

ON THE GRADUATE MODEL OF THE COMMAND OFFICERS OF THE ROMANIAN LAND FORCES

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Abstract: The paper presents the results of the scientific research undertaken by the authors regarding the way the graduate model is implemented in the training process for command officers. Introduction of the new curriculum in the military academies has resulted in the establishment of a core curriculum (including the disciplines of various specialties) and the curriculum at the academy's decision (linked to the domain Military Sciences and Intelligence) - two segments which have as main objective to reduce the gap between the permanent change of the officer's mission and job requirements, be it a theater of operations, an operative unit, an institution of education or an economic or administrative one and the competences formed by the education process. A significant stake of the new curriculum was the shaping of the "academy's personality", in a society which seeks to respect and value diversity, in the context of meeting national standards of quality education and provision of equal opportunities to all young people. In this context, a question emerged: how much is enough in the training of the command officers? How do we find the limit in their academic training in relation to branches and military specialties, how do we measure the abilities/competences of students or graduates and how do we introduce measures to regulate the process of forming the necessary skills and competences of command officers of all branches and military specialties. All these are just some of the questions whose answers the authors try to present in this paper. At the same time, we also present a software application of a dynamic design of the educational curriculum in relation to the labor market developments in the military, from the perspective of continuous training and implementation of the requirements formulated by our beneficiaries.

Keywords: educational curriculum, command officers, mathematical model, officers' competences.

1. INTRODUCTION

All over the world, the military academies are considered educational and training centers which focus on forming officers for all army categories. Therefore, their mission has an everlasting character. They are well-defined organizations where knowledge plays an outstanding part.

After having been restricted only at the military level, most of the military academies gained university vocation and recognition which amplified the key role of acquiring knowledge in order to achieve the assigned tasks and their own institutional development.

The process of reshaping "Nicolae Bălcescu" Land Forces Academy in relation to the knowledge management has been addressed in two ways: as a management of organization that is concerned with the use and integration of different types of knowledge, and as the management of knowledge itself. In fact, these aspects usually have to combine together into a general vision about the organization and knowledge management, subordinated to the academy's mission. A condition favoring this process is the fact that in the Land Forces Academy hidden potentials of knowledge can be found which are not obvious but should be extracted, captured, organized and transferred to help increase the value and efficiency.

We followed five criteria having a guiding strategic role:

- knowledge is a product, it must be directed towards finality - the graduate;
- the transfer of knowledge should be optimized - best practices;
- the knowledge is focused on meeting the social command;
- a high degree of personal responsibility for knowledge;
- strategy of the management of the intellectual assets.

The design of the institution's reform included the change of the educational ideal - according to the social command as model of a graduate and the managerial decision - due to the self-evaluation process and new openings and opportunities offered by the Euro-Atlantic integration.

Within the design, steps were taken in the following areas:

- *normative approach* – by developing the concept of training the land forces officers, ensuring consistency between the new professional requirements and the professional training strategy;
- *strategic approach* - by elaborating its own development strategy;
- *operational approach* – by practicing the necessary changes at the level of the Academy's management structures, curriculum design and content of training;
- *administrative approach* – validation/institutionalization of reform by decisions of the beneficiary.

The complexity of the graduate model approved by the Council of the Military Staff of the Land Forces required careful consideration in developing algorithms for processing the quantifying parameters of the graduate requirements.

2. MATHEMATICAL MODELING OF THE GRADUATE MODEL

The proposed mathematical model is based on the five professional competences of the graduate:

C1: Analysis, test and application of methods of diagnosis and decision-taking in the management of the military organization;

C2: Application of military art and use of weapons capabilities / military specialties to solve specific problems in different situational contexts;

C3: Implementation of the strategies of training and performance evaluation within individual and group training;

C4: Application of military techniques of individual action in different situational contexts;

C5: Exercise of the rights, freedoms and duties of citizenship in different situational contexts.

Having identified the professional competences of the graduate, the essential elements represented by their level descriptors, grouped, in their turn, in knowledge (K) and abilities (A).

In developing the mathematical model, the quantifiable elements identified by the authors are:

i_1 : Knowledge, understanding of concepts, basic theories and methods of the domain and area of specialization, their appropriate use in professional communication;

i_2 : Use of basic knowledge to explain and interpret various types of concepts, situations, processes, projects etc. associated to the domain;

i_3 : Application of principles and basic methods to solve problems / well-defined situations, typical to the domain, under circumstances of qualified assistance;

i_4 : Proper use of criteria and standard assessment methods to evaluate the quality, merits and limitations of processes, programs, projects, concepts, procedures and theories;

i_5 : Development of professional and /or research projects, using principles and methods used in the domain;

i_6 : Running responsible professional duties, under conditions of limited autonomy and qualified support;

i_7 : Familiarity with roles and activities specific to team work and distribution of tasks to the subordinate levels;

i_8 : Awareness of the need for continuous training, resource efficiency and learning techniques for personal and professional development.

We will treat these factors as essential parameters of the model. Due to the interdependence of these factors it is necessary to group them into two subcategories:

- P_1 : **Descriptors of professional competences** which will include the quantifiable elements i_1 to i_5 .

- P_2 : **Descriptors of transversal competences**, which will include the quantifiable elements i_6 to i_8 .

Grouping these parameters will allow an immediate analysis of the *level achieved in the training* plan (P_1, P_2) by each graduate, stating his/her position too.

Within the parameter *Descriptors of professional skills* P_1 , the five indicators will show *knowledge* according to i_1 to i_5 .

Within the model, for simplification, we will name the parameter *Descriptors of professional competences* P_1 as being *Actional*, and parameter *Descriptors of transversal competences* P_2 , as being *Conjectural*.

Schematically, the structural model of the determination of the level of training of the graduate is shown in Figure 1.

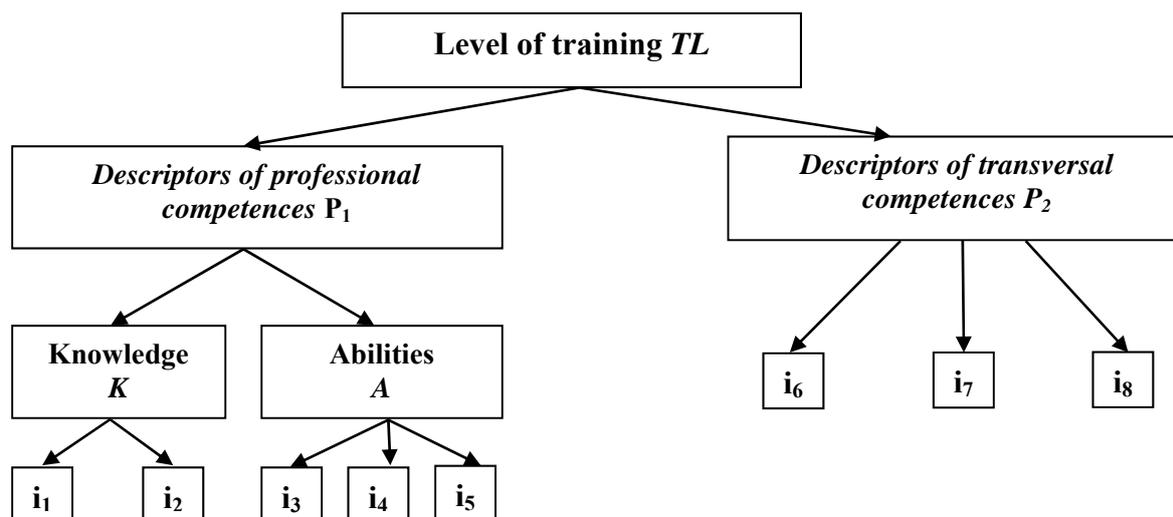


Fig. 1. The structural model of the level of training of the graduates.

The fact that an independent linear relationship cannot be established between the eight parameters, leads to the idea that, in the mathematical model, the weighting of indicators i_1, i_2, \dots, i_8 is required. The mathematical model proposes a level II weighting.

The first level, level I or the group of deciders I, is represented by the beneficiary and level II, by the peculiarities of the labor market. The structure of the group of deciders is given by their contribution to the definition of the five professional competences of the graduate, already mentioned (C1 to C5).

The establishment of level I weights will be influenced by the political, economic, geographic and military situation as well as the capability of analysis and expertise of the military analysts from general staff or operational level / strategic structures.

Level II weights are dictated by the specific requirements of the labor market at a given time. These weights are specific to each indicator.

For the beneficiary, group decider I, the 8 indicators can be in three possible states:

- the minimum state (critical) or state "0";
- the optimal state or "1" state;
- the maximum state or "2" state.

Obviously, one can imagine several states of indicators i_1, i_2, \dots, i_{13} .

The choice of only three states is determined by the ultimate goal of the mathematical model: the development of a flexible decision-making tool to indicate the level of training of the graduate in an accepted minimum period of time.

The military expertise and social investigation are factors that may influence the accuracy of the proposed mathematical model.

A possible picture could look like that one in Table number 1:

Table 1. Weight of analysis factors and the state indicators at the level of deciders I

Level of deciders I	Descriptors of professional competences P1					Descriptors of transversal competences P2		
	Knowledge K		Abilities A					
Weight of analysis factors	0.45		0.55			1.00		
Weight of state factors	i_1	i_2	i_3	i_4	i_5	i_6	i_7	i_8
	0.60	0.40	0.50	0.30	0.20	0.30	0.30	0.40
Maximum state	100%	100%	100%	100%	100%	100%	100%	100%
Optimal state	80%	70%	80%	90%	80%	70%	80%	90%
Minimum state	60%	50%	60%	70%	60%	50%	60%	70%

In the plan of coordinates (P_1, P_2) this group of deciders will position the maximum, optimal and minimum states of the center of gravity. Clearly the maximum state is given by the coordinates $(P_{1_{SM}} = 1, P_{2_{SM}} = 1)$.

For the states given in table number 1 three states have the following values:

The values of the three states in table number 1 are the following:

- maximum state: $Max.S.(P_{1_{SM}} = 1, P_{2_{SM}} = 1)$;
- optimal state: $Opt.S.(P_{1_{S.Opt.}} = 0,795, P_{2_{S.Opt.}} = 0,81)$;
- minimum state: $Min.S.(P_{1_{S.m.}} = 0,5985, P_{2_{S.m.}} = 0,61)$

In the graphical representation plan (P_1, P_2) these states are shown in Figure 2.

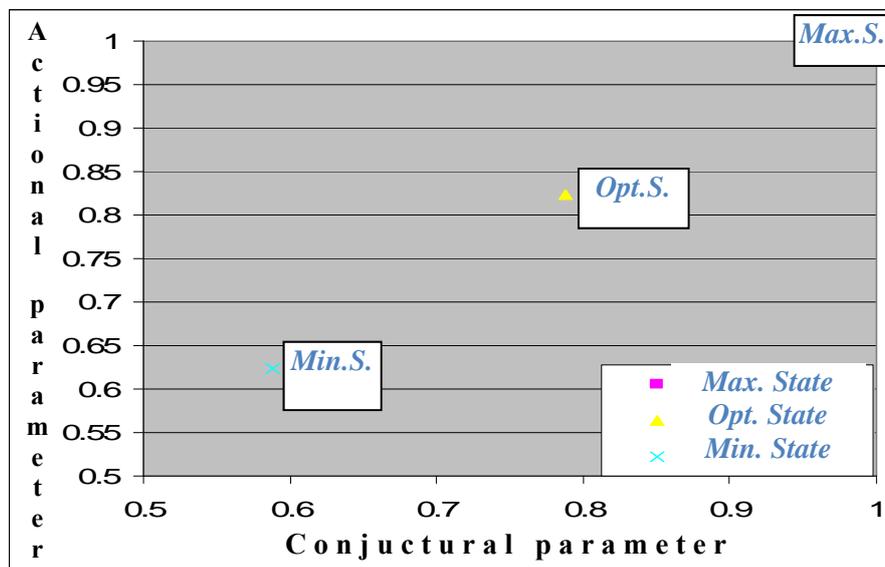


Fig. 2. Maximum, optimal, minimum states at level of deciders I.

Correlation with the requirements of the labor market will be achieved by specifying the condition of indicators i_1, i_2, \dots, i_8 , by selecting for each of them the appropriate state in which they are: maximum, optimum and minimum (critical) for the situation at the moment of the training analysis.

Basically, at this point, the level II group of deciders will select the conditions in which the 8 state indicators are for a concrete situation of the labor market.

A possible "map" level II group of deciders can be represented as shown in Table 2.

Table 2. State of indicators for levelII group of deciders

State of parameters	i_1	i_2	i_3	i_4	i_5	i_6	i_7	i_8
Maximum state		X					X	
Optimum state	X			X		X		
Minimal state			X		X			X

At this point, we can calculate the parameter *Descriptors of professional competences* P_1 , and the parameter *Descriptors of transversal competences* P_2 , respectively, with relations:

$$P_1 = w_1 \cdot K + w_2 \cdot A \tag{1}$$

$$P_2 = w_6 \cdot i_6 + w_7 \cdot i_7 + w_8 \cdot i_8$$

in which w_1 represents the weight of indicator *knowledge* K , w_2 represents the weight of indicator *abilities* A , w_6 represents the weight of indicator i_6 , w_7 represents the weight of indicator i_7 , w_8 represents the weight of indicator i_8 .

Clearly, we have the relations:

$$w_1 + w_2 = 1, \quad w_6 + w_7 + w_8 = 1 \tag{2}$$

The indicator *Knowledge* K is calculated using the equation:

$$K = w_{1,1} \cdot i_1 + w_{1,2} \cdot i_2 \tag{3}$$

in which $w_{1,1}$ represents the weight of state indicator i_1 , $w_{1,2}$ represents the weight of state indicator i_2 .

The indicator *Abilities* will be calculated with relation:

$$A = w_{2,3} \cdot i_3 + w_{2,4} \cdot i_4 + w_{2,5} \cdot i_5 \tag{4}$$

in which $w_{2,3}$ represents the weight of the state indicator i_3 , $w_{2,4}$ represents the weight of the state indicator i_4 , $w_{2,5}$ represents the weight of the state indicator i_5 .

Relations (3), (4), (5) and (6) are supplemented with relations:

$$w_{1,1} + w_{1,2} = 1, \quad w_{2,3} + w_{2,4} + w_{2,5} = 1 \tag{5}$$

On the basis of algorithm presented above, at this point we can calculate the value of parameter *Descriptors of professional competences* P_1 , as well as the value of the parameter *Descriptors of transversal competences* P_2 , which will specify the position and nature of the level of training of the graduates. The calculation is done with the help of relations (1).

The model presented was done with the help of program Microsoft Office Excel, and the calculation interface is shown in Table 3.

Table 3. Calculation interface for the level of training

MATHEMATICAL MODEL OF THE LEVEL OF TRAINING OF THE GRADUATES

Level of deciders I	Descriptors of professional competences P1					Descriptors of transversal competences P2		
	Knowledge		Abilities					
Weight of analysis factors	0.45		0.55			1.00		
Weight of state indicators	i_1	i_2	i_3	i_4	i_5	i_6	i_7	i_8
	0.60	0.40	0.50	0.30	0.20	0.30	0.30	0.40
Max. State	100%	100%	100%	100%	100%	100%	100%	100%
Opt. State	80%	70%	80%	90%	80%	70%	80%	90%
Min. State	60%	50%	60%	70%	60%	50%	60%	70%

Table 3 (continued)

MATHEMATICAL MODEL OF THE LEVEL OF TRAINING OF THE GRADUATES

Level of deciders I	Descriptors of professional competences P1				Descriptors of transversal competences P2			
	Knowledge		Abilities					
Level of deciders II								
Weight of parameters	<i>I1</i>	<i>I2</i>	<i>I3</i>	<i>I4</i>	<i>I5</i>	<i>I6</i>	<i>I7</i>	<i>I8</i>
Maximum state		X					X	
Optimal state	X			X		X		
Minimum state			X		X			X
Level of indicators	.48	.40	.30	.27	.12	.21	.30	.28
Level of factors	.396		.3795			.790		
LEVEL OF TRAINING	.7755				.790			
Maximum state	1				1			
Optimal state	0.795				0.81			
Minimum state	0.5985				0.61			

In the plan of coordinates (P_1, P_2) we can represent the level of training for each particular situation of a graduate (figure 3).

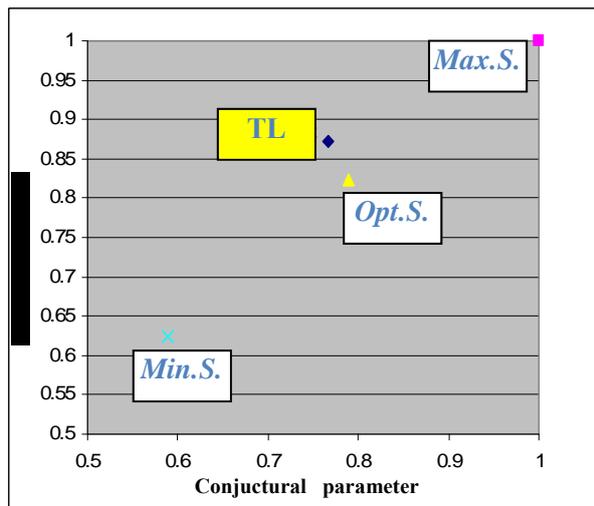


Fig. 3. The training level TL.

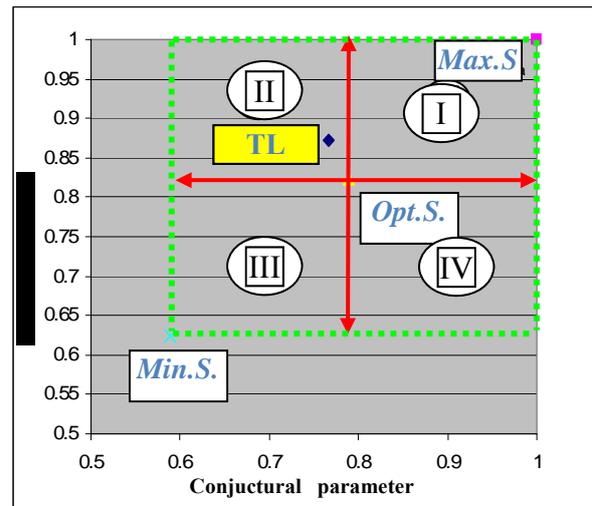


Fig. 4. The position of the training level TL.

The analysis of the nature of the *Training Level (TL)* will be made according to its position against the optimal state *Opt. S.*

3. INTERPRETATION OF RESULTS

In all situations the weight center will be below the maximum state (*Max. S.*) and above the critical state which is identical with the minimum state (*Min.S.*).

For this analysis we will divide the domain of possible solutions into 4 quarters with the center in the optimal state *Opt. S.* (Figure 4).

The domain of the possible solutions is given by the equations:

$$P_{1C.G.} \geq P_{1S.min.}, P_{2C.G.} \geq P_{2S.min.}, P_{1C.G.} \leq P_{1S.Max.}, P_{2C.G.} \geq P_{2S.Max.} \quad (6)$$

whose representation is a rectangle shown in green.

Each point within the domain of the possible solutions represents a potential *training level*.

If the training level **TL** is in the quarter I (Figure 5) of the domain of the possible solutions:

$$\begin{aligned} x &= P_{1C.G.} - P_{1S.Opt.} > 0 \\ y &= P_{2C.G.} - P_{2S.Opt.} > 0 \end{aligned} \tag{7}$$

the nature of the weight center can be conjectural if $x > y$ or actional if $x < y$.

No matter the situation we might find ourselves in, it is the desired state for the weight center, because its position is between the optimal and maximum state:

$$P_{1S.Opt.} \leq P_{1C.G.} \leq P_{1S.M.ax.} \tag{8}$$

For these reasons this quarter can be called *the quarter of benefits*.

It is obvious that $x = 0$ or $y = 0$ dictates the position of the training level **TL** on one of the axis that delineates the quarter I. In the case in which $x = y = 0$ the training level **TL** is in the origin, we mean in the position of the optimal state *Opt. S.*

These two last observations are also valid if the training level **TL** is in the quarters II, III and IV.

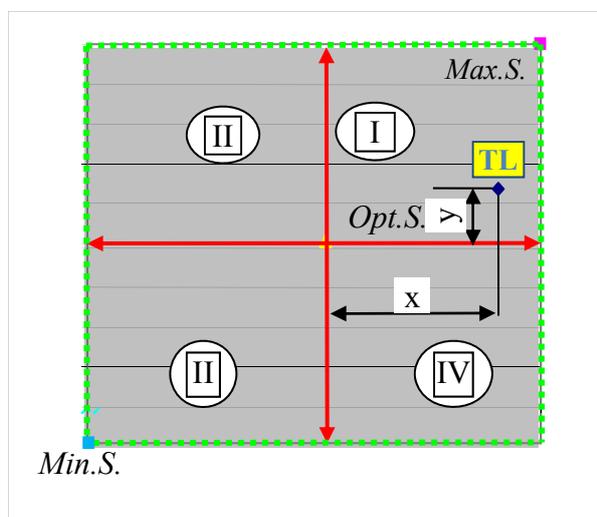


Fig. 5. Positioning of the **TL** within 1st quarter.

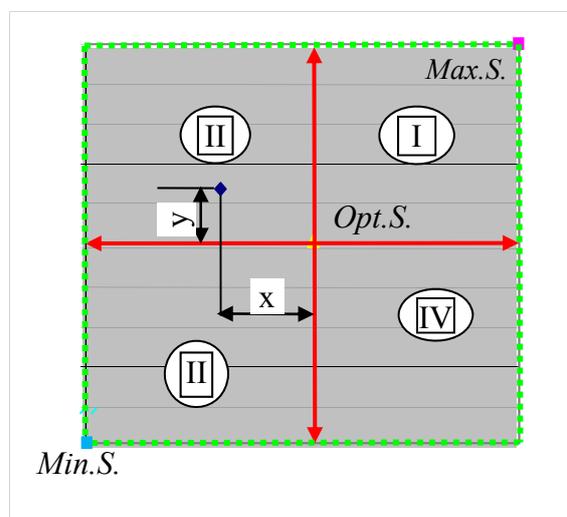


Fig. 6. Positioning of the **TL** within 2nd quarter.

If the training level **TL** is within the quarter II (Figure 6) of the domain of possible solutions:

$$\begin{aligned} x &= P_{1C.G.} - P_{1S.Opt.} < 0 \\ y &= P_{2C.G.} - P_{2S.Opt.} > 0 \end{aligned} \tag{9}$$

the nature of the training level **TL** is actional because:

$$P_{1C.G.} < P_{1S.Opt.}, P_{2C.G.} > P_{2S.Opt.} \tag{10}$$

This quarter can also be called the *actional quarter*.

If the weight center **CG** is in the quarter III (Figure 7) of the domain of possible solutions:

$$\begin{aligned} x &= P_{1C.G.} - P_{1S.Opt.} < 0 \\ y &= P_{2C.G.} - P_{2S.Opt.} < 0 \end{aligned} \tag{11}$$

the nature of the training level **TL** is:

- actional, if $|x| > |y|$ or
- conjectural, if $|x| < |y|$.

In this quarter:

$$P_{1C.G.} < P_{1S.Opt.}, P_{2C.G.} < P_{2S.Opt.} \tag{12}$$

reason for which this can be also called *attention quarter*.

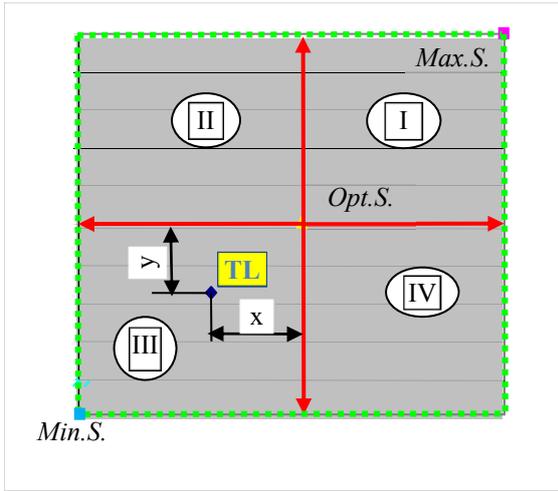


Fig. 7. Positioning of the TL within 3rd quarter.

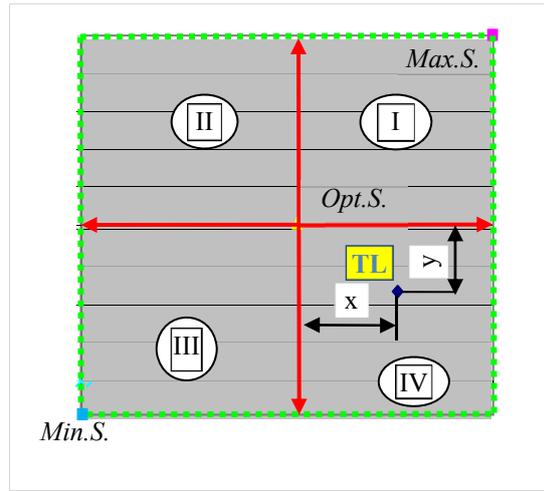


Fig. 8. Positioning of the TL within 4th quarter.

If the training level **TL** is in the quarter IV (Figure 8) of the domain of possible solutions:

$$\begin{aligned} x &= P_{1C.G.} - P_{1S.Opt.} > 0 \\ y &= P_{2C.G.} - P_{2S.Opt.} < 0 \end{aligned} \tag{13}$$

the nature of the training level **TL** is conjectural because:

$$P_{1C.G.} > P_{1S.Opt.}, P_{2C.G.} < P_{2S.Opt.} \tag{14}$$

This quarter can also be called *conjectural quarter*.

The mathematical model presented can be improved by defining the four states of indicators i_1, i_2, \dots, i_{13} :

- minimum state (critical) or state "0";
- optimal state or state "1";
- maximum state or state "2";
- state of alert "A"

Having defined these 4 states, we will have to use 2 systems of quarters to analyze the training level TL. The second system of quarters is positioned with the center in the minimum (critical) state, having its axis represented as shown in Figure number 9.

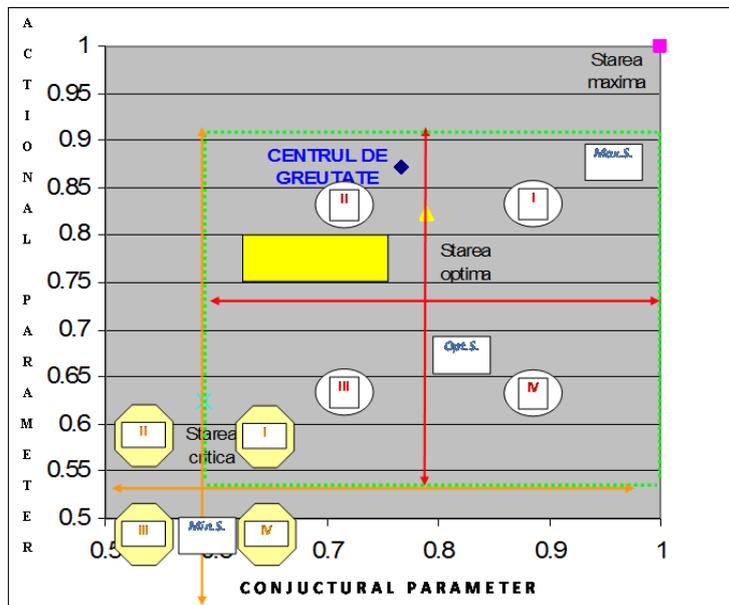


Fig. 9. Analysis model of the training level TL with four states.

The algorithm of analysis follows the same steps as previously established. The presented model is a flexible decision-taking tool capable to show the positioning and nature of the training level **TL**.

4. CONCLUSIONS

The military education can be a real promoter of the military values on the labor market by the very professional quality of its graduates as well as by their abilities, knowledge and competences; the personal success and reputation of the military personnel as individuals or representatives of the group being the key for the assimilation of the military profession at the level of the Romanian society. In this regard, following the logic of the national education strategies, the Ministry of National Defense (MoND) is required to consider the size of the military education as a strategic, priority direction to support its organizational processes, in line with the requirements imposed by the military and civilian occupational standards in the field.

We stress all this as the studies have revealed that:

- ☞ to achieve the training-education objectives, MoND must determine not only the minimum criteria for the profile of the graduate but also their *corresponding weights in the professional training of the military personnel in the stages of training*, so that planning of the higher education should take into account the quantifiable hierarchy of the minimal competences attached to the profile designed for the first assigned position of the military - in this way you can clearly separate the specific knowledge and skills in the curriculum of undergraduate training, in relation to future training opportunities through formative and vocational education; reducing their weight in higher education will probably result in the increase of the weight of the transversal competences, with direct effect on the recognition of the military profession on the external labor market;
- ☞ the formation of that knowledge and those abilities and competences with multiple, trans-disciplinary and multidisciplinary values applied in various domains (military and civilian) must be promoted with prevalence in order to increase the mobility of human resources from the military field;
- ☞ the necessity to create *a dynamic system to design the educational curriculum in the military education system* is obvious, so that the graduate profile should be continuously and in real time "connected" and "dedicated" both to the military realities but mainly to the changing labor market particularities, generated by the technological, economic, cultural, geopolitical or specific geostrategic changes.

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ASUPRA COMPONENTEI TEHNICE ÎN FORMAREA FITERILOR DE COMANDĂ DIN FORȚELE TERESTRE ALE ROMÂNIEI

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Rezumat: Lucrarea prezintă rezultatele cercetării științifice întreprinse de autori cu privire la modul în care modelul absolventului este implementat în procesul de formare a ofițerilor de comandă. Introducerea noului curriculum în academiile militare s-a materializat în constituirea unui curriculumul nucleu (incluzând disciplinele din cadrul specializărilor) și curriculumul la decizia academiei (corelat cu profilul Științe militare și informații) – două segmente care au ca principal obiectiv micșorarea decalajului între modificarea permanentă a misiunii ofițerului și caracteristicilor locului de muncă, fie el un teatru de operații, o unitate operativă, o unitate de învățământ sau eventual o instituție economică sau administrativă și competențele formate prin procesul de învățământ. O miză importantă a noii viziuni curriculare a fost conturarea „personalității academiei” într-o societate care își propune să respecte și să valorizeze diversitatea, în contextul respectării standardelor naționale, ale unei educații de calitate și acordării unor șanse realmente egale tuturor tinerilor. În acest context a apărut fireasca întrebare: cât este suficient în pregătirea ofițerilor de comandă? Cum găsim limita în pregătirea universitară a acestora corelată cu armele și specialitățile militare, cum măsurăm abilitățile/competențele studenților, respectiv absolvenților și cum introducem măsurile care să regleze procesul de formare a competențelor și abilităților necesare ofițerilor de comandă de toate armele și specialitățile militare sunt doar câteva dintre întrebările ale căror răspuns le regăsim în lucrarea propusă de autori. În același timp, autorii prezintă și un model matematic de proiectare dinamică a curriculumului educațional în raport cu evoluțiile pieței muncii în domeniul militar, din perspectiva formării continue și implementării cerințelor formulate de către beneficiari.