

# Level of Situational Motor Abilities qualitative changes and football player's performance successfulness under the influence of complex football training

Key words: **complex football training, transformational process, situational motor abilities, performance successfulness, qualitative changes**

Ključne riječi: **kompleksni nogometni trening, transformacioni proces, situaciono motoričke sposobnosti, uspješnost u igri, kvalitativne promjene**

## Abstract

The aim of the research is to determine the level of qualitative changes of situational motor abilities of situational motor abilities and performance successfulness of football players under the influence of the complex football training. The samples of examinees represent 107 football players, 16 to 17 years old. All of the examinees are registered football players in cadet teams' competing in municipality and regional leagues. They are involved in long-term training process in their clubs and taking that in consideration they are the bearers of football quality in this age group. Variables selected for this examination hypothetically covered the area of specific motor abilities with 11 variables and are of performance successfulness in football with 15 variables, 7 variables for the successfulness in defense and 8 for forward successfulness.

The programming of training activities applied in this investigation had multidimensional character, whereas through the different training methods we tried to improve the situational motor abilities as well as the performance successfulness in football game. Load quantity was according to the age characteristics of the sample, and was applied through the 134 training matches and 46 matches (28 leagues and 18 controls).

For the determination of the quality changes created under the influence of complex football program, notable in a change of situational motor abilities and performance successfulness in football game, we applied the factor analysis – congruency method.

General analysis of the program with its operators, methods and load had significant influence at qualitative changes in situational motor abilities, and in area of performance successfulness in football game we can say that the structure had no rearranging of the variables in isolated factors. Therefore we can conclude that there were no statistically significant qualitative changes. Based on the results we can conclude that the treated sample reached high level of specific, technical training, which now should be applied more in a match and get to know all the unpredicted situations when confronted with the opposite team player.

## Introduction

Players each movement is connected to the one or more anthropometric dimensions, and the complex of movements for respective dimension complex. (Corluka, M., 2008.)

Basic precondition for the efficient movement is rational technique, that makes fully visible each players motor potential. Without that bad technique becomes the noise factor during the realization of movement and limiting factor during the display of motor capacity.

Football technique (Talovic, M. 1998.) is the basic means in sports fight, and enables the player to better express its abilities

## Sažetak

**Nivo kvalitativnih promjena situaciono motoričkih sposobnosti i uspješnosti u igri nogometaša pod uticajem kompleksnog nogometnog treninga**

Cilj istraživanja je utvrditi nivo transformacionih promjena situaciono motoričkih sposobnosti i uspješnosti u igri kod 107 nogometaša uzrasta 16-17 godina nastalih pod uticajem jeednogodišnjeg programa rada. Za procjenu situaciono motoričkih sposobnosti korišteno je 11 varijabli a za procjenu uspješnosti u igri vršili su nezavisni suci, ocjenama od 1 do 5 koji imaju bogato igračko i trenersko iskustvo, profesori sporta i tjelesnog odgoja, te nogometni treneri koji posjeduju UEFA B ili A licencu. Korišteno je sedam varijabli za procjenu uspješnosti igre u odbrani i osam varijabli za procjenu uspješnosti igre u napadu. Za utvđivanje kvalitativnih promjena situaciono motoričkih sposobnosti i uspješnosti u igri nastalih pod uticajem programa rada primjenjena je faktorska analiza. U inicijalnom mjerenju situaciono motoričkih sposobnosti, izolovane su 3 glavne komponente i to: faktor brzine krivolinijskog trčanja – agilnosti, faktor baratiranja i brzine vođenja lopte i faktor snage udarca po lopti i preciznosti glavom. U finalnom mjerenju izolovana su 4 faktora: faktor snage udarca po lopti i preciznosti glavom, faktor brzine krivolinijskog trčanja – agilnosti, faktor baratiranja loptom ili faktor spretnosti i faktor baratiranja i brzine vođenja lopte. Globalno gledajući program rada svojim sadržajem i trenajnim operatorima, opterećenjima imao je značajan utjecaj na kvalitativne promjene situaciono motoričkih sposobnosti, a u prostoru uspješnosti u igri možemo reći da se struktura nije bitnije mjenjala, da nije došlo do pregrupisanja varijabli unutar izolovanih faktora. Stoga se može zaključiti da nije došlo do statistički značajnih kvalitativnih promjena. Na osnovu dobijenih rezultata može se zaključiti da je tretirani uzorak dostigao visok nivo specifične, odnosno tehničke obuke, obuke koju sada treba što više primjenjivati u igri i suočavati sa svim onim nepredvidivim situacijama koje nam donosi suočavanje sa protivnikom.

and itself depends on personal level of those abilities. The conclusion is that the technique is characterized by individuality.

Football game requires not only rational movement technique, but also the ability to control and regulate the movement depending on situations solving requirements during the match. Football does not have standard movements, but variable, although their structural basis is the same. (Bajramovic, I., 2008.) From that we can say that in football there are no standard, fixed and closed movements' stereotypes, but they are variable and plastic stereotypes that are in every moment ready for alternative movements. Taking in consideration a many structure analysis of football game it can be presumed that the success in football game depends on large number of different abilities and characteristics. Certainly that from those abilities and characteristics which affect the football successfulness are specific – motor abilities, however significant

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attention in last decades is paid to the game successfulness as the basic indication of the football players abilities level.

Problem of the investigation are the level of qualitative changes of situational motor abilities of situational motor abilities and performance successfulness of football players aged 16 to 17. The aim of the investigation is to determine the level of transformational changes created under the influence of one – year - long training program.

## Method

### Sample of the examinees

The sample of the examinees in this investigation is presented by 107 football players aged 16 to 17. All of the examinees are registered football players in cadet teams competing in municipality and regional leagues. They are involved in long-term training process in their clubs and taking that in consideration they are the bearers of football quality in this age group.

### Sample of the variables

Eleven variables were used for the evaluation of situational motor abilities:

1. SNPPNV- foot aiming – vertical aim, 2. SNPEGH Elevational head aiming – horizontal aim, 3. SNKOST Horizontal wall deflections 20 seconds, 4. SNKSLA Ball control speed (slalom), 5. SNBUPP Ball control speed with lateral change of direction, 6. SNBV20 Ball control speed at 20 m standing start, 7. SNESNO Foot kick strength, 8. SNESGL Head kick strength, 9. SNBTPO Running speed in half circle, 10. SNBTTP Running with change of direction laterally, 11. SNBTSL Slalom run.

Evaluation of the football game successfulness was done by five independent judges, by observation, with previous football players and coaching experience, professors of Sport and Physical Education and football coaches with B or A UEFA license, by evaluating subjects with marks from 1 to 5. Variables are:

Variables for the evaluation of defense successfulness:

1. Level of pressure during defense 2. Assisting defense 3. Turnovers, 4. Free kick successfulness, 5. Successfulness in transformation when ball lost, 6. Blocking, 7. Ability to play at different positions in defense

Variables for the evaluation of offense successfulness:

1. Ball control, 2. Ability to pass, 3. Protrusions with a ball, 4. Play without a ball, 5. Successfulness in transformation when ball won, 6. Ability to play at different positions in forward, 7. Game kicks, 8. Free kick successfulness in forward

### Methods of data processing

For the determination of the qualitative changes of the situational motor abilities and football game successfulness created under the influence of training program factorial analysis was performed. Analyzed were, as the difference in structure of covariance matrix of manifest and latent variables in two different time point from which we deducted the component model of factorial analysis. The Guttman-Kaiserov criterion, by which significant are all of the latent dimensions whose characteristic root is higher than on or equals 1. (Radjo, I., Wolf, B., 2002.) Using Bartlett test we tested the possibility to perform any kind of factorisation at the treated variables.

## Results and Discussion

### Factorial analysis results of the situational motor abilities

Table 1. shows characteristic roots and explained variance at the initial measurement of situational motor abilities, where by the analysis of numerical values we can say that there are 3 main components isolated, covering 59,44% of total variance explained (around 40% of variance is under the influence of iniquity). First main component has the highest level of variance explained 32,61%, second main component explains 15,71% and third 11,12% of total variance explained.

Difference from initial is that at the final measurement (table 2.) 63,97% of total variability was explained with 4 isolated factors. First factor at final measurement, after the training program explains 27,34% of total variance, second 15,38% , third 11,62% and fourth 9,62%. Taking in consideration this outcome it can be concluded that the relation between situational motor abilities had certain changes. Comparing the values of final and initial measurement it can be seen that is a larger number of isolated main components at the final measurement.

Analysis of the initial measurement (table 3.) shows that in the first isolated main component, the largest amount of the variance explained have variables SNBTPO Running speed in half circle, SNBTTP Running with change of direction laterally, SNBTSL Slalom run so that this factor can be called factor of the speed of change of direction run – agility factor.

At the second main component, the largest projection have variables SNKOST Horizontal wall deflections 20 seconds and SNBTSL Slalom run as the foot technique variables SNBUPP Ball control speed with lateral change of direction, SNBV20 Ball control speed at 20 m standing start as a foot technique variables. Because of more areas that show high projections this factor can be defined as a mixed factor of the foot technique and speed of the ball control.

At the third main component, highest projection have variables SNPEGH – elevational head aiming and SNESGL – head kick strength. This factor is mixed and can be called the factor of the ball kick strength and head aiming.

Analysis of the matrix structure results of the final measurement (table 4.), at the first main component are isolated variables SNPEGH – elevational head aiming and SNESGL – head kick strength. This factor is mixed and can be called the factor of the ball kick strength and head aiming. The appearance of this factor as the main isolated factor can be explained and added to the large number of the repetitions these kinds of movements during the worm-up (passing, long and short distances) and cool – down (vertical and horizontal aiming), were these exercises dominated , so it is possible that in this way they improved this ability.

At the second main component the highest projection have variables SNBTPO Running speed in half circle., SNBTTP Running with change of direction laterally and SNBTSL Slalom so that this factor can be called factor of the speed of change of direction run – agility factor. As it can be seen second factor clearly differentiated agility, running without ball, which can be also explained by the training program in which the players had large number of short runs, change of direction so this found its place in second factor deriving total explained variance of 15,38%.

At the second main component, the largest projection have variables SNKOST Horizontal wall deflections 20 seconds so this factor can be called as a factor of ball control and coordination. This factor behaved the same as the initial measurement, only difference at the final measurement was that this factor of ball control or coordination divided in two factors so that we get one

single factor defined as a ball control – wall deflections. Possible explanation of this isolation of two factors as single factors can be found in a fact that it is the product of the large number of the specific movement stereotypes repetition. Large number of training sessions started with the continued deflections or ball passes between two players, or wall deflections, whereas it produced automatism and could add to an increase in values of the final compared to the initial measurement.

At the fourth main component, highest projection have variables SNBTSLA – slalom run as a variable called ball control, SNBUPP Ball control speed with lateral change of direction as a variable called ball control. This factor is mixed and can be defined as a ball control or speed of ball control run factor.

Regrouping of the variables occurred in the results of final compared to the initial measurement, as well as the enlargement of factor quantity, which shows us that there had been quality changes in a structure, and a transformation of some numeric attributes of the situational motor abilities of the examinees.

Generally, the training program with its elements, methods and load had a significant influence at the qualitative change in situational motor abilities. Analyzing the elements of training it is visible that they influenced the changes because the basis of the work with this age of examinees was predetermined movements, or the automatic execution of predetermined tasks with or without a ball.

Compared to the initial, final measurement isolated another main component, called coordination or the ball control ability, and compared to the other isolated factors it can be said that the drill training and work without ball extremely effective in perfection in the mechanically adopted movements.

### Factorial analysis results of the football players successfulness

Analysis of the isolated components of the football players successfulness (table 7) showed that two main components isolated and explained the area of the football players successfulness with 70, 83% of common variance.

Individual parts to the common variance explanation of these two isolated function are 57, 12% for the first and 13, 70% for the second.

Analysis of the final results values (table 8) show that there are as well two main components isolated and that the total value of the explained variance is 69,12%, with first component in value of 55,06% explained variance, and second of 14,05.

Based on the matrix structure of the successfulness at the initial measurement (table 9) it can be shown that at the first main component are all of the variables that determine and are dominant for the defense play, so this factor can be defined as a defense factor, no matter that in the first component there is a one variable defining forward play UIPN Free kick successfulness

**Table 1.**  
Isolated components of the football players successfulness at initial measurement

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,587	32,612	32,612	3,587	32,612	32,612
2	1,728	15,710	48,321	1,728	15,710	48,321
3	1,223	11,122	59,443	1,223	11,122	59,443

**Table 2.**  
Isolated components of the football players successfulness at final measurement

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,008	27,342	27,342	3,008	27,342	27,342
2	1,692	15,380	42,723	1,692	15,380	42,723
3	1,279	11,628	54,351	1,279	11,628	54,351
4	1,058	9,622	63,973	1,058	9,622	63,973

**Table 3.**  
Structure matrix of football players successfulness at the initial measurement

	Component		
	1	2	3
SNPPNVI	-,441	,135	-,018
SNPEGHI	,057	-,062	,706
SNKOSTI	,178	,631	,311
SNKSLAI	,066	-,813	,274
SNBUPPI	,044	-,813	,159
SNBV20I	,256	-,602	-,144
SNESNOI	-,070	,470	,409
SNESGLI	-,193	-,011	,657
SNBTPOI	,789	,008	-,189
SNBTPII	,943	,052	,018
SNBTSLI	,931	,054	,052

**Table 4.**  
Structure matrix of football players at the final measurement

	Component			
	1	2	3	4
SNPPNVF	,318	-,352	-,005	-,449
SNPEGHF	-,719	,081	,321	,101
SNKOSTF	-,191	-,151	,806	-,153
SNKSLAF	,277	-,102	,424	,657
SNBUPPF	,016	-,045	-,305	,797
SNBV20F	,300	,311	,068	-,041
SNESNOF	-,406	-,202	,018	-,316
SNESGLF	-,788	,132	-,107	-,178
SNBTPOF	,341	,509	,359	,008
SNBTPIF	-,015	,910	-,019	-,029
SNBTSLF	-,012	,873	-,150	,002

In to the second main component isolated variables ball control, passing skill, ball attack, forward play without a ball, successfulness in transformation after ball won, successfulness in playing different positions in defense, action shots, so variables that are dominant in moments when we are attacking opposite goal, so second main component can be called attack factor.

In a structure matrix of the final measurement (table 10) it can be seen that there are two main components isolated, so there were no enlargement or decrease of the isolated components.

As in the initial measurement, there is isolated, this time clear main component that could be called pure factor of the defense and the second one that can be called pure factor of attack.

It is shown from the tables 11 and 12 that there is a high correlation, which can be explained by tight connection of the treated sample variables of player's successfulness.

Comparing the results of initial and final measurement, or the evaluation of the player's abilities in a match, we will see that

there are differences, but also a differences that does not improve qualitative changes.

Surely, these are the indications that in the future the elements of the training have to be adjusted to the requirements of the game, because it is of the great importance that the player wins not only the space with its motor abilities but also the opposite player so he could quickly and more efficiently realize the attack or prevent the one.

So, for the player to bring the timely decisions and solve new coming situations during the match, it is of great importance to have those elements in training and in more number of the repetitions. In a same way, more number of training sessions in a week, which biological age and quality level allows, would probably add to the positive improvements of quality changes.

**Table 7.**  
*Isolated components of the football players successfulness at initial measurement*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8,569	57,127	57,127	8,569	57,127	57,127
2	2,056	13,707	70,833	2,056	13,707	70,833

**Table 8.**  
*Isolated components of the football players successfulness at final measurement*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8,260	55,068	55,068	8,260	55,068	55,068
2	2,108	14,056	69,125	2,108	14,056	69,125

**Table 9.**  
*Structure matrix of football players successfulness at the initial measurement*

	Component	
	1	2
KLI	-,097	-,946
VDI	-,035	-,928
PLI	-,071	-,953
IBLI	,381	-,515
UTNI	,092	-,929
SIVPNI	,215	-,451
UIPNI	,547	-,206
SII	,232	-,444
RPOI	,841	-,029
POI	,797	-,084
OLI	,850	,011
UIPOI	,831	,083
UTOI	,856	-,003
SIVPOI	,929	,100
SSI	,816	,013

**Table 10.**  
*Structure matrix of football players at the final measurement*

	Component	
	1	2
KLF	-,139	,926
VDF	,012	,734
PLF	-,104	,915
IBLF	-,005	,816
UTNF	,121	,758
SIVPNF	,131	,749
UIPNF	,130	,379
SIF	,162	,607
RPOF	,856	,045
POF	,784	,139
OLF	,842	,112
UIPOF	,852	-,022
UTOF	,946	-,084
SIVPOF	,873	-,068
SSF	,903	,016

## Conclusion

Significant qualitative improvements in a area of the specific abilities can be explained with the fact that the training program was planned in that way that the examinees met with different elements structured mainly of large number of isolated technique elements, like different passes between two players, technique elements, ball control, runs with or without ball from point A to point B an with large number of repetitions. To conclude, training in which we would know the sequence of the exercise in advance, number of repetitions, lines of movement surely could influence the improvement of the aforementioned abilities. Weaker transfer from initial to final state in the area of the game successfulness can be explained by small number of training with the actual game situations or their simulations in which the players would be in situations that paint the picture of the actual game. This brings us to the conclusion that in every case it should through the training secure more "situations from game" that will provide player improvements in a game, and develop football intelligence through the different situations in which he should decide right and on time. To include such elements that will simulate different situations, in which the player constantly finds him in a solutions of certain technical-tactical tasks, with the opposite player (pressure, guarding, blocking) which demands that player thinks and acts creatively.

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