

## TYPES OF DISCIPLINE DECATHLON FUNCTIONAL DEPENDENCES IN RELATION TO AGE AND LEVEL OF SCORE ACHIEVEMENTS OF THE WORLD MOST SUCCESSFUL DECATHLONS

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### **Abstract**

*By establishing latent structure of decathlon discipline performed in this paper, an objective performance was acquired about motor abilities and skills which lie in basic manifestation of maximum eventing potential on different levels of decathlon success. Obtained information about types of cross-functional dependence of decathlon disciplines, in regards to age and level of result realization of the world's most successful decathlons in season 2010./2011. showed presence of general motor stereotype of synergic expression of decathlon potential. A set of variables of decathlon disciplines was submitted to varimax rotation by component factor analysis, wherein four latent dimension were segregated in all three groups of observed decathlons: speed potential, throwing power, explosive horizontal and vertical jumping ability, aerobic-anaerobic and technical efficiency. By comparative analysis of contribution size and assessment of measures and unity of isolated latent dimensions was observed homogeneity of racing disciplines with sprinting character and throwing disciplines and pronouncedly different character of dimensions that manifest in jumping disciplines and running the 1500 meters, which withal makes them typical generators of variability of synergic manifest of maximum decathlon potential.*

**Key words:** *athletics, decathlon, structure, types, result efficiency*

### **Introduction**

Complex, combined competitions - the all-rounders within the modern and dominant sport specialties, are counterbalanced by a special philosophy in the perception and preference for versatility as the primary goal of physical exercise, giving individuals the opportunity to express to a greater number of individual achievements. Decathlon is a unique and composite athletic decathlon discipline that its structure and scope of disciplines requires the development of a broad spectrum of motor skills different in biomechanical and physiological attributes. Result in decathlon sums the scoring value of the results of ten disciplines. For decathlon is characteristic simultaneous development and maximum expression of a set of motor skills that are not free, but the synergy effect of quality which are manifested in each discipline decathlon (Smajlovic, 2000). Synergic effect interrelationships of motor quality sought to exert the maximum. Decathlon is determined by the least three different factors. The first, which stems from the nature of the relationship between the manifestation of motor quality man in sit-activities, the other which is influenced by genetic predispositions essential for their optimal development and a third who is conditioned by limiting the possibilities of realization of methodological requirements of motor quality inter-development in the training process. However, apart from the above natural factors, there is a "default" factor that relates to the principle of scoring valorisation of the results. By analysis of decathlon tables published in 2001 was revealed that their application condition predestination of the result of success due to

differences in the direction and size of the evaluation of disciplines (Westera, 2006; Unwin, 2007; Wang, 2007). The study of conditions essential for the full expression and development of decathlon potential on the basis of the relationship between the spectrum of disciplines included in the decathlon, this work aimed to gain insight into the presence of characteristic types of functional dependence of decathlon discipline. To obtain an objective notion of structure of decathlon area, an assessment of measures and unity of manifestation of decathlon potential in relation to age and level of 'score is needed to achieve the most successful decathlon world.

### **Methods**

The survey covers the most successful junior decathlons in the world (N = 100) and senior (N = 350) categories in 2010./2011. and the most successful decathlons of all time "All time list 2011" (N = 100), whose results are taken from the official statistical yearbook of the International Association of Athletics Federations (IAAF), published in 2010 and 2011. To define the latent structure of decathlon discipline factor analysis was carried on the principle of the main components with varimax rotation. In order to find more realistically existing motor dimensions, all factors were kept resulting in matrix factorization variance and cross-correlation of the Kaiser-Meyer-Olkin (KMO) and Bartlett's spheric test. In the matrix of selected factors after varimax rotation are presented only variables that have a projection on the day component of greater than 0.5.

## Results and discussion

A comparative analysis of the size and structure of contributions isolated latent dimensions of observed groups decathlon, there is a presence of general motor stereotypes of functional dependence disciplines contained in the decathlon. The resulting extrapolated factors represent good expectations from certain subspace, with a few minor deviations that can be logically interpreted in accordance with the general characteristics of the sample analyzed decathlon. There was a presence of stable fourcomponent structure with relatively independent dimensions that are reported: speed potential, throwing strength, explosive horizontal and vertical jumping ability,

aerobic-anaerobic and technical efficiency. Pri it is observed back- racing disciplines sprint character and throwing disciplines and distinctly different character dimensions are manifested in the jumping events and running section 1500, which also makes them typical generators variability expressing decathlon synergy potential in relation to age and level of achievement 'score decathlon. The main feature of the result of efficiency the most successful decathlon all-time (All time list 2011), (Table 1), is reflected in the dominant share of speed potential through the pursuit of excellence in the long jump and sprint typical running events of 100m and 110m hurdles, and bacačkoj force in the disciplines shot put and discus.

Table 1 Varimax structure factor matrix  
Most succesfull decathlons – All time list 2011.

Variable	F 1	F 2	F 3	F 4
100m	,887			
110mPRE	,722			
1500m	-,573		,535	
DAL	-,540			
DISK		,797		
KUG		,795		
MOT		-,505	,658	
400m			,626	
VIS				,694
KOP				-,521

Table 2 Varimax structure factor matrix  
Most succesfull decathlons – seniors 2010./2011.

Variable	F 1	F 2	F 3	F 4
100m	,829			
110mPRE	,747			
400m	,699			
DAL	-,624			
KUG		,864		
DISK		,847		
KOP		,570		
MOT			-,735	
1500m			,690	
VIS				,931

Table 3 Varimax structure factor matrix  
Most succesfull decathlons – juniors 2010./2011.

Variable	F 1	F 2	F 3	F 4
100m	,798			
110mPRE	,782			
400m	,709			
KUG		,822		
DISK		,754		
KOP		,534		
VIS			,758	
DAL			,720	
1500m			-,584	
MOT				,821

In doing so, they simultaneously with poor aerobic-anaerobic component when running 1500m and weaker technical performance jump, pole vault and vice versa. The second feature is a negative interdependence aerobic-anaerobic components and technical efficiency. The smallest share in his score of efficiency has dimensions explosive vertical jumping performance in the high jump, followed by weaker performance in the javelin and vice versa. The most successful senior categories of 2010/2011 decathlon result in efficiency in both high shares exercised on the basis of speed potential which synergistically manifest in running events of 100m, 110m hurdles, 400m and long jump and throwing power potential, synergy manifest in all throwing events. On the other hand, just as tall and twice as lower share in the success of his score has dimensions explosive vertical jumping ability that manifests itself during execution discipline vertical jump and measuring aerobic-anaerobic and technical efficiency, whereby desetobojci allocated to those who achieve good results in 1500 and running weaker in the pole vault and vice versa (Table 2). Result efficiency of the most successful decathlon junior category 2010/2011. (Table 3) is characterized by the largest share of the dimensions of velocity potential in manifested disciplines: 100m, 110m hurdles and 400m and a slightly smaller share of dimensions throwing power, manifested in all throwing events. A significant share in his score the efficiency of this group decathlon has dimensions of vertical and horizontal accelerations which exerts a synergistic disciplines in high jump and long jump, which simultaneously monitors the weak aerobic-anaerobic component in running across stocks 1500m and vice versa. Isolated and very large share in his score of efficiency has dimensions of technical efficiency of the overall pole vault. In assessing the extent and manifestation of communion of decathlon potential in relation to age and level of achievement 'score, it was found that the greatest significance on the result efficiency in the decathlon discipline has run 100m

that best describes the complex velocity potential and which together with the discipline of running 110m hurdles represents representatives of community of decathlon discipline. Also fellowship was established in disciplines shot put and discus. When the two groups decathlon senior categories with different levels of achievement 'score, registered a significant separation of disciplines vertical jump, or dimensions explosive vertical vertical jump and decathlon at the junior categories extract discipline pole vault representing the dimension of technical efficiency. Discipline running 1500m and pole vault adequately describe the nature of the relationship between desetobojskih discipline indicating that the efficiency of the results, regardless of the age and quality of the decathlon, mainly achieved by opposing motor skills based on the severity of the stimulus in the short term and one-time capabilities determining the capacity of maximum physical potential on one side of capabilities based on more repetitive implementation of motor structure and level of technical efficiency on the other side. Somewhat larger differences in the structure of manifestation maximum potential desetobojskih observed in the decathlon in the junior age in relation to the senior, attributed to the effects of intensive progressive dynamics of the development of motor potentials and technical perfecting. In this, so to speak, initiation stage of decathlon career, we noticed a tendency towards the development of special routing quality, and then, by reaching a higher sport class, complex training completes with absolute power and technical preparedness, essential in jumping and throwing (Kabitsis et al., 1992; Kormanjos, 1997; Jeřábek, 2003). For a clearer insight into the characteristics of the structure of the interrelationship between disciplines present in different stages of decathlon career is important to understand the future growth results instructing discipline decathlon developing decathlon, presenting a chart with average the results, decathlon achievements, expressed in score values.

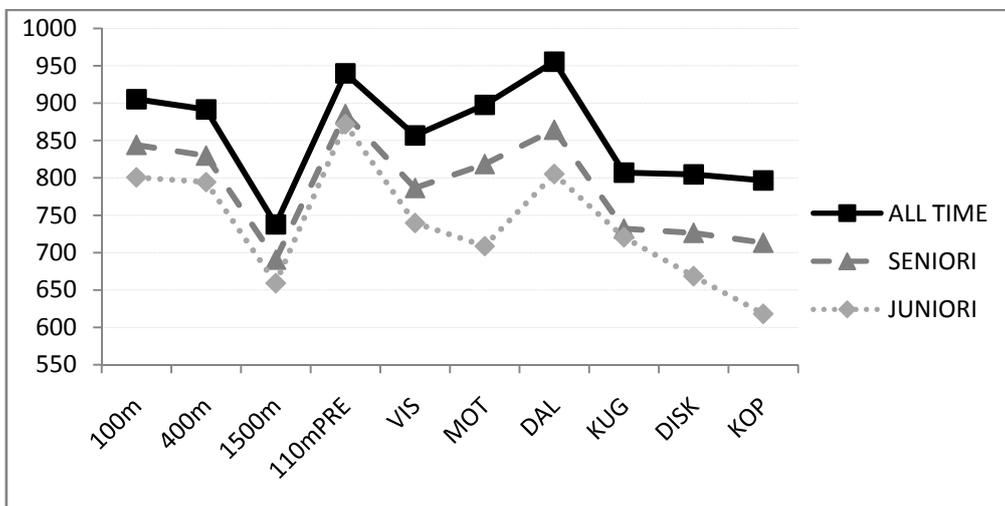


Figure 1 Structure of discipline decathlon expressed in score values of results achieve the most successful decathlon senior, junior and the most successful decathlon all-time (All time) - 2010/2011.

## Conclusion

This study obtained information about the complex interrelations motor and functional structure disciplines contained in the decathlon, characteristics of manifestation of decathlon potential in relation to age and level of achievement 'score decathlon, which contributed to the expansion of information relevant for understanding the character decathlon as complex and structured disciplines.

Parallel structures analysed latent discipline decathlon in relation to age and level of achievement 'score, obtained additional performance on complex matter optimization training process decathlon at different stages of sports career. In access literature establishes the relationship between the dynamics of discipline decathlon in relation to the development of physical quality and technical preparedness, highlights that technique is the key to full capacity utilization rate and power of decathlon, necessity of mastering the technique jump pole, running a

hurdle and javelin throw and their significant impact on changing the structure of the interrelationship between disciplines (Stemmler and Baumler, 2005; Wester, 2006; Wang, 2007; Li et al., 2011; Park and Zatsiorski, 2011).

At the same findings indicate the results of this study, that are jumping disciplines present the greatest differences in manifestations of motor dimensions and where are the primary requirements for the technical efficiency, especially in the junior age. However, in the choice of strategy for the development of the individual, in addition to natural conditions the relationship between motor skills in decathlon space and individual decathlon predispositions, it is worth to point at predestination of development potential of the current scoring system, having established that the throwing disciplines and disciplines of running 1500m less profitable and that can interfere with sprint capacity if more based on their development (Wester, 2006; Wang, 2007).

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## TIPOVI FUNKCIONALNE ZAVISNOSTI DISCIPLINA DESETOBOJA U ODNOSU NA UZRASST I NIVO REZULTATSKOG OSTVARENJA NAJUSPJEŠNIJIH DESETOBOJACA SVIJETA

### **Sažetak**

Utvrdivanjem latentne strukture disciplina desetoboja izvršene u ovom radu, dobivena je objektivna predstava o motoričkim sposobnostima i vještinama koje leže u osnovi iskazivanja maksimalnog višebojskog potencijala na različitim razinama desetobojske uspješnosti. Dobivene informacije o tipovima međufunkcionalne zavisnosti disciplina desetoboja, u odnosu na uzrast i razinu rezultatskog ostvarenja najuspješnijih desetobojaca svijeta u sezoni 2010./2011., ukazale su na prisutnost generalnog motoričkog stereotipa sinergijskog iskazivanja desetobojskog potencijala. Skup varijabli desetobojskih disciplina komponentnom faktorskom analizom podvrgnut je varimax rotaciji pri čemu su izdvojene po četiri latentne dimenzije u sve tri skupine promatranih desetobojaca: brzinski potencijal, bacačka snaga, eksplozivna horizontalna i vertikalna skočnost, aerobno-anaerobna i tehnička efikasnost. Usporednom analizom veličine doprinosa, te procjenom mjere i zajedništva izdvojenih latentnih dimenzija uočena je jednorodnost trkačkih disciplina sprinterskog karaktera i bacačkih disciplina a izrazito različit karakter dimenzija koje se iskazuju u skakačkim disciplinama i trčanju dionice od 1500m, što ih ujedno čini tipičnim generatorima varijabiliteta sinergijskog iskazivanja maksimalnog desetobojskog potencijala.

**Ključne riječi:** atletika, desetboj, struktura, tipovi, rezultatska efikasnost

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