Organisational Design Factors and the Efficiency of Spanish First Division Football Teams

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The activity carried out by football players during games can be considered as an example of the characteristics of a team as understood by Organizational Economics. In this study, the Spanish First Division football teams were taken as a sample to evaluate the implemented organisational design. Data Envelopment Analysis was used to calculate the efficiency and the variables representing the degree of coordination achieved in the games were determined by factor analysis. It can be concluded that there are efficient Spanish First Division football teams that have implemented organizational designs leading to good team coordination.

INTRODUCTION

The calculation of the efficiency of sports teams using frontier methods is a field of study that has certain tradition. However, generally speaking, the suggestion of Lovell (1993, p. 18) to relate the efficiency levels achieved to the internal organization of the clubs has not been followed. The main contribution of this article resides in the attempt to follow this recommendation using the football teams that participated in the First Division of the Spanish football league between the years 2001 and 2010 as a study sample. Slack resources, understood as the surplus of productive resources used by the organizations with respect to their isoquant, have been used as a link between efficiency and organizational design.

Firstly, the explanations that Organizational Economics and Strategic Management give for the existence of slack resources in organizations were considered. In this sense two alternatives were found: either slack resources serve to address environmental contingencies and mitigate problems of internal coordination, or they can be considered as wasteful. Secondly, the fact that calculations of levels of efficiency using frontier methods classify all those organizations that are above their isoquant as inefficient, and that the distance from that isoquant is used as a quantification of inefficiency, was also taken into account.

Therefore, the aim of this work is to determine whether the inefficiency observed in First Division Spanish football teams is due to an excessive use of resources or whether it could be justified as the use of slack resources to solve environmental or coordination problems. Consequently, it would necessary to assess whether the activity of football teams reveals any particular characteristics that hinder the internal coordination of its members or if they face particularly convulsive environments.

Within Organizational Economics, the internal structure qualified as "team" would need a design which can result in the use of slack resources. A team is defined as a group of individuals who have a decision-making capacity and share the same objective, but based on different information. Given the characteristics of a team, it is acknowledged that, leaving to one side the uncertainty caused by random events over which it has no control, the results obtained would improve if all of the team's members shared all the available information. However, this implies an increase in the costs of the process, more specifically, an increase in the costs of coordination and in the time used to that end. The solution to this problem has been described as team design, with one of its alternatives being the establishment of slack resources, which implies a reduction in efficiency.

The representative production function of the activity of a football team can be divided into two distinct phases: the activity before a game and that of the game itself. This paper focuses on the second of these two phases, since this is where the team´s output is produced and, at the same time, it is where there is a greater possibility that the types of problems that slack resources could mitigate would arise.

The frontier method known as Data Envelopment Analysis (DEA) has been used to calculate the efficiency. This method has the advantage that it does not require the production function to be defined, while the classification of any deviation from the frontier as inefficiency is commonly cited as its primary disadvantage. However, for the case dealt with in this paper, and adopting the position that all inefficiency or distance from the isoquant may be due to two different causes (excessive use of resources or the use of resources for resolving problems) and trying to determine which one of these explains the case of First Division Spanish football teams, it may be appropriate to start with an inefficiency value equivalent to the maximum distance from the isoquant. To apply the DEA in the calculation of the efficiency of the football teams, sporting success as represented by the points earned throughout the season was taken as the output variable, and offensive plays made and the number of players used in the competition, were taken as input variables. Next, variables representing the need for coordination during games (plays involving a large number of players and passes, throw-ins and clearances that were received by a teammate) and the absence of coordination (plays involving few players, fouls, cards, passes, throw-ins and clearances intercepted by the opponent ...) were taken and a factor analysis was performed to group them and facilitate their use in the last part of the article, which consists in a descriptive study using graphs of the relationship between efficiency and coordination for Spanish First Division football teams.

This paper is structured as follows. In the second section the treatment that Organizational Economics and Strategic Management give to slack resources is presented with the aim of justifying an analysis that attempts to determine whether the inefficiency observed in an organization is due to waste or to the need for internal coordination or for solving environment-related problems. In the third section, the principles of Team Theory are translated to the football team´s activity on the field to demonstrate that the coordination and communication problems presented by the theory are present in the sample under study and, consequently, the solution also proposed by Team Theory consisting of the use of slack resources that reduce efficiency, may have been adopted by some football teams. The fourth section lists the methods that DEA provides for calculating the various efficiency concepts and the results obtained for the sample are analyzed. In the fifth section, a descriptive analysis is done to determine whether the organizational design adopted by football teams to coordinate their play and improve communication during games has negatively affected the levels of efficiency achieved. The paper ends with the conclusions.

SLACK RESOURCES AND EFFICIENCY

The classic model of perfect competition predicts that no companies will obtain extraordinary profits and that resources will be allocated efficiently, i.e. only the quantities strictly necessary will be used and in the right combination according to their prices. However, reality frequently contradicts this prediction and the results obtained vary among companies because the hypothesis that underpins the model does not hold. With regard to the assumptions regarding the performance of the companies themselves, the role played by managers is more complex than that foreseen by Classical Economic Theory, according to which the task of management is limited to the decision regarding the quantity of product to be produced depending on the prevailing market price.

The recognition of the role played by managers in the allocation of resources has given rise to different streams of research. Thus, according Stoelhorst and van Raaij (2004), Organizational Economics tries to answer the question of why firms exist and why they adopt the scale and scope they do, using the coordination of economic activity as an explanation, while Strategic Management focuses on the sources of competitive advantage that explain the differences in the results among companies.

On the other hand, Leibenstein (1966) distinguishes between allocative efficiency and what the author calls "X-Efficiency". According to his view, allocative inefficiency measures only the impact of price distortions and quantities due, for example, to welfare losses caused by monopolies, restrictions on international trade, the existence of subsidies or publicly owned companies, but always under the assumption that all companies buy and use their resources efficiently. This internal efficiency is what Leibenstein (1966) called "X-Efficiency" and would be related to the allocation of managers in the companies, a very important aspect taking into account that they determine not only their own productivity but also that of their subordinates. For Leibenstein (1966) the three main determinants of X-efficiency are intra-company motivation, for example via wages, external motivation due to competition or the imitation by other companies and the proper use of existing knowledge.

Ultimately, the conclusion could be that the internal complexity of companies and the consequent activity of its managers would explain why inefficiencies in the allocation of resources occur. These inefficiencies are understood as the holding of surplus resources in amounts greater than those predicted by Economic Theory or, in the words of Kerschbamer and Tournas (2003), the reason why companies are situated above the isoquant.

These surplus resources are what in literature are known as slack resources, which have been defined in various ways. Cyert and March (1963, p. 36) indicate that the slack "consists in payments to members of the coalition in excess of what is required to maintain the organization" and state that their existence is due to imperfections in the markets for resources. Bourgeois (1981, page 29) defines slack resources as a “Cushion of excess resources available in an organization that will either solve many organizational problems or facilitate the pursuit of goals outside the realm of those dictated by optimization principles”. Although, according to these definitions, slack resources are necessary for the survival of organizations, in the literature there is no consensus as to the effects slack resources have on business performance. While some authors suggest a positive relationship between these two variables, others suggest a negative one. Among the former, Penrose (1959, p. 67) considers that the existence of resources that are not fully utilized in current operations are an incentive for companies to find alternative uses for them and employ them in expansion. The work of Cyert and March (1963, page 38) can also be included within this group; for them slack resources absorb a substantial part of the variability of the environment and play a role in stabilization and adaptation thereby allowing organizations to survive under adverse conditions. On the contrary, Jensen (1986) argues that in those companies where there is a cash flow higher than strictly necessary to finance projects with a positive net present value, managers have incentives to invest inefficiently for the organization, since the cash flow may be used to increase the size of the company as a means of increasing management power and remuneration. Bourgeois (1981) shows that in some cases the slack is treated as a means to ensure the success of the organization while in others it is treated as the equivalent of inefficiency. Given this discrepancy, the author suggests that the relationship between slack and the success of organizations has an inverted U shape, since it is good up to a certain point and from there on it is negative, i.e., the absence of slack is as detrimental to the company as is the presence of too many slack resources.

This lack of consensus has been noted in the literature. Daniel et al. (2004) performed a meta-analysis with the aim of finding a generally applicable relationship between slack resources and performance. They point out that the discrepancies in the conclusions of the previous studies may be because the performance variables proposed have been very diverse and that the influence the slack has on the results depends on the type of slack under consideration.

Regarding the first source of the differences on the effects of slack resources indicated, Wefald et al. (2010) indicate that it may be due to the fact that besides the financial results of the companies, as in Daniel et al. (2004), slack has also been linked to innovation, internal efficiency, organizational structure, risk and knowledge management. Furthermore, both Daniel et al. (2004) and Wefald et al. (2010) agree

that research on the relationship between slack and performance should take into account the industry type.

Regarding the different types of slack, Bourgeois and Singh (1983) distinguish between available, recoverable and potential slack and Singh (1986) differentiates between absorbed and unabsorbed slack. In this respect, when analyzing the relationship between the success of an organization and the assumed risk, Singh (1986) takes into account the possibility that different types of slack cause different effects and verifies that good results are directly related to slack, both absorbed and unabsorbed. In addition, he also tests the indirect relationships between these two variables: on one hand, better results are related with greater absorbed slack, which in turn is linked to greater assumed risk; on the other hand, business success increases decentralization and decentralization decreases with unabsorbed slack.

Different functions are attributed to slack resources in the literature. According to Bourgeois (1981), slack plays two fundamental roles: resolving problems within the organization and the adapting to changing environments. Within the consideration of using slack resources for the resolution of internal problems, this author considers that slack plays the role of an incentive, a resource for problem solving and a buffer. In the latter case, Bourgeois (1981) cites that Galbraith (1973, page 15) acknowledges, "The creation of slack resources, through reduced performance levels, reduces the amount of information that must be processed during task execution and prevents the overloading of hierarchical channels." Nevertheless, there are authors that acknowledge an additional function with negative effects for organizations. Wefald et al. (2010) distinguish between two different theoretical approaches to explain the existence of slack. The first one, aligned with the ideas of Bourgeois (1981), considers that maintaining slack resources is beneficial because managers have them available to attend unexpected demand or to cope with fluctuations in the availability of key materials; in short, slack resources would be useful in situations of uncertainty. The other school of thought suggests that slack in the form of unproductive capacity or unnecessary capital expenditure increases the organization´s costs and yields poorer performance. In summary, we can adopt the view of Daniel et al. (2004): slack resources can be considered as resources to be used to cope in an unpredictable environment or for internal coordination purposes in complex organizations, or they may be construed as a misallocation of inputs or wastage.

For this reason, Lovell (1993, p. 18) indicates the need to use the literature on the internal organization of firms to formulate hypotheses concerning variations in efficiency. According to this author, the hierarchy, the principal-agent relationship and incentives are relevant when measuring the performance of the producers. Furthermore, Organizational Economics and Strategic Management literature also takes into account the differences in efficiency as an explanation for the differences between companies. Stoelhorst and van Raaij (2004) provide a unifying framework of business management theories that explains the differences in firm performance. They conclude there are five sources of differences that can be considered and one of them is precisely the difference in the efficiency of the business processes[1]. Moreover, among the theories that Stoelhorst and van Raaij (2004)[2] put forth, those which correspond with the Chicago School and the Positioning school specifically cite the differences in efficiency as the reason for the existence of large firms with extraordinary profits in the case of the first and for competitive advantages in the second. Furthermore, according to the Resource-based school, and by extension, the Competence-based school, differences in performance may be attributed to the use of different combinations of productive resources, which would be related to the level of efficiency achieved.

In short, following the ideas of Daniel et al. (2004), managers of organizations strive to achieve a balance between efficiency and holding the surplus resources that enable them to react to unexpected environmental threats or opportunities.

In this paper, the games played by Spanish First Division football teams will be taken as a study sample to apply the recommendation of Lovell (1993, p. 18) which consists in relating the results of the calculation of efficiency with the theories concerning the internal organization of firms. In other words, the present article will analyze whether the use of excess resources by football teams is due to the improper allocation of inputs or the need for coordination and adaptation to the environment intrinsic to this industry. Since the study sample is restricted the suggestion of Daniel et al. (2004) and Wefald et al. (2010) is followed and the industry to which the organizations belong is taken account when assessing the relationship between slack resources and performance. Furthermore, it would be necessary to know

whether circumstances that may be qualified as a need for coordination or adaptation to an environment arise during football games. As Jost (2000) and Serra (2001) point out, players interact in a dynamic flow, so that coordination is necessary as each player adapts naturally and immediately to game play. In addition, Team Theory, which focuses on the mechanisms of coordination of the individuals, can provide a theoretical framework for assessing whether the use of slack resources would be justified during football games.

Recent papers are devoted to analyze the relationship between slack resources and some characteristics or decisions taken by firms. Salge and Vera (2013) and Vanacker, Collewaert and Paeleman (2013) study the relationship between slack resources and firm performance. The first of those papers assumes slack resources are necessary to increase learning capabilities which are positively related with performance. The second paper analyses the influence of investors as moderators of the relationship between slack resources and performance. Mousa and Reed (2013) try to give a value to slack resources. Finally, Dosi, Iborra and Safón(2015) and Kim, Cho and Khieu (2014) study the use of slack resources in internationalization and innovation activities, respectively. We could say that the present paper follows this last approach as we try to analyze the possibility and effects of using slack resources in coordination activities by football teams during games.

APPLICATION OF ORGANIZATIONAL ECONOMICS TO FOOTBALL TEAMS

With regards to the productive process of football teams, Schofield (1988), Carmichael and Thomas (1995) and Carmichael, Thomas and Ward (2000) consider a recursive system in which the success of the team depends on the performance of the players during the game. This, in turn, depends on both their abilities and on the work of the coach. Therefore, applying this to football teams, the production function can be considered to consist of two different components, each with its own inputs and outputs:

- Firstly, the players' abilities (sporting talent, physical condition and form, experience, etc.) can be considered together with the work of the coach (work done during training sessions, tactics, line-ups, etc.) as the inputs to a result, which is the team performance during the game, i.e. the offensive and defensive plays against the opposing team.
- Secondly, the offensive and defensive plays (the result of the first component) are taken as inputs that are transformed into success during the games, which can be considered as the output.

Moreover, according to Marschak and Radner (1972, p. 4) a team, as understood by Organizational Economics, consists of various people who perform different tasks, including the collection and communication of information and decision making, but have common interests. The parallel that exists between the characteristics of a football team in the second of the production stages, i.e., during a game, and those of a team as understood by Organizational Economics, can be observed by the activities of its individual members, the existence of common objectives, the influence of the environment on performance, the interdependence between individuals and the solutions proposed to solve the problems derived from the need to co-ordinate. Each of these points will be considered separately.

With regards to the activities of the individuals that make-up a team, as understood by Organizational Economics, attention should first be drawn to the specialization by tasks and, secondly, to the fact that the information available to each of the team's members concerning the environment is different. In the context of football teams, task specialization implies that goalkeepers, fullbacks, midfielders, forwards and the coach are not interchangeable with each other, and they each have distinct tasks assigned to them. In general terms, it is possible to distinguish between the tasks given to the players and the coach: the former interpret and decide the moves to be made during the course of the game on their own account, whilst the latter acts by introducing the relevant changes in the team formation. Furthermore, each player acquires information about the environment during the course of the game (e.g., the goalkeeper and fullbacks with respect to the forwards of the opposing team, and the forwards with respect to the opposition fullbacks), which leads to a situation of information asymmetry.

In the groups that form teams, there is no conflict of interest, and all the team members pursue the same objective (Marschak and Radner, 1972, p. 123ff; Radner, 1972, p. 189). According to Mechtel et al. (2011), a football team is made up of different members who must cooperate to reach a common

objective: to win a football game, although in reality it could be considered a sub-objective of a higher one, which would be to win the league championship in question[3].

As Marschak and Radner (1972, p. 126) demonstrate in the utility function that they establish for a team, the results depend not only on the decisions of its members, but also on the values taken by the variables outside its control, which, for football teams, could be represented by the performance of the opposing team.

Radner (1972, p. 208ff) and Marschak and Radner (1972, p. 126 y 129ff) emphasize that in a group characterized as a team under the terms of Team Theory, the interdependence among the individuals materializes in the effects that the activity of each individual has on the result obtained by the group as a whole. Therefore, to be able to speak of a team, the synergies among its components must be observable, i.e., the results obtained by the team must be greater than the sum of the results that would be obtained individually by each member acting independently. Furthermore, the activity of each member will be considered as optimum, not only in terms of his individual contribution to the result, but also by taking into account the decisions adopted by the remaining members. This would require, given the asymmetry of information of the environment, an exchange of information, since the overall result of the group improves if more information is exchanged and the coordination of activities of the individuals is improved, even when this means that a higher cost must be borne. For a football game, the existence of synergies cannot be directly evaluated. However, there would appear to be empirical evidence of improved results induced by training sessions and implementing rehearsed plays; examples of this are the national teams, which carry out extensive training stages prior to championships, or the case of teams made-up of players who have not previously played together, which only occurs in charity games[4]. Furthermore, the plays that involve various players are an example of interrelated individual activities and the need for an exchange of information. As for the first of these two aspects, the result of these plays depends as much on the decisions of each individual player as on those taken by the remaining members of the team, and not exclusively on the individual action that culminates the play. With regards to the second aspect, the equivalent of the exchange of information in such plays would be the need for the participants to agree among themselves in some way (through brief communications, mutual understanding or standards of conduct), which in turn would improve the outcome of the play, the result of the game and result of the championship, since each player has better information about the situation of his area of the field. Moreover, as opposed to other games like basketball, a football game cannot be interrupted for an exchange of information between the players, or between the players and the coach, with the aim of preparing the plays to be made. When expressed in economic terms, this circumstance can be interpreted as a very high cost of information exchange on the playing field, so that the use of other mechanisms, such as prior planning and training, becomes fundamental.

According to Organizational Economics, a team is a group of individuals specialized in different tasks and with different information about the environment. The exchange of information and the coordination among the individuals improve the overall team performance. Therefore, the problem faced by the team is what information should be shared and what should be the coordination mechanism. This is the case not because there is a conflict of interest between individuals involved in the negotiation, given that they share a common objective, but rather because the transmission of information that increases the profits by facilitating the coordination of the individuals, has a cost. All of these circumstances are aggravated by the random nature of the exogenous contingencies and the impossibility of predicting them in advance.

To resolve the problems derived from the need for coordination of decision making by independent economic agents, the use of the market mechanism has been suggested, given that this provides efficient results in many areas of the economy. However, the conditions required for the market mechanism to produce desirable results is not present for teams. As a result, it is necessary to establish alternative coordination mechanisms, such as establishing rules, programs or procedures that instruct team members on how to respond to each contingency. For football games, this would involve establishing common tactics developed during the training sessions prior to each game. Similarly, decision centers need to be created; during the games, the captain of the team would fill this role, as would the coach, albeit to a lesser extent, since he can only give instructions during half time based on his perception of the game[5]. Furthermore, if the environment is characterized by great uncertainty and variability, the group will need

to revert to systems implying a high degree of individual judgment. In each game, the circumstances of play vary; for example, the rival team is different, and the condition of the field changes from game to game. Thus, despite the tactics established by the coach and the exchange of information that may take place between players or between the captain and the rest of the team, when making individual plays or participating in a collective play, it is the player himself who decides which activity will be performed.

To cope with all of this, Galbraith (1973) proposes different organizational designs that facilitate the transmission and reception of the information necessary for the coordination task. One of these is the establishment of slack resources, which absorb the impact of unforeseen contingencies but, consequently, allow fewer resources to be dedicated to the anticipation of this contingency and to designing rules or procedures to deal with it. The existence of such resources therefore leads to a reduction in the efficiency of an organization.

Therefore, the premise of this study and its justification could be stated as follows: when performing the second stage of the production process, football teams show the characteristics of teams as defined by Organizational Economics. Consequently, there is a need for coordination that must be solved by an organizational design. But this organizational design can be based, or not, on the use of slack resources, which produces a decrease in efficiency. This statement relates the levels of efficiency reached by the football teams to the organizational design implemented during the game. So, two different situations, with different implications and recommendations, can be observed:

- *Situation 1: Highly efficient teams have fewer coordination problems and that the inefficient ones do no not implement an organizational design that leads to coordination among its members.*
  It follows that the former have implemented an internal design that achieves the coordination of, and communication between individuals during the game without using slack resources. In this case, the inefficiency observed in the other teams could be classified as a waste of resources. The recommendation for the inefficient teams is that it would be possible to achieve a higher level of output from the same allocation of resources by changing the organizational design until it is similar to that of teams with higher levels of efficiency.
- *Situation 2: The most efficient teams are found to have coordination problems and the rest do not.*
  One might conclude that the inefficient ones are inefficient because they have resorted to the use of slack resources to achieve the necessary coordination among the individuals during a game. This case would indicate a situation that would justify the existence of slack resources by the improved coordination and communication among the players during the games, and the teams could choose between organizational designs that enhance the coordination of individuals and others that allow it to reach high levels of efficiency.

Since the purpose of this study is not hypothesis testing but the analysis of which of the possible relationships between coordination and efficiency is shown in Spanish First Division soccer teams, regressions relating the two variables are not estimated, but a graphical representation is used to draw conclusions. These graphs consist of coordinate axes with values representative of the coordination and efficiency for each unit in the sample. Therefore, the first of the two above scenarios would lead to a concentration of observations in the quadrant of both high efficiency and high coordination values, and the other concentration of points in the quadrant representing low values for both variables. By contrast, the graph for the second situation would show a concentration of units in the quadrant representing high efficiency and low coordination and another cloud of points in the opposite quadrant.

EFFICIENCY OF PROFESSIONAL SPANISH FIRST DIVISION FOOTBALL TEAMS

The high cost of information exchange during football games means that the presence of slack resources would be more justified here than in other activities. Consequently, the classification of a football team as efficient in a given competition cannot be based on theoretical standards or on averages that use data from other industries as a reference; rather, it must be based on the values that reflect the activity of football teams with similar characteristics. Thus, a possible excess use of resources can be evaluated and, consequently, whether or not the organizational design adopted is appropriate, taking into account the restrictions imposed by the rules of the game itself or any other circumstances that affect all football teams in the course of the game. Frontier functions may be especially appropriate as a tool to use

for calculating efficiency for the case in question, since they calculate the efficiency of one unit in comparison to the values of the production activity of a sample that is as homogenous as possible.

Frontier functions measure efficiency with respect to the best observations and correspond to optimization processes. There are a number of different approaches within these types of models, which have been summarized in Førsund, Lovell and Schmidt (1980). In the empirical section of this paper, we will employ deterministic non-parametric frontiers, also known as Data Envelopment Analysis (DEA). These types of models do not establish a specific functional form for the frontier, but they are formed through linear programming techniques, such as the envelopment of the observed values. Companies on a frontier established in this way are classified as efficient. As Farrell (1957) indicates, the most significant aspect of this method is not the graphical representation of the isoquant, but the mathematical formulation via a linear programming problem such as the following:

$$\begin{aligned} \text{P.1.} \qquad & \text{Min } \lambda_{1i} \\ \text{s.t.} \qquad & u \leq z\,U \\ & \lambda_{1i}\,x \geq z\,X \\ & z \in R_{+}^{k} \end{aligned}$$

where λ_{1i} is the total technical efficiency index considering an orientation towards the input (which means that a unit is technically efficient if it is not possible to reduce the use of one of its factors without increasing the use of any other resource or without reducing the amount of any product) and constant returns to scale, u is the vector that represents the amounts of the m products produced by the company, U is the k.m matrix representing the amount of m products for k companies in the sample, x is the amount of the n production factors used by the company whose efficiency is being measured, X is the k.n matrix of the amounts of the n production factors used by the companies in the sample, and z is a vector of parameters that determines efficient combinations of factors and products against which the efficiency of the organization being analyzed is evaluated. When $\lambda_{1i} = 1$, the company being analyzed lies on the isoquant and it is impossible to obtain its production vector with a radial reduction of all its resources.

Since the aim of the analysis is not only to identify those Spanish First Division football teams that efficiently utilize their resources on the playing field, but also to establish the relationship between efficiency and organizational design by analyzing whether the inefficiencies detected are due to the use of slack resources for coordination purposes or due to waste, inefficiency should be classified as all deviations from the frontier, which is what the DEA does. On the other hand, the efficiency ratio values are used as a variable to be explained in a further analysis.

As stated by Lovell (1993, p. 53), a 2-step procedure can be used to explain the factors that influence the efficiency of a business sample in the following manner: first, the efficiency values of the sample under consideration are calculated, and then a regression is estimated whose dependent variable is the efficiency value calculated in the previous stage. However, according to this author, the inconvenience of this method is that the efficiency variable values are bounded, which means that they need to be transformed, or the appropriate econometric techniques applied, before being used as a dependent variable in a regression. Tortosa-Ausina (2003) recommends the use of Tobit regressions, and this is the procedure followed by Drake and Simper (2003) to explain the differences in the efficiency achieved by the police in different parts of England and Wales. However, De Borger and Kerstens (1996) calculate the efficiency of local Belgian governments using various models and limit the use of the Tobit regression to those cases where efficiency values come from bounded models, and use an OLS estimate for the rest. This is why a method for calculating the efficiency that yields unbounded values was chosen; that being the modified version of the DEA proposed by Andersen and Petersen (1993), which allows for the calculation of the value known as super efficiency. The efficiency values obtained by this modified version do not have a maximum value equal to unity, as in the traditional DEA, so they can be used at a later stage of analysis without the problems that arise from using a bounded dependent variable. Using a modified Data Envelopment Analysis with a view to using a regression appears in Lovell, Walters and Wood (1994).

The Andersen and Petersen (1993) modified version of the DEA allows for discrimination and differentiation among the different efficient units and, if constant returns to scale are assumed, consists in solving the following linear programming problem for them:

$$\text{P.2.} \qquad \text{Min } \lambda_i^*$$
$$\text{s.t.} \qquad u \leq z\,U^*$$
$$\lambda_i^*\, x \geq z\,X^*$$
$$z \in R_+^{k-1}$$

where u is the vector representing the quantities of the m products made by the efficient company under analysis, U* is the matrix of range (k-1).m, representing the quantities of the m products for the companies considered in the sample, and for which the one under analysis is excluded, x is the amount of n productive factors used by the company whose efficiency is being measured, X^* is the matrix of range (k-1).n of the quantities of the n inputs used by the companies in the sample, excluding the company being studied, and z is a vector of intensity parameters that determine the combinations of factors and products that are efficient, i.e. that are situated on the isoquant and serve as a reference for the calculation of the efficiency of the organization under study. Since the reassessed efficient unit is not included in the reference sample of this problem, the super efficiency value, which is the ratio λ_i^*, can take on values greater than one. Thus, the efficient units now have a different efficiency value where, obviously, the higher the value, the more efficient the company can be considered to be. The interpretation of λ_i^*, according to Andersen and Petersen (1993), is the proportion by which the amount of productive resources could be increased and the company analyzed still be considered efficient.

To measure the efficiency using Data Envelopment Analysis, the variables and resources considered as possibly being representative of the product have to be determined. The analysis undertaken in this study is centered on the second of the previously mentioned components of the production function, and the choice of variables closely follows the proposals of Espitia-Escuer and García-Cebrián (2004, 2006 and 2008) who also analyzed the efficiency and productivity of Spanish First Division football teams. In our study, success in the competition is considered the output variable, whilst those variables representing offensive play and the performance of the players is considered input.

Regarding the measurement of output as success in the competition, Dawson, Dobson and Gerrard (2000) indicate that a draw is a common game result, and the League rules allow for this result, with no obligation to find a way of determining a winner or loser for each game. Therefore, they consider the number of points accumulated during a season as a variable that conveniently measures a football team's results, since its calculation includes the three possible results of a game (win, lose or draw), and each result is rewarded with a different number of points. This study does not consider the number of goals scored as an output variable, because a team´s final standing in the league depends not on this, but on the difference between goals scored and goals conceded.

As variables representative of offensive play, we considered the number of offensive plays, the number of minutes during which the teams had possession of the ball and the number of shots and headers. The decision of not include defensive moves as input is due to the fact that all teams have to play against each other twice in the Spanish First Division, so the influence of the opposition can considered to be homogenous throughout the sample. In addition, following Espitia-Escuer and García-Cebrián (2010), offensive plays are considered to produce sporting success, i.e., they contribute to obtaining the output of the organizations studied, while defensive plays are aimed at adapting to the environment and, therefore, do not qualify as resources that enter into the production process of football teams.

In addition, the human factor is a production resource present in all activities, so we have also included the number of players as part of the input that characterizes the second part of the production function of a football team. The justification for using the number of players without differentiating between them by their characteristics can again be found in Espitia-Escuer and García-Cebrián (2010), where the authors state that the differences between the individuals is one of the reasons why different levels of efficiency are observed among organizations.

The period taken for this study is the seasons between 2001 and 2010 and the data used was provided by Opta Sports. Values of global technical efficiency and super efficiency are calculated by taking the

data for each of the Spanish First Division football teams individually in each of these seasons. A summary of the results is in Tables 1 and 2.

TABLE 1
DESCRIPTIVE STATISTICS OF THE EFFICIENCY VALUES OBTAINED

	Total technical efficiency	Super efficiency
Maximum	1.0000	1.3360
Minimum	0.3715	0.3715
Average	0.7526	0.7655
Standard Deviation	0.1555	0.1803

The data presented in Table 1 show that the average total technical efficiency and super efficiency are similar for the sample studied, but the results for super efficiency show a somewhat greater dispersion as the efficient units have values greater than unity. Moreover, the reason that the minimum value is identical for both is due to the fact the only difference in the values obtained is shown for the efficient units.

EXPLANATORY FACTORS FOR EFFICIENCY AND THEIR RELATIONSHIP TO FOOTBALL TEAM ORGANISATIONAL DESIGN

To detect whether the inefficient use of resources by football teams in developing their game is due to the use of slack resources as a solution to the problems of organizational design or due to waste, a factor analysis was performed as a first step. This takes a comprehensive set of actions as explanatory variables which indicate a high degree of coordination among team members on the field of play (such as good passes, goal kicks and clearances that reach a team-mate or plays involving a large number of players). Conversely, it also considers those reflecting poor coordination (e.g., a loss of possession, substitutions, made, poor passing, goal kicks and clearances that reach an opponent or plays in which few players participate). All of these variables have been taken for the span of the study, i.e. for the seasons between 2001 and 2010.

After eliminating all those variables with a high correlation, the factor analysis determined that the explanatory variables to be considered in the study are those shown in Table 3. Of these, the variables considered as indicative of coordination among team members are plays involving 7, 8 or 9 players. The variables proposed as indicative of poor team coordination are fouls committed, yellow and red cards received and play involving 1, 2 or 3 players.

TABLE 2
SUPEREFFICIENCY VALUES OBTAINED BY THE EFFICIENT FOOTBALL TEAMS

Season	Team	Super efficiency
2001/2002	Valencia	1.1632
2002/2003	Madrid	1.0191
2002/2003	Real Sociedad	1.1268
2003/2004	Deportivo	1.1436
2003/2004	Valencia	1.1678
2004/2005	Barcelona	1.0904
2004/2005	Madrid	1.1651
2005/2006	Barcelona	1.1149
2005/2006	Osasuna	1.1103
2006/2007	Barcelona	1.1364
2006/2007	Madrid	1.0856
2006/2007	Sevilla	1.0192
2006/2007	Valencia	1.0045
2007/2008	Madrid	1.0922
2007/2008	Villarreal	1.1173
2008/2009	Atlético Madrid	1.0224
2008/2009	Barcelona	1.1584
2008/2009	Madrid	1.0693
2008/2009	Villarreal	1.0406
2009/2010	Barcelona	1.3360
2009/2010	Madrid	1.1447

Table 2 shows the super efficiency values for teams considered efficient in each one of the seasons studied. The team with the highest super efficiency value is Barcelona in the 2009/2010 season, which is also reflected in Table 1.

Principal component analysis was used as an extraction method in the factor analysis performed and Varimax with Kaiser Normalization was used as a rotation method. The results grouped the explanatory variables in four factors, also shown in Table 3. The first represents the coordination of the team during games, as it is composed of all the variables that reflect this situation with a positive weighting. The variables for the second factor indicate poor coordination among the players; they all have a positive weighting. Therefore, this second factor is considered to represent a lack of coordination in football teams. The factor analysis revealed a third factor that consists of the number of fouls committed. There was also a fourth factor consisting of the number of cards received, which could be interpreted as a lack of sportsmanship for the team. However, since the variables that compose them had been characterized as being representative of poor coordination, the reasoning to explain the relationship that these factors may have with efficiency is similar to that followed for the factor representing the lack of coordination.

TABLE 3
RESULTS OF THE ROTATED COMPONENT MATRIX

	Factor 1 Coordination	**Factor 2 Lack of coordination**	**Factor 3 Fouls committed**	**Factor 4 Cards received**
7 players	0.95			
8 players	0.94			
9 players	0.93			
1 player		0.81		
2 players		0.92		
3 players		0.90		
Fouls committed			-0.91	
Yellow cards				0.74
Red cards				0.59

The aim of this study was not to verify a theoretical hypothesis, but to determine if the inefficiency of the football teams in the sample could be explained by the implementation of an organizational design that achieves the coordination of the players on the field through the use slack resources. To determine this, the relationships between the four factors that, according to the results obtained capture the explanatory variables of the degree of coordination between players during the games and the efficiency ratios achieved by Spanish First Division football teams, have been plotted. To ensure that the comparisons are coherent, both the efficiency and factor analysis results were obtained by considering the information from each one of the seasons separately. Both total technical efficiency and super efficiency were taken as efficiency variables. The ratios for the latter are not bounded, so there is a possibility that for this variable the graphs will show a stronger relationship between efficiency and coordination than for the values of global technical efficiency.

FIGURE 1
RELATIONSHIP BETWEEN THE VALUES OF TOTAL TECHNICAL EFFICIENCY AND THE FACTORS OBTAINED

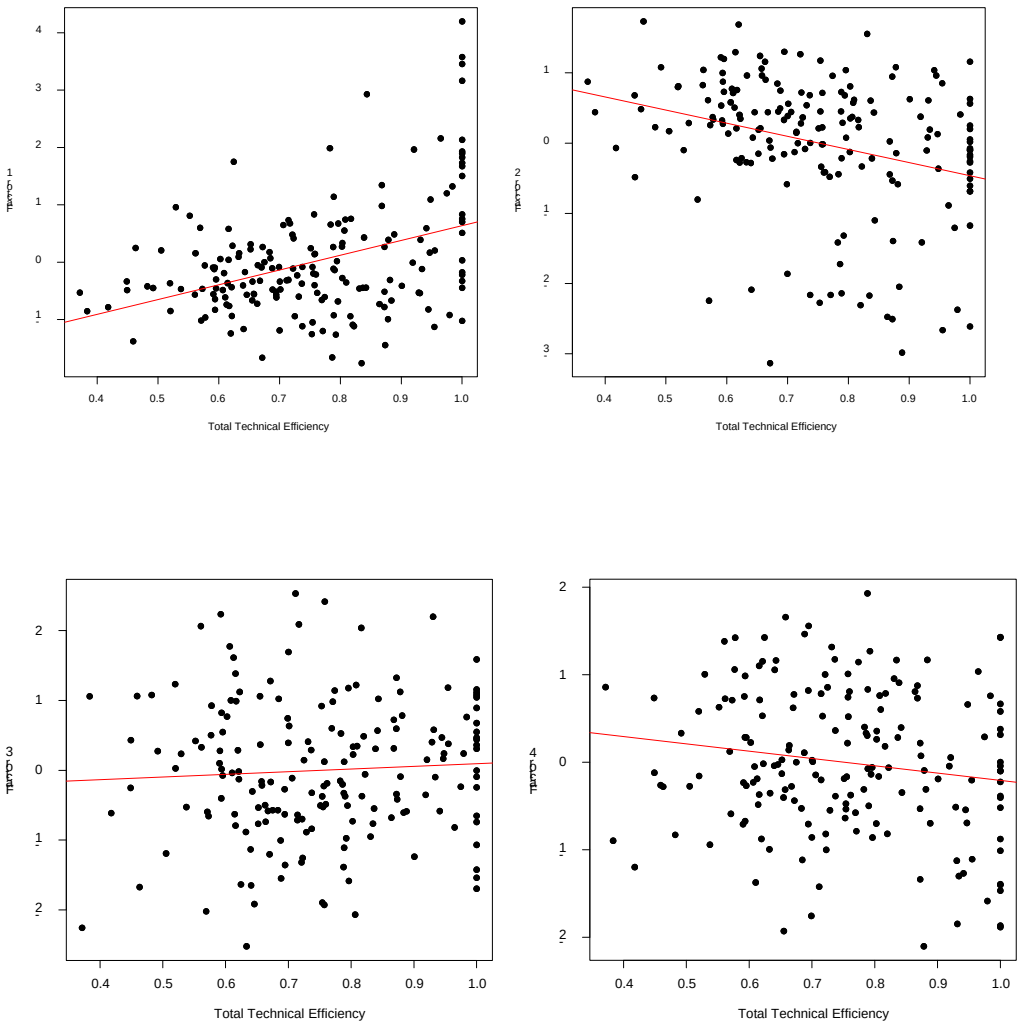

Figure 1 shows global technical efficiency related to factors representing coordination, and it can be seen that the highest concentration of inefficient teams occurs around the low values for the factor representing coordination and high values for the factor that includes variables related to the lack of coordination. However, the efficient teams are distributed along almost the entire range of variation in the values of the factors representative of coordination and its absence.

FIGURE 2
RELATIONSHIP BETWEEN VALUES FOR SUPEREFFICIENCY AND THE FACTORS OBTAINED

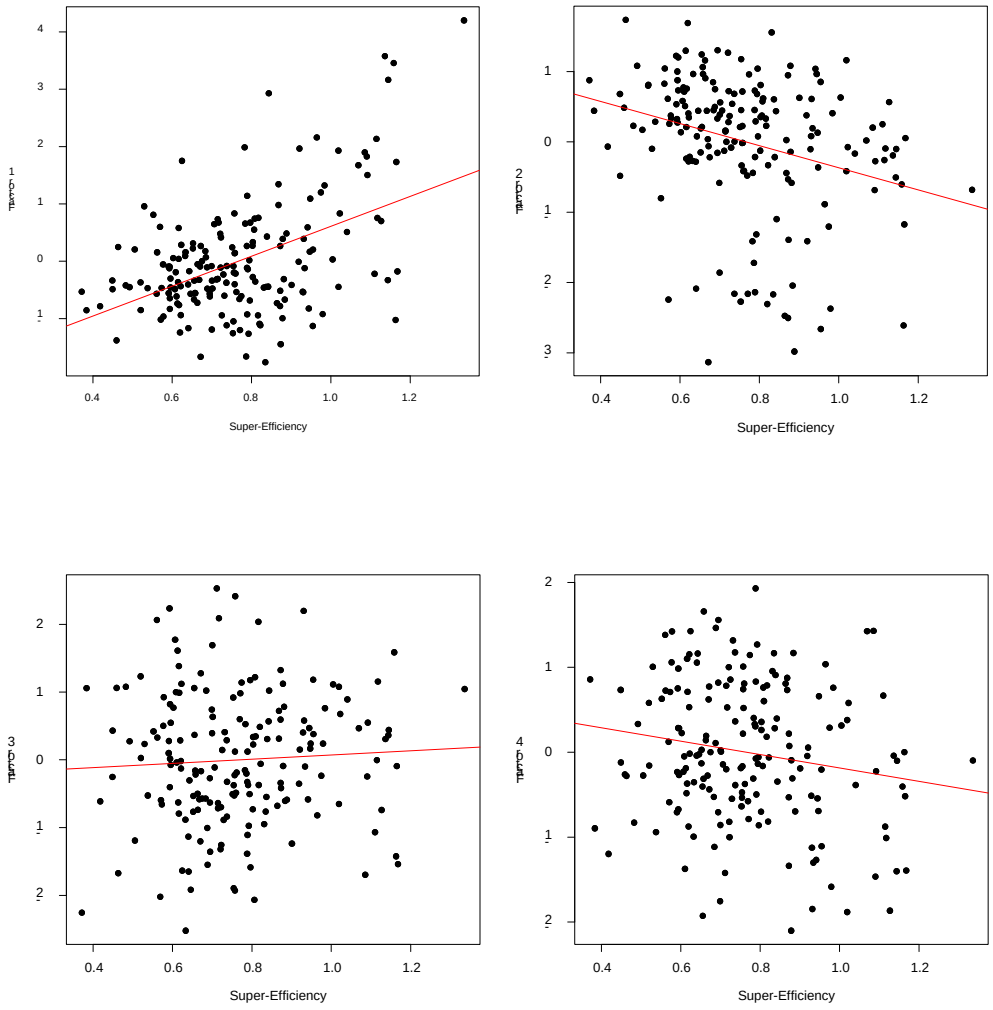

Figure 2, in which the relationship between super efficiency ratios and factor values shows, obviously, the same situation for inefficient teams. However, since it discriminates among the efficient ones, the trend represented by the red line shows a higher positive correlation between efficiency and coordination and a greater negative correlation between efficiency and the lack of coordination, since its slope is steeper than in Figure 1.

The relationship between any of the efficiency variables considered in this study and the factors representing fouls and cards received, as shown in Figures 1 and 2 is nonexistent, as both inefficient and efficient teams are distributed throughout the entire range of variation of the values of these factors, with no concentration of units being seen.

Consequently, the analysis shows that the inefficiency of Spanish First Division football teams is not explained by an organizational design that uses slack resources to achieve coordination among the players on the field of play, as there are efficient teams with a high coordination. Moreover, in the figures analyzed, there is a concentration of inefficient teams around the low values of the factor representing coordination and the high values for the factor representing lack of coordination. However, the results do not fit any of the situations that, a priori, were seen as possibilities: either greater inefficiency with better coordination (coordinated inefficient teams and efficient teams with problems of coordination) or otherwise (coordinated efficient teams and inefficient teams with coordination problems). The results

obtained show inefficient teams with coordination problems, so their inefficiency could be described as a waste of resources, but not all efficient teams show a lack of coordination problems, as there is an additional group to be added to the two possible situations established theoretically: efficient teams with an organizational design leading to a lack of coordination among its players. Consequently, since inefficiency cannot be explained by the use of a better organizational design, but rather to a waste of resources, inefficient teams could be recommended to make better use of their productive resources and to "imitate" efficient teams. However, among the latter there are teams with an organizational design that drives the proper coordination of the players during the games, and teams where this is not the case. Therefore, an additional criterion could be considered when making recommendations to inefficient teams.

Efficiency values the absence of a wasteful use of resources, but this study assumes that the purpose of football teams is to achieve good sporting results. Therefore, efficacy, defined as the degree to which the organization's aims are reached, may be an additional criterion to take into consideration when making recommendations for Spanish First Division football teams, in the light of the results of this study.

Table 4 shows the positions reached in League competitions for efficient teams in the sample, together with their values for the factors representing coordination of the players on the field and for the lack of coordination. Teams with players whose actions on the field could be considered as more coordinated are those that have a high value for the first factor and a low value for the second. If we consider that values above unity for the first of these factors indicate coordination between team members during a game, it can be seen that the champions for the seasons studied have a higher value than this, with the exception of seasons 2001/2002 and 2003/2004. In addition, Real Madrid had a value greater than 1 for the coordination factor in the seasons 2004/2005, 2006/2007 and 2009/2010 when it finished in second place. On the other hand, the negative values could be considered as low values for the factors representing the lack of coordination among team members and the champions for all the seasons studied, with the exception of 2003/2004 have values below zero for the second factor. This was also true for Deportivo in the 2003/2004 season, Real Madrid in 2004/2005 and 2009/2010, Villarreal in 2007/2008 and 2008/2009 and Atlético Madrid in 2008/2009. In short, in view of the results obtained in this study, it could be said that the only teams to show high values for the factor representing coordination together with low values for the factor representing lack of coordination are the champions for each of the seasons studied (except for Valencia for the two seasons that it won and Real Madrid for the two seasons that it finished second).

CONCLUSIONS

During the course of a football game, it is difficult to exchange information, especially between the coach and the players. As a result, and given that not all individuals have perfect information about their environment, there are offensive plays and periods of possession that do not result in an increase of output obtained as measured by points scored during the competition. Furthermore, injuries, suspensions and other random events can contribute towards the use of a higher number of players than that which is considered efficient. Applying Organizational Economics and Strategic Management to football teams, it could be said that the organizational design - which allows for information exchange between the players during the course of the game so that their actions can be coordinated - uses part of the resources to moderate the effects of unforeseen events. These slack resources are thus not directly involved in achieving the result, so efficiency suffers.

In this study, we measured the efficiency of professional Spanish First Division football teams to evaluate their organizational design. More specifically, we measured their efficiency in the productive stage carried out during the games played in the league for the seasons covering the period from 2001 to 2010. We applied DEA methodology to calculate values for total technical efficiency and super efficiency.

TABLE 4
VALUES FOR THE COORDINATION AND LACK OF COORDINATION FACTORS FOR EFFICIENT TEAMS IN THE SAMPLE

Season	Team	Final League position	Coordination factor value	Lack of coordination factor value
2001/2002	Valencia	Champions	-1.02	-2.61
2002/2003	Madrid	Champions	1.93	-0.41
	Real Sociedad	2nd	0.70	0.56
2003/2004	Deportivo	3rd	-0.32	-0.50
	Valencia	Champions	-0.17	0.05
2004/2005	Barcelona	Champions	1.82	-0.68
	Madrid	2nd	1.73	-1.17
2005/2006	Barcelona	Champions	2.13	-.025
	Osasuna	5th	-0.21	0.25
2006/2007	Barcelona	Champions	3.57	-0.19
	Madrid	2nd	1.89	0.20
	Sevilla	3rd	-0.44	1.16
	Valencia	4th	0.03	0.63
2007/2008	Madrid	Champions	1.50	-0.27
	Villarreal	2nd	0.75	-0.09
2008/2009	Atlético Madrid	4th	0.83	-0.07
	Barcelona	Champions	3.45	-0.60
	Madrid	2nd	1.67	0.01
	Villarreal	5th	0.50	-0.16
2009/2010	Barcelona	Champions	4.19	-0.68
	Madrid	2nd	3.16	-0.10

The second stage consisted of a factor analysis to group the variables representing coordination and good communication of the players on the field of play, and the absence thereof. Finally, graphs of the relationship between the efficiency levels of the Spanish First Division football teams and the coordination achieved through the implementation of organizational design were plotted.

Leaving aside the possibility that the football teams analyzed in this study did not show any relationship between efficiency and coordination from a general point of view, one would expect two possible outcomes:

- Efficient teams are well coordinated on the field of play and inefficient teams apply an organizational design where its team members are more individualistic.
- Efficient teams lack coordination in their play while inefficient ones are coordinated.

The first case indicates an organizational design that provides adequate communication between players without the use of slack resources. Therefore, any inefficiency identified would not be explained from an organizational design point of view, and the practices employed by efficient teams would be recommended for them. The second case would show that, at least in the sample taken under consideration, good coordination among the players during the games is only achieved using slack resources and, consequently, the inefficiencies observed would be justified by the implementation of an organizational design leading to better coordination.

The results of this study show that inefficient teams have low levels of coordination, and among the efficient teams, there are both those with a coordinated play and those with an individualistic game. Therefore, savings in resources of the efficient teams is not related to coordination, and organizational design does not affect the efficiency achieved, as there are teams that do not use slack resources to achieve coordinated play.

In empirical studies calculating the efficiency of a series of organizations, the recommendation for inefficient ones is not to squander the resources they have, and to imitate the production processes of efficient organizations. In this study, by linking the level of efficiency achieved with the organizational design implemented to achieve good coordination among the players, two types of efficient teams were obtained: the coordinated and the individualistic. Therefore, when making recommendations to inefficient teams, one needs to consider which is better: should they imitate and try to become coordinated efficient teams or individualistic efficient teams. To help answer this question, one must make use of an additional criterion, and this study has opted for efficacy, which is defined as the attainment of the objectives set by an organization. This study considered the aim of football teams to be the maximization of sporting results and, by relating the coordination achieved by efficient teams and their standing in the Spanish First Division, it was found that efficient coordinated teams were at the top of the table for the time period covered by this study. In conclusion, by uniting the criteria of efficiency and efficacy, it would appear that inefficient teams should use their resources productively while, at the same time, adopting an organizational design that provides adequate communication and coordination among the players. Therefore, the role played by the first phase of the production process of football teams should be emphasized. It is here where the talent and hard work of players and the coach are combined to prepare the plays to be performed on the field; where the foundations of the organizational design are set for the style of play that will be implemented in the games played.

ENDNOTES

1. The other four are: positional advantages in product markets, unique or otherwise costly-to-copy resources, innovative capabilities and a superior learning capability.
2. Organizational Economics includes transaction cost theory, agency theory, Industrial Organization theory, the Schumpeterian view, the Chicago School and the resource-based view. Of all of these, the first two consider, as does Neoclassical Economic Theory, that firms allocate their resources efficiently and therefore do not explain what could be the sources of differences in efficiency. They also differentiate between four schools within Strategic Management: the Planning School, the Process School, the Competence-based School and the Positioning School. Stoelhorst and van Raaij (2004) emphasize these last two, since they study the content of the strategy, i.e. the nature of successful strategies versus the others that analyze the strategy process, or in other words, how the strategy should be developed.
3. This work assumes that the aim of football teams is to maximize sporting performance, compared to other authors who consider the maximization of economic benefit of sports clubs as its purpose. This can be seen in Fort and Quirk (1995), Szymanski (2003), Sandy et al. (2004), Fort (2006), Késenne (2007) and García del Barrio and Szymanski (2009).
4. This provides an additional justification for the division into two stages of the productive process of soccer teams: the conditions necessary for a soccer team to be identified as a team according to Organizational Economics are established in the first stage, in such a way that the theory can be used to analyze the second stage of the productive process.

5. Thus, it could be concluded that during soccer games both alternatives to the market are used in a complementary manner.

REFERENCES

Andersen, P. & Petersen, N.C. (1993). A Procedure for Ranking Efficient Units in Data Envelopment Analysis. *Management Science*, 39, (10), 1261-1264.

Bourgeois, L.J. (1981). On the measurement of the organization slack. *The Academy of Management Review*, 6, (1), 29-39.

Bourgeois, L.J. & Singh, J.V. (1983). Organizational slack and political behaviour within top management teams. *Academy of Management Proceedings*, 43-47.

Carmichael, F. & Thomas, C. (1995). Production and efficiency in team sports : an investigation of rugby league football. *Applied Economics*, 27, (9), 859-869.

Carmichael, F., Thomas, D. & Ward, R. (2000). Team Performance : The Case of English Premiership Football. *Managerial and Decision Economics*, 21, (1), 31-45.

Cyert, R.M. & March, J.G. (1963). *A behavioural theory of the firm*, Prentice-Hall Inc.

Daniel, F., Lohrke, F.T., Fornaciari, C.J. & Turner, Jr., R.A. (2004). Slack resources and firm performance: a meta-analysis. *Journal of Business Research*, 57, (6) (special issue), 565-574.

Dasi, A, Iborra, M & Safón, V. (2015). Beyond path dependence: Explorative orientation, slack resources, and managerial intentionality to internationalize in SMEs". *International Business Review*, 24, (1), 77-88.

Dawson, P., Dobson, S. & Gerrard, B. (2000). Estimating Coaching Efficiency in Professional Team Sports : Evidence from English Association Football. *Scottish Journal of Political Economy*, 47, (4), 399-421.

De Borger, B. & Kerstens, K. (1996). Cost efficiency of Belgian local governments: A comparative analysis of FDH, DEA and econometric approaches. *Regional Science and Urban Economics*, 26, (2), 145-170.

Drake, L. & Simper, R. (2003). The measurement of English and Welsh police force efficiency: A comparison of distance function models. *European Journal of Operational Research*, 147, (1), 165-186.

Espitia-Escuer, M. & García-Cebrián, L.I. (2004). Measuring the Efficiency of Spanish First-Division Football Teams. *Journal of Sports Economics*, 5, (4), 329-346.

Espitia-Escuer, M. & García-Cebrián, L.I. (2006). Performance in sports teams: results and potential in the professional football league in Spain. *Management Decision*, 44, (8), 1020-1030.

Espitia-Escuer, M. & García-Cebrián, L.I. (2008). Measuring the Productivity of Spanish First Division Football Teams. *European Sport Management Quarterly*, 8, (3), 229-246.

Espitia-Escuer, M. & García-Cebrián, L.I. (2010). Measurement of the Efficiency of Football Teams in the Champions League. *Managerial and Decision Economics*, 3, (6), 373-386.

Farrell, M.J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society*, Serie A, 120, Part III, 253-281.

Førsund, F.R., Lovell, C.A.K. & Schmidt, P. (1980). A survey of frontier production functions and of their relationship to efficiency measurement. *Journal of Econometrics*, 13, (1), 5-25.

Fort, R. (2006). *Sports Economics*, Prentice Hall.

Fort, R. & Quirk, J. (1995). Cross-subsidisation, incentives, and outcomes in professional sports leagues. *Journal of Economic Literature*, 33, (3), 1265-1299.

Galbraith, J. (1973). *Designing Complex Organizations*, Adison-Wesley.

García Del Barrio, P. & Szymanski, S. (2009). Goal! Profit maximization versus win maximization in football. *Review of Industrial Organization*, 34, (1), 45-68.

Jensen, M. (1986). Agency cost and free cash flow, corporate finance and takeovers. *American Economic Review*, 76, (2), 323-329.

Jost, P.J. (2000). *Organization und Koordination*, Weisbaden Glaber.

Kerschbamer, R. & Tournas, Y. (2003). In-house competition, organizational slack and the business cycle. *European Economic Review*, 47, (3), 505-520.

Késenne, S. (2007). *The Economic Theory of Professional Sport*, Edward Elgar.
Kim, S.K., Cho. H. & Khieu, H. (2014): "Slack and R&D Strategy: The Effect of Slack on Internal R&D and External R&D, and Innovation. *Journal of Management Policy and Practice*, 15, (2), 33-42.
Leibenstein, H. (1966). Allocative efficiency vs. X- Efficiency. *American Economic Review*, LVI, (3), 392-415.
Lovell, C.A.K. (1993). Production Frontiers and Productive Efficiency. In *The Measurement of Productive Efficiency*, H.O. Fried, C.A.K. Lovell and S.S. Schmidt (ed.), Oxford University Press.
Lovell, C.A.K., Walters, L.C. and Wood, L.L. (1994). Stratified models of education production using Modified DEA and regression analysis. In *Data Envelopment Analysis: Theory, Methodology and Application*, Charnes, A., Cooper, W.W., Lewin, A.Y. y Seiford, L.M. (ed.), Kluwer Academic Publishers.
Marschak, J. & Radner, R. (1972). *Economic Theory of Teams*, Yale University Press.
Mechtel, M., Bäker, A. Brändle, T. & Vetter, K. (2011). Red Cards: Not Such Bad News for Penalized Guest Teams. *Journal of Sports Economics*, 12, (6), 621-646.
Mousa, F.T. & Reed, R. (2013). The impact of Slack Resources on High-Tech IPOs. *Entrepreneurship Theory and Practice*, 37, (5), 1123-1147.
Penrose, E.T. (1959). *The Theory of the Growth of the Firm*, Oxford Basil Blackwell.
Radner, R. (1972). Teams. In *Decision and Organization*, C.B. McGuire and R. Radner, ed., North-Holland Publishing Company.
Salge, T.O. & Vera, A. (2013). Small Steps that Matter: Incremental Learning, Slack Resources and Organizational Performance. *British Journal of Management*, 24, (2), 156-173.
Sandy, R., Sloane, P. & Rosentraub, M.S. (2004). *The Economics of Sport: an International Perspective*, Palgrave MacMillan.
Schofield, J.A. (1988). Production functions in the sports industry : an empirical analysis of professional cricket. *Applied Economics*, 20, (2), 177-193.
Serra, A. (2001). *Mercados, Contratos y Empresa*, Servicio de publicaciones de la Universidad Autónoma de Barcelona, Bellaterra
Singh, J.V. (1986). Performance, slack, and risk taking in organizational decision making. *Academy of Management Journal*, 29, (3), 561-585.
Stoelhorst, J.W. & van Raaij, E.M. (2004). On explaining performance differentials Marketing and the managerial theory of the firm. *Journal of Business Research*, 57, (4), 462-477.
Szymanski, S. (2003). The economic design of sporting contests. *Journal of Economic Literature*, 41, (4), 1137-1187.
Tortosa-Ausina, E. (2003). Non-traditional activities and bank efficiency revisited: a distributional analysis for Spanish financial institutions. *Journal of Economics and Business*, 55, (4), 371-395.
Vanacker, T., Collewaert, V. & Paeleman, I. (2013). The Relationship between Slack Resources and the Performance of Entrepreneurial Firms: The Role of Venture Capital and Angel Investors. *Journal of Management Studies*, 50, (6), pp. 1070-1096.
Wefald, A.J., Katz, J. P., Downey, R.G. & Rust, K.G. (2010). Organizational Slack, Firm Performance and the Role of Industry. *Journal of Managerial Issues*, XXII, (1), 70-87.

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