

Motivation Index to Improve the Soccer Performance

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Abstract. The soccer players always have sought to improve its performance. There are methodologies, diets, and an excellent coach to improve the soccer skills. In this paper, we propose the use of metrics or statistical indicators for improving the soccer performance. Additionally we take into consideration the rating of the individual errors with negative points: Goals Shots Off Target, Not goals from direct free-kicks and indirect free-kicks, Unsuccessful dribbles, Caught Opposition Offside, Unsuccessful Shots free-kicks or indirect free-kicks, Head Shots Off the target, Shots Off Target, Unsuccessful Long /short passes, Pass Directions incorrect, Pass Lengths incorrect, Pass Locations incorrect, Duels lost on the offensive/defensive, Aerial duels lost on the offensive/defensive, Own goals, Penalties conceded, Defensive mistakes, Fouls Committed, Corner Crosses / direct or indirect free-kicks conceded, Throw-ins conceded, Yellow or red cards, Substituted off, and others, which significantly affects the soccer performance of the team, to the metric called Motivation Index or lack of motivation. A European soccer match was analyzed to obtain the index of motivation and thereby determine the relationship of the index with the final outcome of the match. We use the NacSports software to perform an analysis of videos of a soccer match.

Keywords. Sports Performance, statistical indicators, Motivation Index, soccer performance.

I. INTRODUCTION

There are several areas within the Sciences of sport which should be analyzed to determine the optimal athletic performance:

- Sports medicine. The effects of sport (physical activity) in the human body, from prevention and treatment of diseases and injuries. It is also called physical activity medicine, physical education medicine, the medicine of the exercise, medicine specialized in deportology. The branches and disciplines of sports medicine include basic (anatomy, physiology, exercise biomechanics), clinics (prevention, treatment, and rehabilitation of injuries and diseases) and other applied sports sciences (psychology, nutrition, Sport, metrology, cine anthropometry).
- Sports Pedagogy. The activities of imparting knowledge (educating) in Sports Science.
- Sports philosophy. The investigation of ethics and others aspects related to Sports Science.
- Sports psychology. The sociology of sport is an area of sociology that focuses on sport, with the sport being the center of the study of the sociology of sport, and sociology being the leading scholar of the sociology of sport as a social phenomenon and in social structures, Employers and organizations or groups committed to the sport. Current research areas include sport and diversion, sport and media, sport, body and emotions, violence in sport, sports policies, sport, and globalization.
- Sports sociology. The study of the human societies in Sports Science.
- Physical activity. The state of being active doing physical exercise.
- Biochemistry, Biomechanics. Measurable Exercise Efforts in the Human Body.

- Chronic disease and exercise. It determines the effects of a patient and their clinical condition when performing a sport that generates a high physical effort.
- Physiology, physiotherapy, rehabilitation, exercise, and health. Use of applications with water, energy or steam to reduce the effects of fatigue generated by the sport.
- Lifestyle and fitness. Healthy lifestyle balanced between exercise and good nutrition and regular fitness.
- Gender in sports, growth, and development. Sports practice by gender regarding the type of sport and its growth over time combined with its sporting development.
- Human performance and aging. Human performance and aging of the population in modern societies.
- Management and sports law. Sports management and associated legislation that regulates their practice especially of international sports federations.
- Molecular biology and genetics. Biology associated with molecular behavior and genetic biotypes.
- Motor control and learning. Motor control and learning to improve sports performance.
- Muscle mechanics and neuromuscular control. Muscle mechanics associated with failures in the performance and neuromuscular control derivate of hereditary diseases.
- Muscle metabolism and hemodynamics. Muscular and hemodynamic metabolism of the human being.
- Education, engineering, and technology. Implementation of sport in education, engineering and its improvement through technology.
- Environmental physiology, ethics, adapted coaching, nutrition and exercise. Environmental physiology, sports ethics, sports counseling, nutrition, and exercise.
- Overtraining, sports history, training and testing, and Performance. Overtraining in child including risks, history of the sport and its related tests together with its performance over time.

The soccer players always have sought to improve its performance. However, much of the soccer player performance analysis is doing by a coach or talent detectors. The analysis is usually done based on the professional experience to observe objective and subjective questions of the soccer player, from the stance to the passes of goal or goals scored. However, sometimes escape those hands good possible future soccer players due to not taking into account all the attributes and objectively ponder them.

In this paper, we propose the use of statistical indicators and metrics for improving the soccer player performance. In the section 2 are the related works, in section 3 are the statistical indicators and metrics for improving the soccer performance, in section 4 are the results of the experimentation, and finally are the conclusions of the research.

II. RELATED WORKS

Hernández Moreno et al. [10, 11] mentions that there are three different analyses of the structure functional of the sports of cooperation-opposition: 1) Technical / tactical. The technical is the procedure where the game action is, in particular, the resulting originated by the sum of the movements of the player or players in general; the tactic is the coordination of the movements with the rest of the components of motion action and the participants. 2) Attack/defense. Hernandez Moreno et al. [10] proposed containing the following analysis model cooperation/opposition in possession of the ball (attack phase) and cooperation/opposition without possession of the ball (defense phase). 3) Cooperation/opposition. Where the action of the game is the result of an interaction between colleagues and adversaries, so the companions collaborate between itself to get the end intended and them adversaries make it seem to prevent that scope said objective. Alvaro et al. [1] propose to subdivide the competition into smaller units that meet all the components of the competition and which may have relevance in performance so that the final result is a summation of the strength of such units called units of competition. The set of units of competition constitutes a cycle of the game. A game cycle is the period elapsed since the ball is in play until it ceases to be so. In a football game, randomly is necessary for a single match or a small number of matches, but from some games, the luck is not a factor [16].

Zubillaga [25] presents the results of the analysis of 194 matches of Spanish and European League football. Examines the total distance, the distance, the distance in a race, sprint distance, the distance in high intensity and frequency of sprint for each of the players and picks up the variables of a specific position, of competition, of the equipment, the level of possession of the ball. It also considers the result of each part, the effective time of the game, the part of the match and field factor.

Drust et al. [5] ensure that the position within the team, the level of play, the style of the game, fatigue, and the conditions of the environment such as temperature, humidity, and altitude affect the distances traveled by the players. Randers et al. [19] discuss that travels meters due to the fatigue factor. In diverse researchers, the Physical and physiological factors related to athletic performance as the record of the distance traveled, the speed at which performs these distinguishing the maximum speed for specific activities and the duration of efforts [4,19,25].

Key factors or activities involved in a football match, the greater is the randomness of the goals and greater descriptive statistical distribution with reality. According to Sumpter [21] the pattern of events in a game of soccer is made by way random (distribution of Poisson).

The most of the software to improve the performance sports resort to a set of technical for developing the psychological skills of the athletes as relaxation, programming of objectives to short and long term, imagination, control of the attention and concentration, auto-instructions and other technical cognitive [8].

It is crucial the intelligence, creativity, emotional control, the psycho-physical state of maturation, experience, social relations, environment, and competitiveness for better performance in a football game [7]. García Naveira

and Remor [7] mentioned that the knowledge of emotional States, the personality and the specific behavior of each player, through an evaluation to determine the profile and establish methods and goals which can enhance the strengths and manage the weak is essential. The psychosocial factors of attitude, confidence or cohesion in the performance in soccer are important. They recommend the inclusion of the psychologist of the sport within the organization.

The teams with greater cohesion, positive, moral attitude and mood, are more likely to win [22]. The states of mood before the competition, influence on the performance of a team of soccer during all the season and this relationship are subject to the variable location of the game, being the game played out of local games where more is manifest the states of mood and its consequent influence on the performance. Thus, the aim of each player, weather, food and hydration, the State of the pitch, the local factor vs. visitor, the referee, move the marker or the rival, are variables that will matter at the meeting.

Biomechanical and technical indicators are a unique expression of individual performance, that rather than the collective, which it may allow understanding better the player but not at the game. It is considered as a factor of relevance and maximum efficiency indicator, the achievement of the goal. They analyse the events preceding to the achievement of the goal, taking into account variables such as the number of passes, the number of players involved, the area of the launch, temporary time, total duration and the type of move, the level of opposition, the contact surface, among others [6,12,13,20].

In different research are considered indicators such as the number of shots to the door [14,22,23]. A retrospective sequential analysis of the actions leading up to the launch on goal considers that these actions are indicators of success [17].

López Thureaux and Noa Cuadro [18] mentions about several indicators such as the relationship between goals scored and the number of attacks in favor; the relationship between goals marked, shooting to the passes and occasions of goal; the relationship between goals scored and shots in favor. Lago [16] develop a model of regression linear that handles as variable independent those minutes that the teams have the marker in against, to please or tied along each party, three variables that identify to each one of the equipment and its rival and the character local or visitor. To the date could not be found any research that uses a metric of motivation for individual performance and a soccer team. In this paper, we propose the use of metrics or statistical indicators for improving the soccer performance. Additionally, we take into consideration the rating of the individual errors with negative points, significantly affects the soccer performance of the team or the loose of the match, to the metric called Motivation Index or lack of motivation.

III. Motivation Index to Improve the Soccer Performance

In this section is presented statistical indicators for the match performance, the soccer player performance, soccer team performance and the index of the motivation of the team. The activities are necessary to obtain the indicators statistical is shown in the tables 1, 2 and 3.

Table 1. Activities carried out on the offensive.

Activities	Description	Values
Goals from throw-ins (Pass or Assists)	A successful attempt at scoring from throw-ins.	50
Goals from direct free-kicks	A successful attempt at scoring from direct free-kicks.	200
Not goals from direct free-kicks	An Unsuccessful attempt at scoring from direct free-kicks.	-70
Goals from indirect free-kicks	A successful attempt at scoring from an indirect free-kicks.	300
Not goals from indirect free-kicks	An Unsuccessful attempt at scoring from an indirect free-kicks.	-50
Goals from Corners	A successful attempt at scoring from Corners.	400
Goals Penalty	A successful attempt at scoring from the penalty.	100
Not Goals from Penalty	An Unsuccessful attempt at scoring from the penalty.	-100
Goals conceded or Assists	A successful attempt at scoring by assisting another soccer player.	50
Goal Locations	The Act of being in the right place to be able to score a goal.	20
Not Goal Locations	The Act of not being in the right place to be able to score a goal.	-20
Goal Body Parts	A successful attempt at scoring with any Body Parts (Chest, leg, face, knee).	70
Not Goal Body Parts	An Unsuccessful attempt at scoring with any Body Parts (Chest, leg, face, knee).	-20
Goal from Head Shots	A successful attempt at scoring with Headshots.	150
Goals Shots Off Target	An unsuccessful attempt at scoring.	-100
Assists	The assists are passes to create occasions of the goal.	50
Total Goals Points	The Goals total points are equal to the sum of the attributes Goals from throw-ins (Pass or Assists), Goals from direct free-kicks, Goals from indirect free-kicks, Goals from Corners, Goals Penalty, Goals conceded or Assists, Goal Locations, Goal Body Parts, Goal from Head Shots, Goals Shots Off Target, and Assists.	
Successful dribbles	The successful propulsion of a ball by repeated taps or kicks.	5

Unsuccessful dribbles	The unsuccessful propulsion of a ball by repeated taps or kicks.	-5
Caught Opposition Offside	The mistake of occupying an illegal position on the soccer field.	-5
Successful Shots inside penalty area (but not goal)	The successful act of striking at a ball inside penalty area.	2
Unsuccessful Shots inside penalty area	The Unsuccessful act of striking at a ball inside penalty area.	-2
Successful Shots outside penalty area (but not goal)	The successful act of striking at a ball outside the penalty area.	10
Unsuccessful Shots outside penalty area	The Unsuccessful act of striking at a ball outside the penalty area.	-10
Successful Shots free-kicks (but not goal)	The successful act of striking at a ball from free-kicks.	15
Unsuccessful Shots free-kicks	The Unsuccessful act of striking at a ball from free-kicks.	-15
Successful Shots indirect free-kicks	The successful act of striking at a ball from indirect free-kicks.	10
Unsuccessful Shots indirect free-kicks	The Unsuccessful act of striking at a ball from indirect free-kicks.	-10
Successful Shots Corners	The successful act of striking at a ball from Corners.	50
Unsuccessful Shots Corners	The Unsuccessful act of striking at a ball from Corners.	-10
Shot Body Parts	Successful Shot body parts in any area of the Soccer field.	10
Head Shots on the target	A successful Head Shots in any area of the Soccer field.	5
Head Shots Off the target	An Unsuccessful Head Shots in any area of the Soccer field.	-5
Shot Plays	Shot Plays in any area of the Soccer field.	10
Shot Locations	The Act of being in the right place to be able to shot.	5
Shots Off Target	An Unsuccessful Shots in any area of the Soccer field.	-5
Successful Volleys Shots	A successful shot before it touches the ground.	5
Unsuccessful Volleys Shots	An Unsuccessful shot before it touches the ground.	-5
Totals Shots points	The total shots points are equal to the sum of the attributes related to the shots.	
Successful Long passes	A successful Long throw (a ball) to another player.	10
Unsuccessful Long passes	An Unsuccessful Long throw (a ball) to another player.	-10
Pass Directions correct	A successful throw (a ball) with direction correct to another player.	7
Pass Directions incorrect	An Unsuccessful throw (a ball) with direction correct to another player.	-7

Pass Lengths correct	A successful throw (a ball) with Length and strength of pass correct to another player.	5
Pass Lengths incorrect	An Unsuccessful throw (a ball) with Length and strength of pass correct to another player.	-5
Pass Locations correct	To lose the mark correct to receive a pass.	2
Pass Locations incorrect	To lose the mark incorrect to receive a pass.	-2
Successful Short passes	A successful short throw (a ball) to another player.	5
Unsuccessful Short passes	An Unsuccessful short throw (a ball) to another player.	-5
Pass Accuracy	The passes with lengths and directions correct.	12
Crossing Pass correct	A Successful Crossing Pass.	20
Crossing Pass incorrect	An Unsuccessful Crossing Pass.	-20
Total Passes points	The total passes points are equal to the sum of the attributes related to the passes.	
Duels won on the offensive	Any struggle won between two skillful opponents on the offensive.	2
Duels lost on the offensive	Any struggle lost between two skillful opponents on the offensive.	-2
key plays	Best player of the match.	300
Aerial duels won on the offensive	Any Aerial duels won on the offensive	6
Aerial duels lost on the offensive	Any Aerial duels lost on the offensive	-6

Table 2. Activities carried out on the defensive.

Activities	Description	Values
Own goals	A successful attempt at scoring in their own team's net or scoring area.	-100
Defensive errors leading to goals	A wrong action attributable to bad judgment or ignorance or inattention on the defensive leading to goals.	-50
Penalties conceded	A handicap or disadvantage that is imposed on a competitor for an infraction of the rules of the game.	-50
Aerial duels won on the defensive	Any Aerial duels won on the defensive.	4
Aerial duels lost on the defensive	Any Aerial duels lost on the defensive.	-4
Duels won on the defensive	Any struggle won between two skillful opponents on the defensive.	2
Duels lost on the defensive	Any struggle lost between two skillful opponents on the defensive.	-2

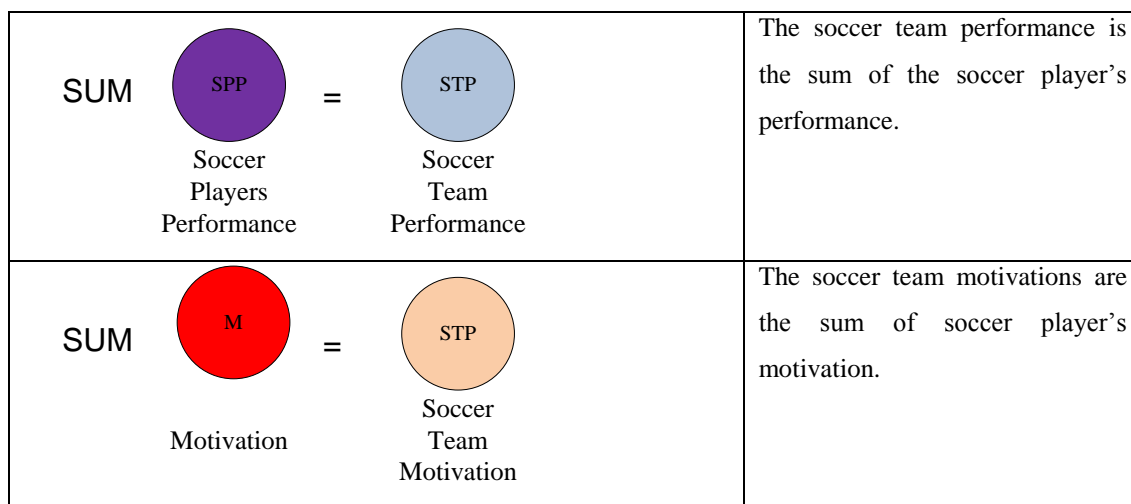
Defensive errors	A wrong action attributable to bad judgment or ignorance or inattention on the defensive.	-5
Interceptions of the ball	Anticipations (interceptions or reactions) of the ball.	4
Fouls Committed	An act committed that violates the rules of the sport.	-2
Corner Crosses conceded	Corner Crosses conceded.	-2
Direct free-kicks conceded	Direct free-kicks conceded.	-5
Indirect free-kicks conceded	Indirect free-kicks conceded.	-10
Throw-ins conceded	Throw-ins conceded.	-3
Corners conceded	Corners conceded.	-10
Standing tackle	Steals of the ball.	-5
Sliding tackle	Aggressive tackle.	-10
GoalKeeper-Stretched	Extended or spread over a wide area or distance to the ball	10
Goalkeeper-Handling	Handling of the goalkeepers.	20
Goalkeeper-Kicking	It is the launch making the goalkeeper with the foot when the ball has left for the finish line.	5
Goalkeeper-Reflexes	Reflexes of the goalkeeper.	20
Goalkeeper-Pos	Positioning correctly of the goalkeeper.	5
Goalkeeper-Pass with the hand	It can be a flush of soil and air.	5
Goalkeeper-Collection or reception of the ball	It is the action of catching the ball with the hands, normally helped of the chest, so is keep the possession and can play it later with their companions.	10
Goalkeeper-Clearance with fists	It is a gesture very complex that requires great control body and an excellent coordination in the air. Used to move balls that the goalkeeper cannot catch, looking for precision and power to carry the ball into an area not controlled by the opponents.	20
Goalkeeper-Clearance with the feet	It is used in situations in which goalkeeper should anticipate the attacker coming out of the large area on some occasions to shorten the trajectory of the ball and the game space, and must make a clear away the ball from your area.	15
Goalkeeper-Clearance with the head	It is used in the situations in which goalkeeper comes out of his area to clear a ball divided with the boat.	20

Table 3. Extraordinary Activities.

Activities	Description	Values
Fouls Suffered	An act suffered that violates the rules of a sport	5
Yellow cards	A grave warning after a rules infraction.	-2
Red cards	The player's dismissal from the field of play.	-4
Substituted off	A player that takes out of the soccer field.	-50
Substituted on	A player that takes the place of another player in the game.	20
Average Possession	The amount of time (percentage) of a team possesses the ball during a game of soccer.	20
Crosses correct	A successful medium-to-long-range pass from a wide area of the field towards the center of the field near the opponent's goal.	10
Crosses incorrect	An Unsuccessful medium-to-long-range pass from a wide area of the field towards the center of the field near the opponent's goal.	-10

In this paper, we propose the use of statistical indicators for improving the soccer performance.

INDICATORS (INDIVIDUALS)	PURPOSE
<p>OA + DA + EA = MP Offensive Activities + Defensive Activities + Extra Activities = Match Performance</p>	An indicator of the performance of each player's match contains positive and negative points of the offensive, defensive and extra activities.
<p>MP x PM = SPP Match Performance x Position Multiplier = Soccer Player Performance</p>	The soccer player performance is obtained by using the values of the match performance multiplied by the position multiplier.
<p>OA + DA + EA = M Offensive Activities Errors + Defensive Activities Errors + Extra Activities Errors = Motivation</p>	An indicator of the motivation of each players match contains only the negative points of the offensive, defensive and extra activities.
INDICATORS (TEAM)	PURPOSE



We take into consideration the rating of the individual errors with negative points: Goals Shots Off Target, Not goals from direct free-kicks, Not goals from indirect free-kicks, Unsuccessful dribbles, Caught Opposition Offside, Unsuccessful Shots inside penalty area, Unsuccessful Shots outside penalty area, Unsuccessful Shots free-kicks, Unsuccessful Shots indirect free-kicks, Unsuccessful Shots Corners, Head Shots Off the target, Shots Off Target, Unsuccessful Long passes, Pass Directions incorrect, Pass Lengths incorrect, Pass Locations incorrect, Unsuccessful Short passes, Duels lost on the offensive, Aerial duels lost on the offensive, Own goals, Defensive errors leading to goals, Penalties conceded, Aerial duels lost on the defensive, Duels lost on the defensive, Defensive mistakes, Fouls Committed, Corner Crosses conceded, Direct free-kicks conceded, Indirect free-kicks conceded, Throw-ins conceded, Yellow cards, Red cards, Substituted off, and others, which significantly affects the soccer performance of the team, to the metric called Motivation Index or lack of motivation.

Table 4. Position Multiplier.

Acronyms	Position	Position Multiplier
GK	GoalKeeper	1.5
Defenders		
RB	Right Back	1.3
RWB	Right Wing Back	1.3
CB	Centre Back	1.4
LB	Left Back	1.3
LWB	Left Wing Back	1.3
MidFielders		
RW	Right Wing	1.2
RM	Right Midfielder	1.2
CAM	Centre Attacking Midfielder	1.2
LM	Left Midfielder	1.2
CM	Centre Midfielder	1.3
LW	Left Wing	1.2
CDM	Centre Defensive Midfielder	1.3
Forwards		

LF	Left Forward	1.1
ST	Striker	1.1
CF	Centre Forward	1.1
RF	Right Forward	1.1

IV. EXPERIMENTATION AND RESULTS

Various European soccer matches were analyzed to obtain the index of motivation and thereby determine the relationship of the index with the final outcome of the match. We use the NacSports software to perform an analysis of videos of various soccer matches. In this paper, we present the indexes applied to a match of the champions League. Taking into account positive evaluation or rating of individual errors in the player weighing them with positives / negatives in activities: failed goals from shots, failed goals from direct free kick, not successful dribbles, be in a position out of place, shots failed within the penalty, missed shots area outside of the area of penalty, failed direct free kicks, failed indirect free kicks, corner kicks failed, failed head shots, missed shots (away from the goal), errors defensive ending in goal, awarded penalties, lost in the defensive aerial duels, lost in defensive duels, defensive errors, committed fouls, shots of granted corner, awarded direct free kicks, indirect free kicks granted, granted throw-ins, yellow cards, red cards, be replaced by a teammate, and other aspects that significantly affect performance football team. For aspects related to copyrights of the professional player's names, the original names have been modified.

Table 5. Match Champions League J15-PSGG vs Barkelona.

Player	Activities carried out on the offensive	Activities carried out on the defensive	Extraordinary Activities	Match Performance	Motivation
PSG					
K. Trappo-GK	0	35	0	35	0
T. Meuniero-RB	101	4	0	105	0
Marquiñhos-CB	42	10	0	52	0
P. Kimpember-CB	46	0	0	46	0
L. Kurzawap-LB	87	0	0	87	-5
M. Verrattis-CM	48	16	-50	14	-50
A. Rabiott-CM	50	24	-2	72	-2
B. Matuidis-CDM	110	8	0	118	0
Á.D Marías-RW	685	0	-50	635	-50
J. Draxlers-LF	183	0	-50	133	-55
E. Cavanis-ST	117	0	0	117	-4
Barcelona					
M.A.T. Stegens-GK	-10	50	0	40	-15
S.R. Carnicero-RB	-10	-39	0	-49	-39
G. Piqués B.-CB	-10	-39	0	-49	-39
S. Umtitis- CB	-24	-51	0	-75	-53
J. Albas R.- LB	-14	-47	0	-61	-43

S. Busquetes B.-CDM	-16	-41	-2	-59	-37
A.F.T. Gomesa-CM	-14	-33	-52	-99	-81
A. Iniestas L.-CM	-14	-18	-50	-82	-64
L. Messias-RW	-18	-26	0	-44	-18
N. Da Silva S. Jr.-LW	-24	-24	0	-48	-24

The results of the experimentation were that various errors on routine plays could affect the rate of individual motivation and equipment; and at the same time have a high probability of the team losing the match (table 6).

Table 6. Final Results of the Match Champions League J15-PSGG vs. Barkelona.

Activities	PSG	Barcelona
Goals	4	0
Totals Shots	16	6
Shots	10	1
Corners	2	4
Fouls	13	10
Yellow cards (red)	1(0)	3(0)
Average Possession	43%	57%
Soccer Team Performance	1724.4	-600.2
Soccer Team Motivation Index	-166	-415

V. CONCLUSIONS

Many of the soccer matches are influenced by the emotional state of soccer players. Big and small errors can affect the overall performance of the soccer team. Global and individuals Motivation indicators of the soccer team are a way of measuring the behavior within the realm of the player's game. We note that small individual errors affect the state of the motivation of the players, which in turn affects the final result of the match. Indicators of motivation can be an important tool to be applied to make corrections during the match. Moreover, thus avoid losing the match by negative values indicators of motivation.

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