



## Estimating Iranian Professional Football Players' Prices A Neural Networks Approach

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### ABSTRACT

**Purpose:** The study aimed to estimate the price of Iranian professional football league players.

**Methodology:** The research method was mixed exploratory designs, qualitative and quantitative methods. The research participants in the qualitative section included managers, club coaches, and experts familiar with the football players' market. Therefore, fourteen participants were selected by snowball until we reached saturation. The research tool in the qualitative section included in-depth interviews, so the reliability of the re-test method was 81%. In the quantitative section, the statistical population had all the football players in the Iranian Football Professional League during 2016-2020, and random sampling was done. So, 863 players were selected to use their data for analysis. The quantitative methods were also collected from valid sites and the Iranian Football League Organization. The model was also designed through radial neural networks using software SPSS and R.

**Findings:** The qualitative section showed that the player's performance, personal characteristics and abilities, club characteristics, and bubble-creating factors are influential in determining the price of football players. In the quantitative section, a model with three hidden layers was designed, which had a nominal error rate in predicting the price of players.

**Originality:** Today, one of the main problems in the field of transfer in football leagues is the small number of appropriate criteria for pricing players. This study aims to estimate the price of professional football players using artificial neural networks.

### Keywords

Football Clubs  
Players Market  
Players' Value  
Pricing, Players Transfer

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## 1. Introduction

The World Football Association, with millions of players and billions of fans, is the world's most popular sports organization (Müller et al., 2017). The budgets of the best football clubs are continually growing, and the value of the best players is also increasing (Majewski, 2021). Due to this increasing amount of money, the sport has become an essential part of the global economy (Klobučnik et al., 2019). Only in 2020 was a slowdown in club spending and revenues due to the COVID-19 pandemic (Metelski & Kornakov, 2021). Many scientists have also tried to determine which factors have the most significant impact on the value of players (Felipe et al., 2020).

From the point of view of sports club management, the most critical decision that affects the success or failure of football clubs and should be carefully considered and then adopted is the attraction of players (Amir & Livne, 2005). The study of Müller et al. (2017) showed that the innovative approach to player recruitment has been a great help in the last two decades to the teams. So, despite the minimum budget spending, they have achieved a good position in the club rankings. Football players are not only human resources for the clubs that attract them; their sports skills and expertise are intangible assets that are valuable and can be traded. Poli (2005) believes that football players have two values. First, they have a virtual value, which they raise or lower through their evolutions on the field and hold if they are legitimated at a club. When the footballer is offered for sale, the virtual value turns into a real deal, with the footballer ready to be sold in return for money (financial value). Of course, this value applies to players with the skills and value to sell for cash, called market value. A player's market value estimates how much a team can sell the player's contract to another group (Herm et al., 2014).

One of the main activities of football clubs is trading (acquisition and disposal) of player contracts (Amir & Livne, 2005). In football, talents are traded in markets specific to the sport, known as transfer markets (Roşca, 2012). The primary justification for the players' transfer and trading system is that the club can regain its capital by training and developing players' skills (Amir & Livne, 2005). Since transferring players significantly affects a club's chances of success (Pawlowski et al., 2010), researchers from various disciplines have long studied the factors that impact transfer fees (Frick, 2007). Of course, it must be acknowledged that most of the transfer fees of football players are related to the price of the players.

However, today, pricing in sports is an art, and pricing decisions reflect a combination of insight, past experiences, and complex analysis. It is one of the critical 4 Ps (Price, Place, Promotion, and Product) in sports marketing that is not created in a gap but is a dynamic and multifaceted process. However, in Iran and some other countries, the pricing of football players does not follow a specific pricing principle and method (Ganj Khanloo et al., 2021; Memari et al., 2020; Sarlab et al., 2022). Also, the study of Dey et al. (2014) showed that some players received more than their competence and performance, and the opposite is true. Besides, although the government provides a lot of financial aid to the clubs and allocates heavy budgets for them, it does not play a role in determining the price of the players, and this is done by the managers and transfer experts of the clubs (Salimi & Tayebi, 2018). Therefore, it can be acknowledged that estimating and predicting the

price of football players is a challenging task. The existence of many parameters, and in many hidden cases, has made a prediction difficult, and complex mathematical algorithms have failed to provide appropriate solutions for an efficient predictive model (Salimi & Tayebi, 2018).

It should be acknowledged that determining players' salaries or contract amounts is an integral part of the sports economy, so minor fluctuations in the amounts will significantly affect a club's income and profitability. Thus, inappropriate planning for determining the value and price of players will impose a heavy load on clubs. In addition, some clubs in Iran face difficulties and challenges in obtaining financial resources. In a way, they are funded by government organizations, and sometimes by the private sector, and generate low income (Izadyar et al., 2016). To eliminate these shortcomings, they use various solutions, such as attracting sponsors and taking loans. However, suppose club managers know the critical factors in pricing football players and the ability to estimate their prices. In that case, the sports budget will be optimally spent, and the risks associated with compensation costs will be reduced (Keefer, 2015). In this regard, the use of statistical data on performance and other characteristics of players using methods of inferring, classification, stability, error correction, and adaptive learning causes awareness and insight of managers and sales officials of football teams able to identify talented and cost-effective players, as well as attract expensive players who have reached their peak with high levels of confidence (Müller et al., 2017; Soltanhoseini et al., 2017; Zhu et al., 2015). Given the above and the importance of football players' pricing, this study aims to estimate the prices of professional football players.

## 2. Methodology

The research method combined qualitative and quantitative methods (GT Approach). The participants in the qualitative section included 14 managers and coaches of football clubs and experts in the Persian Gulf Professional Football League who were familiar with buying, selling, and transferring players. They were determined by purposeful snowball sampling. In the qualitative method, the research tool was an in-depth interview with the statistical sample. The validity of the discussions, as well as the reliability, were investigated by accuracy in determining the subject of the interviews, designing the general planning of the interviews, interviewing with a personal introduction, stating the purpose of the research, expressing data confidentiality and the explanation of why the interviewer was selected for the interview by the researcher during the interviews, taking notes, analyzing the interviews through open, axial and selective coding, and reporting the results of the discussions. In addition, to calculate re-test reliability from the total number of interviews, three interviews were randomly selected, each coded twice at 25-day intervals. Then, the codes specified at these two intervals were compared for the selected interviews, and the stability index at the two coding stages was calculated through existing agreements and non-agreements. The results of this coding are given in Table 1.

**Table 1.** Calculate the reliability of the interview by the retest method.

Row	Interview title	Total number of codes	Number of Agreements	Number of disagreements	Reliability test (%)
1	Interview 3	74	31	12	83%
2	Interview 7	71	29	13	81%
3	Interview 9	70	28	14	80%
	Total	215	88	39	81%

As shown in [Table 1](#), the total number of codes in 25 days is 215, the total number of agreements between codes at these two times is 88, and the total number of non-agreements (expected random arrangements) was equal to 39. The reliability of retesting interviews in this study using the above method is equal to 81%. Given that this figure is more than 60%, it can be said that the reliability of the coding of this research is confirmed. Open, axial, and selective coding methods were used to analyze the data obtained from the interviews.

Besides, the statistical population in the quantitative part to estimate the price of players was all the football players in the Persian Gulf Professional Football League in the years 2016-2020; the number of these teams was 24 teams, and the number of players was 863 people and sampling was done by convenience sampling. In the quantitative method, the given data to estimate the price of football players were extracted from valid sites such as the transfer market<sup>1</sup>, the official website of the Iranian football league<sup>2</sup>, the official website of Premier League football clubs, and the official website of the Football Federation of Iran<sup>3</sup>. The data were also analyzed to design a model for predicting the price of football players by modeling radial bias function (RBF) networks using the software SPSS and R.

### 3. Results

First, in the qualitative statistics part, interviews were conducted with fourteen experts in transferring football players to find the factors affecting the pricing of football players in Iran. In this study, 215 first codes were extracted during the interview process and became 88 more abstract concepts. After the first coding of identification of the codes in which the rest of the interviewees agreed, they were classified (categorized) based on the similarity of the subject, and a title was assigned to each of these categories that is more abstract than the concepts that make up that set of classes. [Table 2](#) shows the concepts made from the first coding and their categorization.

**Table 2.** Open and axial coding of factors affecting player pricing.

The concept of selective coding	The concept of axial coding	The concept of open coding
Principles for Responsible Investment	Factors Related to Player Performance	Honor gained by the player
		Number of yellow cards
		Number of red cards
		Game time

<sup>1</sup> <https://www.transfermarkt.com>

<sup>2</sup> <http://Iranleague.ir>

<sup>3</sup> <http://ffiri.ir>

The concept of selective coding	The concept of axial coding	The concept of open coding
		Number of games in the Premier League
		Number of national games
		Scoring goals
		Helping role in scoring goals
		Non-scoring goal
		Clean sheet
		Age of players
	Factors related to personal characteristics	Height of players
		Game post
		Skill to use both feet
		Ball keeping
		Dripple
		Short pass
		Long pass
	Factors related to player abilities	Ability to finish
		Head
		Defense
		Shooting
		Speed
		Ability to keep one's own goal
		Danger repels ability
		Value of club
	Club Characteristics	Honor gained by a club
		History of participation in the Premier League
		News
	Factors causing the price bubble	Internet
		Agents (brokers)
		Popularity of players

After determining the factors affecting the pricing of professional football players, artificial neural networks were used to estimate their prices. An artificial neural network consists of an input layer, one or more hidden layers, and an output layer, each with several neurons. The number of input and output variables determines the number of neurons in the input and output layers. Trial and error usually specify the number of hidden layers and their neurons at the model training stage (calibration).

The pattern of neural connections, the method of determining the connection weights, and the type of activation function determine the structure of the neural network. In this study, according to the input and output variables, the connection model of neurons and the subject of research, Radial Bias Function (RBF) Networks, were used to model and estimate the price of players. RBF networks are commonly used artificial neural networks for function approximation problems. In mathematical modeling, an RBF network is an artificial neural network that uses radial basis functions as activation. The network output linearly combines the inputs and neuron parameters RBF. Radial basis function networks have many uses, including function approximation, time series prediction, classification, and system control. The processing units of this neural network are focused on a specific position in terms of processing, and this focus is modeled through radial bias functions.

Regarding overall structure, RBF networks are not much different from multilayer networks, and only the type of processing that neurons perform on their inputs is other.

However, RBF networks often have a faster learning and preparation process. It is easier to adjust them due to the focus of neurons on a specific operating range.

### 3.1. Initial model

An artificial neural network with a hidden layer is suitable for approximating any continuing relationship between input and output models. Therefore, in this study, at the beginning of the work, a radial network with a hidden layer and a neuron was used to develop the neural network. Figure 1 shows the designed model for estimating the price of players with a hidden layer and a neuron by software R.

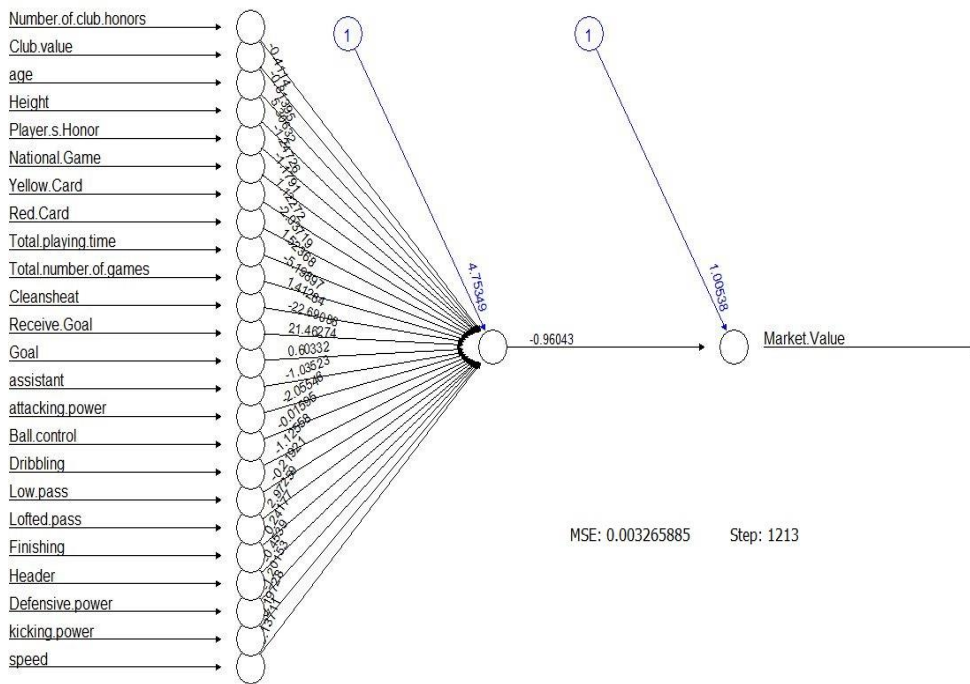


Figure 1. Model designed by RBF neural network with a hidden layer, a neuron, and step 1213.

### 3.2. Model optimization

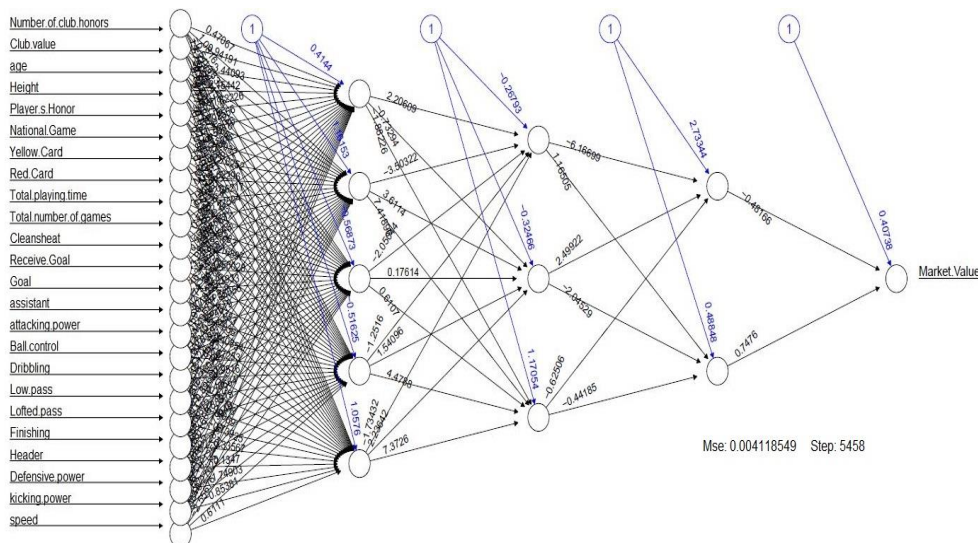
A good optimization algorithm can improve the performance of the deep neural network under fixed network architecture (Yu & Liu, 2019). First-order-based optimization algorithms play an essential role in deep learning because of their efficiency and effectiveness in dealing with large-scale optimization problems (Ruder, 2016). In this study, the predicted price of 647 players for model learning was determined randomly, and the accurate price of the rest of the players (216 samples) was considered for model testing.



**Table 3.** Correlation and error of the predictive model with actual prices.

Number of hidden layers	The number of neurons in the hidden layer	Correlation	MSE	Step	N test	N predict
1	1	0.6430235	0.003265885	1213	216	647
1	2	0.6554715	0.003468584	77	216	647
1	3	0.6958319	0.009816897	3000	216	647
1	4	0.718589	0.003532459	21	216	647
1	5	0.7635277	0.002098218	17	216	647
1	6	0.6301035	0.003590063	17	216	647
2	5&2	0.776117	0.001578392	3675	216	647
2	5&3	0.8154819	0.002168781	19	216	647
2	5&4	0.7070963	0.00300274	19	216	647
3	5&3&2	0.9145935	0.002899686	5458	216	647
3	5&3&3	0.6711332	0.01192906	5458	216	647

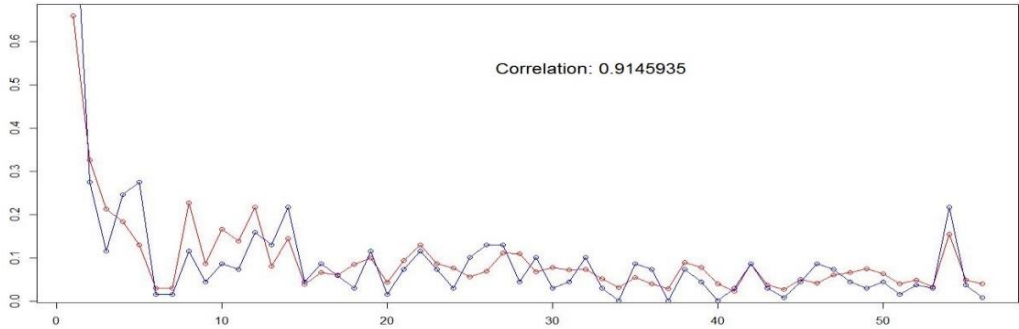
According to Table 3, further model training and increasing the number of hidden layers and neurons and different steps, the correlation value increased, and the model error was reduced. Also, with the excessive increase of hidden layers and neurons, the correlation value of the model is reduced to a certain extent, so the optimal model of predicting the price of players in this study includes three hidden layers and five, three, and two neurons, respectively in the first, second and third layers. Figures 2 and 3 show the final model and correlation between the prices predicted by the model and the accurate price of Iranian football players.



**Figure 2.** Model extracted using neural networks with three hidden layers and five, three, and two neurons, respectively, in the first, second, and third layers, and step 5458.

According to Figures 2, a neural network with supervised radial functions was used to predict the price of football players. The stimulatory functions of neurons in this network are of the sigmoid function type, and the type of network training is in the form of momentum, in which the amount of acceleration (0.67) was considered. The learning rate

was determined in proportion to the network training data (0.75) and the number of repetitions of the algorithm (5458).



**Figure 3.** Correlation between the predicted by the final model and the actual price of Iranian football players.

According to [Figure 3](#), the correlation of the model is 0.9145935, which shows the model's high correlation and optimal fit. [Table 4](#) also shows a few examples of the last model's predictions and the accurate price for Iranian football players.

**Table 4.** The predicted by the final model and the accurate price.

Code player	Real price	Predicted price	Code player	Real price	Predicted price	Code player	Real price	Predicted price
1	3500	2325.754	67	100	198.3818	145	200	319.7121
2	1000	1171.969	71	300	371.3214	151	50	185.8878
5	450	781.377	72	450	495.7539	153	150	127.2368
7	900	684.5204	95	300	345.3614	158	350	349.815
9	1000	498.1041	97	150	313.6257	167	150	178.9636
12	100	154.5379	102	400	242.3666	170	75	143.4966
21	100	150.4425	110	500	288.2361	175	200	220.0255
26	450	830.8387	111	500	432.7378	185	350	193.8088
28	200	346.4264	120	200	428.7168	198	300	258.3179
29	350	623.7996	123	400	281.9238	199	200	277.5929
38	300	527.0626	124	150	316.2712	200	150	305.1878
41	600	798.0123	126	200	299.5382	201	200	266.9699
44	500	329.9487	127	400	303.1407	203	100	187.9471
45	800	550.0001	135	150	229.4202	204	175	216.9882
48	200	181.7339	137	50	157.9934	210	150	161.6197
49	350	279.2557	138	350	236.9837	211	800	581.6456
55	250	255.4742	142	300	185.8389	215	175	215.5675



Code player	Real price	Predicted price	Code player	Real price	Predicted price	Code player	Real price	Predicted price
57	150	343.5186	143	50	145.0164	218	75	189.0269
59	450	391.623	144	300	358.0629	254	350	401.3261

As shown in [Table 4](#), many predictions are close to the players' actual prices, but some differences exist. These differences in predicting players' prices may be due to the irrational and unprincipled determination of the prices of some players in the real world and not paying attention to the scientific indicators of the pricing of some players in the real world, which can be identified through the current research model.

Also, based on the current research on the factors affecting the price of football players and the model presented regarding the estimation of the price of football players, this model can be used at any time and can be developed.

#### 4. Discussion and conclusion

Today, one of the main problems in transfer in football leagues is the small number of appropriate criteria for pricing players ([Memari et al., 2023](#)). With a glance at the number of players' contracts, we will see that not only is it challenging to calculate the price of players due to their multi-faceted nature, but also some football players are costly regarding their performance, and vice versa is true. Therefore, this study aimed to estimate the price of professional football players using artificial neural networks. According to the qualitative results of this study, from the point of view of the interviewees, the most critical factors in estimating the price of players included club characteristics, player characteristics, performance, and abilities, and bubble-generating factors, each of which had a subset that we will describe below.

According to the obtained results from the experts' point of view, the characteristics of the club are among the determining factors in the players' price, including the club's value and brand and the number of honors gained by the club. The value and brand of the club are due to the popularity, equipment, and history of the club. The value and brand of the club are the keys to creating a positive image in the minds of the club's fans, which is inspiring and symbolizes specific values in the minds and mindsets of the fans. The results for the club brand are consistent with the results of ([Izadyar et al., 2016](#); [Tunaru & Viney, 2010](#)). The study of [Izadyar et al. \(2016\)](#) showed that if the player's club brand index increases by 1%, the player's price will increase by an average of 1.45%, with other fixed factors affecting the price.

On the one hand, the number of honors gained by the club not only increases the popularity among the fans but also affects the material value of the club. The study of ([Tunaru & Viney, 2010](#)) showed a positive and significant relationship between club honor and value. The older the club and the longer it is in the prestigious leagues, the better the chances of gaining the club's and players' integrity and value.

According to the study, the characteristics of a player were another factor affecting the price and value of football players. These characteristics include the physical and demographic characteristics of the player, which, according to the study, had the indices

of age, height, play post, and skill of using both feet. Among these features, age was a fundamental index for evaluating the value of buying and selling in the market because it reflects the experience and potential of players. The study of [Bryson et al. \(2009\)](#) showed that age has a nonlinear relationship with the value of buying and selling players, as it increases in the middle of the second decade (mid-twenties) and then reduces. Also, ([Lehmann & Schulze, 2008](#)) showed that age had a relationship with the income and value of football players. However, according to experts, the high price of some exceptions over thirty years old is due to other factors such as experience, increased physical fitness, popularity, and ability to lead.

On the one hand, the height of the players is related to their price and value. This is because the index indicates the player's ability to be hit by the head, which increases the likelihood of gaining and scoring a goal or can prevent the opposing team from scoring by the moderator. The study is consistent with the study of [Fry et al. \(2014\)](#). Another index obtained from the survey was the skill of using both feet for dribbling and shooting. The study of [Brandes and Franck \(2012\)](#) showed that this ability is one of the factors affecting increasing salaries, and the study of ([Herm et al., 2014](#)) also showed the positive effect of this ability on the value of buying and selling football players. However, since the importance of performance indices varies according to the position and most of the players (goalkeeper, defense, midfielder, and forward), these indices should be effective when pricing and evaluating players based on their position. The study of [Brandes and Franck \(2012\)](#); [Garcia-del-Barrio and Pujol \(2007\)](#) also showed that to calculate the types of performance indices of players, the sum of these indices should be considered according to the individual game posts and experts.

The player's performance reflects how well he acts and plays on the playground. According to the results obtained from the perspective of experts, the indices of evaluation include the implementation of players have, the honors gained by the player, the duration of the game, the number of national tournaments, the number of fun in the Premier League, the number of goals scored, the player's helping roles, the number of player's errors and yellow and red cards, and the number of non-scored plans and clean sheets of the goalkeepers. In studies, the number of times a player spends on the playground (player playing time) has always been used to evaluate the value of a player's buying and selling. The study of [Garcia-del-Barrio and Pujol \(2007\)](#); [Gerrard and Dobson \(2000\)](#) indicated that participation in national and international leagues, as well as playing in the national team, has a positive effect on the price of players and the value of buying and selling in the market. Other researchers made a difference between playing during the match season and the total playing time during professional sports ([Franck & Nüesch, 2011](#)), as a substitute ([Bryson et al., 2009](#)) and for a few minutes ([Ruijg & van Ophem, 2015](#)) used to calculate the actual time spent on the playground. Gaining points in football includes scoring goals against the opponent. The goalkeeper repelled scoring goals and his clean sheets. [Bryson et al. \(2009\)](#); [Frick \(2007\)](#) introduced the average number of goals scored in each season and during the player's professional game as a criterion for evaluating a player's performance. In addition, playing a role in achieving a goal or repelling the danger of an opponent's attack was another criterion for the price and value of football players. For example, [Lucifora and Simmons \(2003\)](#) showed evidence from Italian football that playing

a supporting role in attacking an opponent could increase players' salaries. [Lehmann and Schulze \(2008\)](#) also confirmed this in the German Bundesliga.

Another factor affecting the pricing of football players was their abilities and capabilities, including the variables of the power to keep the ball, the ability to dribble, short and long passes, the power of jump and head, the ability to defend and repel danger, the power and ability to shoot, speed, etc. For example, the study of [Herm et al. \(2014\)](#) showed accurate passes; [Franck and Nüesch \(2011\)](#) showed one-on-one combat to repel an attack, block an attack and steal a ball from opposing players; and [He et al. \(2015\)](#) led tackles and correct errors that repel the opponent's attack.

One of the limitations of this study was the effect of some qualitative variables on a player's price that could not be measured or quantified. These variables include social popularity and acceptance, the impact of agents, intermediaries, and the mass media. In their study, [Izadyar et al. \(2016\)](#), in their study, showed that social acceptance is effective in the equation of pricing of football players, and methods such as confirmation and participation of players in charitable activities can be used to promote the social acceptance of players. The study of [Müller et al. \(2017\)](#) showed that the popularity of players has the power to sell club uniforms and stadium seats to fans. The official agents and sports brokers are also a factor in the price of players. In recent years, even professional players have had to contact authorized agents and brokers to play in different teams. The study by [Yaldo and Shamir \(2017\)](#) indicated that estimating the price and salary of a player is a task determined by negotiation between football clubs, agents, and players' representatives.

Despite the efforts of a few studies in this field, the essential variables for determining the price have not been determined by elites and experts in this field and more by limited information, mathematical equations, and simple regressions without the necessary and sufficient validity. Also, due to the complexity and uncertainty of predicting player prices, some of these studies' methods of calculating the final price determination model were inappropriate. The proposed models do not have the necessary capabilities of correction, adaptive learning, classification, tolerance of error, and, most importantly, inference, and this gap is seen to calculate the price of all players, especially new players and newly discovered talents.

For example, [Izadyar et al. \(2016\)](#) used a researcher-made questionnaire to conduct their research. In addition, [Abdi et al. \(2016\)](#); [Müller et al. \(2017\)](#) based on trial and error and regression; ([Herm et al., 2014](#); [Memari et al., 2020](#); [Yaldo & Shamir, 2017](#)) did their studies based on previous articles Data. The only article that so far used both qualitative and quantitative methods to estimate players' prices was the article by [Tayebi et al. \(2022\)](#).

Considering that the same research group conducted both articles, the findings of both types of research are the same in the qualitative part, but in the quantitative factor in the article by [Tayebi et al. \(2022\)](#), the use of artificial intelligence is with a hidden layer and is not very It is not complicated elementary synthetic intelligence methods were used in this research. The data collected from the players were not extensively and complexly analyzed, and the obtained model for estimating the price has a higher error rate for each variable.

However, this article analyzes the data in several layers and examines it more complexly and profoundly. This will reduce the error of calculating the players' prices and the ability to refer more to the research model. In principle, it can be stated that by identifying the weak points of the previous article and the relative detection of errors in the results in the current paper, an attempt has been made to eliminate them, improve the results, and achieve a more accurate prediction.

In general, it can be acknowledged that the most significant difference between this research and similar research was in the research method, estimation method, and price calculation tool. For example, comparing the research method of this research with other research, it can be acknowledged that the researchers that used the regression method to determine the pricing equation, among the countless variables affecting the price of the players, only Several things (such as physical fitness, technique, age, etc.) have a significant impact on their pricing equation.

For example, in the research of [Izadyar et al. \(2016\)](#), the coefficient of determination ( $R^2$ ), which expresses changes in the dependent variable (players' prices) by independent variables (price determining factors), is ( $R^2=0.2$ ). Also, this value is ( $R^2=0.54$ ) in [Abdi et al. \(2016\)](#)'s research. This shows that according to the pricing structure that governs the atmosphere of professional football sports, the explained factors affecting pricing in this research have little effect on the changes in player prices, and the players' prices are derived from other influencing factors. Apart from the factors explained in the equations of the above research, this issue is also well-stated.

It should be acknowledged that not using the opinion of experts in this field and relying on the data obtained from existing linear relationships due to the complex and multidimensional behavior of football players' pricing is not very suitable for prediction and all the practical dimensions and variables. It does not cover and therefore requires using models that can have a more complete and better fit on the pattern of existing relationships between influential variables. Considering this issue, this relationship, which is good in simple linear models, is better in polynomial semi-linear models than linear models and very strong in non-linear models (artificial neural networks); therefore, it can increase the accuracy of forecasts and provide the possibility of necessary planning for those in charge.

According to the above issues, using artificial neural networks in this study increases the accuracy of predictions. It provides the necessary planning for those responsible for buying and selling players in Iranian football clubs. Also, neural network methods do not impose any initial assumptions on data distribution, and their value becomes apparent when the relationship between independent variables (football players' prices) and dependent variables (influential factors) is unclear. Besides, the network's generalizability allows the model to predict the right price for a new player with very little error. The correlation obtained from the results of the last model of this research (Correlation = 0.981253) between the predicted price and the actual price of Iranian football players obtained by training the model indicates this issue.

According to the results of this research and from managerial perspectives, it is suggested to save the budget and costs of Iranian clubs and cut the cost of compensation due to the wrong buy of players before making a buy, first with proper analysis by Elite

experts, the strengths and weaknesses of the club should be measured, and with a holistic view, if the deficiencies are not addressed by the internal talents of the club and the urgent need to buy players from outside the club, all performance variables, abilities, and personal characteristics of the players. Use the data available in reputable sources and the use of the right software to review and then make a buy with the knowledge of price bubbles in the transfer market.

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## برآورد قیمت بازیکنان حرفه‌ای فوتبال ایران بر مبنای استفاده از شبکه‌های عصبی

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### کلیدواژه

ارزش بازیکنان  
باشگاه‌های فوتبال  
بازار بازیکنان  
قیمت گذاری  
نقل و انتقال بازیکنان

### نوع مقاله

پژوهشی اصیل

### چکیده

**هدف:** هدف از انجام این پژوهش برآورد قیمت بازیکنان لیگ برتر فوتبال ایران بود.

**روش:** روش تحقیق، آمیخته اکتشافی و ترکیبی از روش‌های کیفی و کمی بود. جامعه آماری پژوهش در بخش کیفی شامل مدیران، مربیان باشگاه‌ها و کارشناسان آشنا به حوزه بازار بازیکنان فوتبال بودند که چهارده نفر از آنها به روش گلوله برفی تارسیدن به اشباع نظری انتخاب شدند. ابزار تحقیق در بخش کیفی شامل مصاحبه عمیق بود که پایایی آن با روش بازآزمایی ۸۱ درصد محاسبه شد. در بخش کمی، جامعه آماری کلیه بازیکنان لیگ حرفه‌ای فوتبال ایران طی سال‌های ۹۹-۱۳۹۵ بودند که با روش نمونه‌گیری در دسترس، ۸۶۳ بازیکن انتخاب شدند. داده‌ها از سایت‌های معتبر و سازمان لیگ فوتبال ایران جمع‌آوری شد. همچنین این مدل از طریق شبکه‌های عصبی شعاعی با استفاده از نرم‌افزار SPSS و R طراحی شد. **یافته‌ها:** بخش کیفی نشان داد که عملکرد بازیکن، ویژگی‌ها و توانایی‌های فردی، ویژگی‌های باشگاهی و عوامل حباب‌ساز در تعیین قیمت بازیکنان فوتبال مؤثر است. در قسمت کمی مدلی با سه لایه مخفی طراحی شد که کمترین میزان خطا را در پیش‌بینی قیمت بازیکنان داشت.

**اصالت و ابتکار مقاله:** امروزه یکی از مشکلات اساسی در زمینه نقل و انتقالات در لیگ‌های فوتبال کم بودن معیارهای مناسب برای قیمت‌گذاری بازیکنان است. هدف از این مطالعه برآورد قیمت بازیکنان حرفه‌ای فوتبال با استفاده از شبکه‌های عصبی مصنوعی است.

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