

## Assessment of the Motivation Factors for Professional Sport Activity

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**Abstract:** The development of market relations in Russia is forced to consider a sport as a specific sector of the economy with own laws of development, similar and different from other economic sectors. The peculiarity of sport industry is determined first of all, by the professional sportsmen, which influence the efficiency of the whole sport industry. Increased demands on physical training professional sportsmen determines the strong dependence of the sport motivation on the personal characteristics of sportsmen with the preservation of all known substantive and procedural motivation theories of the labor activity. In the present study, the qualitative assessment of the influence of personal characteristics of the sportsman on his motivation is performed using the neural network modeling. To generate the initial data, the results of the sociological interview of the sportsmen of Volgograd city (Russia) were used. The article presents the evaluation of the influence of the motivation factors for professional sport activities on its level and further development of prospective studies in this field.

**Key words:** Sport industry • Motivation for sport activities • Motivation factors • Neural network modeling

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### INTRODUCTION

The fact that the performers (sportsmen) are the most paid category of personnel along with top managers in contrast to other sectors of the economy where the performers are the low-wage employees is specific feature of social-labor relations in the sport industry [1, p. 154]. The special labor conditions of sportsmen, implying overtime workday [2, pp. 55-57] with significant physical and emotional stress during trainings and competitions, ensure the strongest relationship between motivation for sport activities and its efficiency.

Labor activity of sportsmen is regulated by specific standards that are beyond of the labor law [3, pp. 77-86], and imposes the additional limits regards to the workers of other economic sectors.

This increases the interest to study the motivation for sport activities as a special type of professional activity.

This article is to continue the study of motivation for labor activity of the professional sportsmen based on the results of the sociological interview conducted in Volgograd city in 2012 [4].

### MATERIALS AND METHODS

Motivation for sport activity as any other labor motivation is determined by numerous factors and organizational sources [5, p. 136]. Development of measures to increase of the motivation is a development of measures to affect these factors and conditions. Administrative effect even to one factor or condition usually causes a change in the entire motivation system due to the reciprocal influence of factors to each other. However, the power of influence of various factors on the motivation is ambiguous. From this point of view, the choice of the most effective factors influencing the motivation for the sport activity as a type of labor rises a high interest, and influence on these factors to increase the motivation is seems an effective tool.

The results of the sociological interview of 72 sportsmen, held in Volgograd city in 2012 were used as the initial data to identify the impact of various factors on the motivation for labor activity of professional sportsmen [4].

The quantitative assessment of the motivation level was carried out using the degree of respondents' agreement with such statements as: "Sportsmen are satisfied with their job", "Sportsmen can not imagine other work", and "Sportsmen are not looking for another job". The answers were evaluated according to seven-point scale: 1 - flatly disagree, 2 - totally disagree, 3 - disagree, 4 - cannot answer, 5 - agree, 6 - totally agree, 7 - fully agree. The arithmetic mean of the number of answers selected by respondents was chosen as an indicator reflecting the level of motivation for sport activities. Obtained index, theoretically can vary from 1 (if a respondent was flatly disagree with any of the statements) to 7 (if a respondent was fully agree with all statements). The higher a value of index the greater the level of motivation for sport activity as a type of professional work of a respondent.

The personal characteristics of the sportsmen (gender, age, and education level) and a subjective estimate of the duration and intensity of sport activities were selected as the factors affecting the motivation level. The effect of factors on the motivation for sport activity in the sport industry was evaluated using free neural network NeuroPro software [6, p. 169-187]. The choice of software package was stipulated by its accessibility, simplicity, and the possibility of the neural network models to fix the complex relationships between the analyzed data.

#### **Substantiation and Analysis of Sport Activity**

**Motivation Model:** In general, the employment contracting prohibits any discrimination based on gender, age, religion, etc. In the sport industry, this appears as a significant blurring of the boundaries between women and men types of sport. In addition, Russian labor legislation permits "the exceeding of maximum permissible load norms when lifting or manually moving the heavy loads for women-sportsmen ... if it is necessary according to the planed training of women-sportsmen while preparing to sport competitions, and applied loads are allowed by the woman's health condition according to a medical certificate" [7, art. 348.9]. However, the physical abilities of women on average are inferior to the physical possibilities of men that appeared in the fact that men and women compete separately in the same sport type. This explains the choice of "gender" of a sportsman as the factor affecting the motivation level during professional sport activities.

The second factor that has a greater effect on the motivation for labor activity of performers in the sport industry compared with other industries is age. The number of injuries of professional sportsman usually increases with age. "According to opinion of the leading specialists from the Center of sport and ballet trauma and rehabilitation at the Ministry of Health of the Russian Federation, 98 of hundred sportsmen, who received the prize-winning places at major international tournaments, have received severe injuries along with gold and silver medals such as complex bone fractures, ruptures of muscle and tendon tissues, chronic heart and nervous system diseases..." [8]. This reduces the rate of increase athletic results, and, according to the procedural theories of motivation [9] can not influence the willingness to be engaged in sport as a professional occupation.

The special education provides the professional sportsman the opportunity to reduce the number of injuries and raise the efficiency of sport trainings, which allowed choose education as another factor affecting the labor activity motivation of professional sportsmen.

Motivation is a process that begins from physiological or psychological lack or need that activates behavior or induces to achieve a certain goal or reward [10]. Thus, the basis of motivation is the subjective attitude of the individual to the environment that has determined two other factors for the analysis of the sport motivation - subjective assessment of the work duration taking into account overtime trainings by a sportsman and its intensity.

The values for the last indices correspond to the levels of respondents' answers according to the seven-point scale of statements - "Sportsmen always work overtime" and "Sportsmen work more intensively than other people".

To build a neural network model to assess the impact of factors on the motivation level for professional sport activities using the questionnaires filled by sportsmen, we have introduced the several ranks of indicators:

- Y : Motivation level for professional sport activity (output indicator of network),
- X1 : Gender of sportsman (input indicator of network),
- X2 : Age of a sportsman (input indicator of network),
- X3 : Education level of a sportsman (input indicator of network),
- X4 : Assessment of duration of overtime work by sportsman (input indicator of network),
- X5 : Assessment of work intensity by a sportsman (input indicator network).

Table 1: The results of approbation of the neural-network models using examination sample

Neural network learning algorithm (learning error - 0,5)	The average error in examination sample	Variance of error in examination sample	Maximum error in examination sample
Gradient descent	0,10	0,61	0,8
Conjugate gradients	0,32	0,32	0,7
BFGS – type of optimized Newton’s algorithm	0,45	0,45	1,1

Three of four variables were selected for training sample to configure the neural network, and one was reserved in the examination sample to assess the accuracy of neural network configuration.

Used software allowed us builds the multi-layer neural networks with the possibility to change the number of layers of the network and the number of neurons in each layer. The technology of construction of neural network consists in its construction using the data of learning sample with a adjusted accuracy, and verification of possibilities for description of the examination sample data.

Higher number of layers in the neural network and the number of neurons in each layer result in the building of the model with zero error in the learning sample. However, the error adjusted by network on examination sample begins grow from some value of error that is an objective limit of the network dimension.

To evaluate the influence force of motivation factors for sport activity on its level, the network with an error 0.5 at possible change of the output indicator Y from 1 to 7 was built. Dimension of 3 layers by 10 neurons each was accepted as the initial dimension (structure) of a network was adopted. This structure was used to construct four networks with different learning algorithms implemented in NeuroPro: gradient descent, modified ParTan, conjugate gradients, and BFGS - a kind of optimization of the Newton’s algorithm. None of the learning algorithms

was successful to build a network with adjusted error that made us increase the number of layers until 4. The fourth layer was included into the network with 10 neurons and three algorithms resulted in neural networks with the error 0.5. The results of approbation of these algorithms using examination sample are shown in Table 1.

Gradient descent was preferable among all learning algorithms, allowed to build a neural network with adjusted error using the indicator “average error in examination sample” and conjugate gradient according to variance and maximum error in examination sample. Taking into account that the average error is less informative in terms of the ability of the algorithm describe the initial data because it allows the possibility of compensation of positive errors to negative, the network built using the “conjugate gradients” algorithm was chosen as a neural network model for the analysis of the factors of sport motivation.

The influence force (significance) of factors (input indicators of a model) on the motivation level for professional sport activities is shown on a Figure. Theoretically, the significance of the indicators can vary from 0 (no influence) to 1 (the highest influence).

The figure shows that age (X2) and education (X3) have stronger influence the motivation of the sportsmen, and further in descending – gender (X1), the intensity of training (X5), and duration of training (X4).

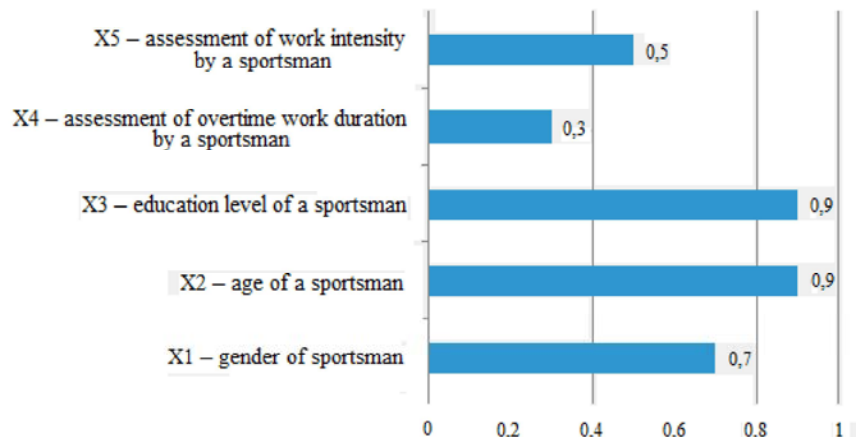


Fig. 1: The influence force of factors on the level of professional motivation of the sportsman

Table 2: Change of the motivation for the sport activities depending on education level of professional sportsmen.

Increase of the training period	The average change in the motivation level	The variance of the change in the motivation level	Maximum change in the motivation level
1 year	0,2	1,2	0,52
2 years	0,25	0,87	0,41
3 years	0,41	0,90	0,73

The simulation results indicate that age and education are general characteristics which strongly affect the motivation for professional sport activity. Therefore, all activities directed to increase the sport motivation should be differentiated according to these indicators. According to study results, we can conclude that development of professional sport without mass propaganda of physical culture among the population is impossible because it allows the improvement of physical abilities of man and development of professional sport education system from the childhood.

The relationship between the professional sport and mass physical culture was shown also in other studies. "Professional sport is important to the social life and strengthening of its economic potential. Sport as the type of commercial activity is intended to replenish a profitable part of the budget, however, cannot become a tool to solve the demographic and social problems without conjunction with the development of mass sports" [11, p. 4]. However, the built neural network model reveals the connection between the development of physical culture and motivation for professional sport activities.

The next step of the study included the quantitative assessment of changes in the level of the sport motivation along the changes of the education level of professional sportsmen. The education level of sportsmen at the formation of rank of X3 index is determined by the number of years of education. Experimentally, the education levels in the examination sample were gradually increased by 1, 2, and 3 years along the assessment of the change in the motivation level (Table 2). All comparisons were carried out with the initial values of the motivation level, adjusted by the network at initial values of the initial data.

The experiment demonstrated the steady, but non-linear tendency to increase of the average motivation level for sport activities at the growth of the education level of sportsmen. Thus, increase of the education level by 1 year results in increase of motivation level by one-fifth, and by 2 years - by one-fourth. Taking into account that the value of a motivation level can reach the maximum - 7, at increasing of the education level by 3 years then the expected increment of the motivation for sport activities is 5% of its maximum.

## CONCLUSIONS

Expansion of the neural network modeling application sphere until the analysis of motivation for professional sport reveal the qualitative and quantitative characteristics of the factors of its formation, that considerably facilitates decision-making on the improving the efficiency of the sport industry as a consequence of the growth of motivation of the sportsmen.

Further study of motivation for professional sport activity is the assessment of the costs to improve the education level and comparison of these costs with the growth of income from winnings at international competitions as a result of higher motivation of the sportsmen. For example, for the sportsman with a Bachelor's degree, this can be a two-year education to receive a Master's degree and for a specialist - three-year post-graduate course, and etc. To determine the relationship between motivation of the sportsmen and the efficiency of their performance in the competition, the neuronet modeling can be also an effective tool.

Sports industry, like any other social-economic system, is inertial and sensitive to the unfounded managerial decisions. Therefore, a preliminary analysis of possible solutions to adequate reality model will significantly reduce administrative errors and allow the identification of possible consequences of the decisions.

The peculiarities of social-labor relations in the sport determine the specific features of motivation for professional sport activity. Unlike any other industry, the role of performers in the sport industry is very high, which makes important the motivation of sportsmen in its effectiveness.

To identify the influence force of factors characterizing the personality of the sportsmen, the neural network model of their motivation has been chosen and studied. The results of sociological interview of professional sportsmen of Volgograd city (Russia) and analysis the actual situation in the sport industry provided us with input and output data of neuronet model. To verify the model, we used examination sample composed of the parts of the values of the indicators.

The results of modeling showed that the most important motivation factors are age and education level of sportsmen. The built network allowed us the qualitative assessment of the influence.

The study results of modeling allow us to determine the prospective studies such as analysis of the relationship between the cost of education, the motivation level of the sportsmen, and, as a consequence, the efficiency of their performance at the international competitions.

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