transfers to determine the intrinsic values of the players used as comparables. With the priorities ( $w_j^{[k]}$ ) and monetary values of the comparables ( $X_j^{[k]}$ ) provided by the experts ( $k = 1, \dots, r$ ) and the relative priority ( $w_y^{[k]}$ ) of the player whose value ( $Y^{[k]}$ ) we wish to estimate; this value ( $k$ ) is given by each expert and calculated by the following expression:

$$Y^{[k]} = \sum_j X_j^{[k]} * \frac{w_y^{[k]}}{\sum_j w_j^{[k]}} \quad (2)$$

#### 4. Multicriteria estimation of the transfer fee of a football player

In this first phase of the methodology the (intrinsic and perceptual) value of the player is estimated. The second phase estimates the transfer fee of the player in the market. The setting of a transfer fee is a complex process that is dependent on a large number of variables. In what follows, the transfer fee is calculated by correcting (raising or lowering) the value of the player that was obtained in the previous phase. The correction is made with an average percentage that can be estimated using AHP or ANP, depending on the inclusion of the independence or dependence of the actors implicated in the negotiation process.

The stages of the methodology for the estimation of the transfer fee of a player, based on the player's value are: Stage 4: Calculation of the Corrective Factor (FC) using AHP or ANP and Stage 5: Obtaining the individual and collective transfer fees. A new hierarchy of three levels is constructed for calculating the Corrective Factor. The mission – the estimation of the Corrective Factor – is placed on the upper level. The second level includes the four actors: the Market (M); the Selling Club (S), the Buying Club (B) and the Player (P). The third level has the range of percentages (alternatives) that will correct (lower or raise) the value of the player that was obtained in the previous phase. On the supposition that there are interdependencies between the actors, then ANP is used; in our case, the interdependencies considered between the four actors on level 2 of the hierarchy are: the Market (M) influence on the other three actors and each of the other actors (S, B, and P) that influence the other two, though they do not influence the market or themselves.

In stage 5, having calculated the transfer fee of the player for each of the experts, a collective figure is obtained from one of the measurements of the individual values, although it is more convenient to give a range of values representing the individual transfer fees and their arithmetical average as a synthesis measurement.

#### 5. Case study

The methodology (Phase 1-valuation; Phase 2 -estimation of transfer fee) is now applied to a real life case: the valuation and estimation of transfer fee for Spanish international player David Villa who recently left Valencia to join Barcelona (19<sup>th</sup> May 2010). The estimation of the value of David Villa (Phase 1 of the methodology) was undertaken in the first quarter of 2010. The results were made public by the team coordinator (José María Moreno-Jiménez) on the 6<sup>th</sup> of May 2010 at a conference on marketing organised by the ESIC Business School in Zaragoza (Moreno-Jiménez et al., 2010). Both the hierarchical model and the group priorities of the elements (the experts were sufficiently homogeneous<sup>1</sup>) can be seen in Figure 1. These elements (criteria, subcriteria and aspects) are:

##### C1: TECHNICAL-SPORTING

- **SC1.1: Aptitudes** (goals, penalties, fouls, minutes, assists)
- **SC1.2: Motor or Physical Aspects** (speed, endurance, strength, previous injuries, age, recovery from injury, general health etc.)

<sup>1</sup> The Geometric COMPatibility Index defined as  $GCOMPI = \frac{2}{(n-1)(n-2)} \sum_{i < j} \log^2 \left( \frac{w_j^{[i]} w_i^{[j]}}{w_i^{[i]} w_j^{[j]}} \right)$  can be used.

- **SC1.3: Attitudes** (control, commitment to self-improvement, choosing the correct option, concentration, team-spirit, sacrifice, leadership etc.)

**C2: SOCIO-CULTURAL**

- **SC2.1: Internal relationships** (with the coach, manager, team-mates directors etc.)
- **SC2.2: External relationships** (rival fans, mass media etc.)
- **SC2.3: Personal characteristics** (personality, professionalism, personal habits etc.)

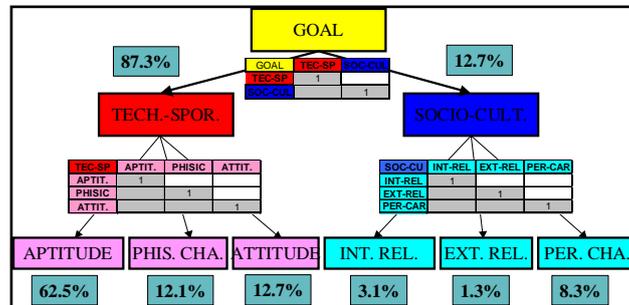


Figure 1. Stage 1 Hierarchy and priorities

The second stage of Phase 1 began by selecting a group of players (witnesses) that could be considered as similar to David Villa, in terms of position and role in the team, and a new group of experts with knowledge of the comparables. Three players (witnesses) that had been transferred in the last year were selected; this meant that it was not necessary to adjust their transfer fees to the current market. The players were: Benzema, signed by Real Madrid for 35 million euros, Etoo, bought by Inter Milan for 20 million euros and Ibrahimovich who joined Barcelona for 65 million euros.

The new group of experts was made up of 7 of the original group. Each of the seven experts gave a valuation of the relative importance of the four players for five of the six subcriteria. For the most important of the subcriteria (SC1.1 Aptitudes), which had a priority of 62.5%, the valuation of the relative importance of the players was undertaken in an objective manner. The experts selected 5 attributes as the most relevant: goals scored for each 1,000 minutes played; penalties won for each 1,000 played; fouls received for each 1,000 minutes played; goal assists for each 1,000 minutes played; total minutes played. The attributes were given the following relative importance: 50% for goals scored; 15% for penalties won; 15% for fouls received; 10% for assists; 10% for minutes played.

From the priorities for the four players obtained in the previous stage for each expert and the market transfer fee for each of the witnesses (Benzema, Etoo e Ibra), the third stage estimates the value of Villa, in accordance with the values assigned to the witnesses by the experts, by means of expression (2). In this case, the value of Villa for Expert 5 is:

$$Y^{\square} = \sum_{j=1}^3 X_j^{\square} * \frac{w_y^{\square}}{\sum_{j=1}^3 w_j^{\square}} = (5 + 35 + 35) * \frac{0.313}{(0.169 + 0.266 + 0.253)} = 95 * \frac{0.313}{0.687} = 43,250\text{€}$$

The values for Villa (similarly obtained) for the other experts are between 42.250 million € and 46.762 million €. The average valuation is 44.548 million €. Having obtained the value for Villa given by the seven experts, the study moves to the second phase of the methodology – the estimation of the transfer fee. As indicated in expression (1), it is necessary to calculate a *corrective factor* that links the valuation to the transfer fee. The corrective factor encompasses economic-business aspects and there are two alternative methods for its calculation, depending on whether there is dependence or independence between the four actors involved. If the factors are considered as independent, AHP (Saaty, 1980) is used, if they are dependent, ANP (Saaty, 1996) is utilised.

The actors and influential aspects are as follows:

- **The Buying Club (B)**: name, need for the player, image, promotion or relegation, new manager, new Board of Directors etc.

- **The Selling Club (S):** name, need for the player, image, promotion or relegation, new manager, new Board of Directors etc.
- **The Player (P):** attitude to transfer, current wages, duration of current contract, duration of future contract, contract cancellation clause (if there is one in that country) etc.
- **The Market (M):** general economic situation, alternative products (similar players), demand, legal and financial restrictions etc.

Based on the supposition of independence (AHP), the corresponding hierarchy is:

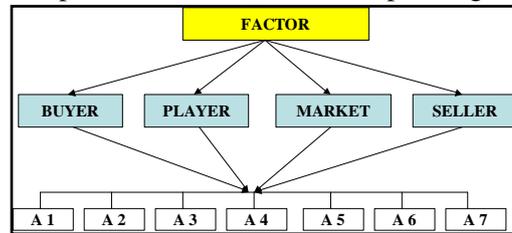


Figure 2. Hierarchy to obtain the corrective factor

Taking the class markers as representative of each range (alternative), the average correction (up or down) for expert 5 is given as a scalar product of the priorities vector ( $w_j$ ) by the class markers vector ( $m_j$ ) of the respective ranges ( $j=1, \dots, 7$ ) (see Table 1). In this case, with a reduction of value (43.25 million euros) of 3.325% Villa's transfer fee was given as 41,812,000 €.

Table 1. Value, corrective factor and transfer fee for Expert 5

<b>Expert 5</b>					<b>Value</b>	<b>43.250</b>	<b>Correction</b>	<b>-3.325</b>
<b>m<sub>j</sub></b>	-40	-20	-5	0	5	20	40	
<b>Alternatives</b>	[-50%, -30%]	[-30%, -10%]	[-10%, 0%]	0%	(0-10%]	(10%-30%]	(30%-50%]	
<b>Priori. (w<sub>j</sub>)</b>	0.000	0.06	0.505	0.355	0.08	0.000	0.000	

**Price** 41.812

The transfer fee of the other experts was obtained in the same way (in some cases an estimation of the priorities was based on the opinions of the experts). The transfer fees given for David Villa were between 40.628 and 43.848 million euros with an average fee, obtained after the correction of the valuation, (an average reduction of 6.396%) of 41,689,000 €. In reality, the fee reported in the mass media for the transfer of Villa from Valencia to Barcelona was 40 million euros.

Based on the supposition that there is dependence among the actors, ANP was used to estimate the priorities of the different alternatives and the corrective factor for each expert. The only difference with the hierarchy used in the previous approach is that we include dependence relationships between the actors: The Market influences the other three actors (Buying club, Selling club and Player); each of these influences the other two but they do not influence the Market or themselves. The *Superdecision* programme (<http://Superdecisions.com>) was used to determine the priorities of the alternatives for expert 5 (Table 2) and produce a new corrective factor of -2.674% (see Table 2), slightly lower than that calculated with the previous approach (-3.325%).

Table 2. Corrective factor, value and transfer fee for Expert 5 with ANP

<b>Expert 5</b>					<b>Value</b>	<b>43.250</b>	<b>Correction</b>	<b>-2.674</b>
<b>m<sub>j</sub></b>	-40	-20	-5	0	5	20	40	
<b>Alternatives</b>	[-50%, -30%]	[-30%, -10%]	[-10%, 0%]	0%	(0-10%]	(10%-30%]	(30%-50%]	
<b>Prior. (w<sub>j</sub>)</b>	0.010	0.046	0.523	0.268	0.133	0.010	0.010	

**Price** 42.094

As with expert 5 (with the aim of illustrating the methodology), the corrective factors and estimated transfer fees were obtained for the other experts by means of ANP and, as with AHP, the range of fees and the average fee were calculated for the group of experts.

## **6. Conclusions**

This paper presents a new methodology for estimating the value and transfer fees of professional football players. The methodology uses mixed valuation (multicriteria and comparative) that adapts to each specific situation, in other words, it depends on the player that is being valued and that player's position on the field of play. Although the attributes associated with each subcriterion, the group of experts and the aspects contemplated for the actors must be adapted to the specific problem, the methodology is common and is made up of two phases.

From a methodological point of view, the robustness of the approach and the stability of the results could be analysed by means of stability intervals in priorities (Aguarón and Moreno-Jiménez, 2000) and stability intervals in consistency (Aguarón et al., 2003). The different aspects related to multiple actor decision making, both in group decisions (Moreno-Jiménez et al., 2005, 2008) and negotiated decisions (Altuzarra et al., 2010) might also be worthy of attention.

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