A Study On the Improvement and Perfection of the Evaluation System of the Ability of Civil-Military Integration Development

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Abstract

The assessment of the ability to develop the military and civilian integration is the basic way to understand the scope, level and extent of the modernization of national defense and the army into the national economic and social development system. It is also an important basis for the state to formulate a policy on civil-military integration. In view of the present situation of the lack of evaluation methods for the development ability of civil-military integration, this paper puts forward a calculation method from the external benefits and its own competitiveness. It is of great significance for the government to give full play to the leading position and role of the government in the development of military-civilian integration with Chinese characteristics, to improve the integration degree of strategic planning, to establish the top-level coordination mechanism, and to promote the in-depth development of military-civil-military integration.

Keywords

Civil-military integration; Capacity development; Evaluation methods; External benefits; Efficiency.

1. A Summary of the evaluation system of the ability of military and civilian Integration development

Comparing with the experience of foreign military and civil integration evaluation, the evaluation system of military and civil integration development ability is basically divided into three parts: fusion foundation, fusion depth and fusion effect. The level of development of civil-military integration has been further raised and optimized in good application areas or regions. The depth of integration is in the development of weapons and equipment, the training of personnel, the support of the army, and the construction of infrastructure. The ability and level of military and civilian integration development can be realized in the aspects of information construction, so as to promote the improvement of military combat effectiveness, which will eventually produce important economic and social benefits (integration effect and fusion foundation) directly or indirectly to the region. The interaction of the three aspects of fusion depth and fusion effect constitutes the interactive model of military and civil integration. The evaluation of the development level of military and civil integration should focus on the above three aspects. The scale and strength of civilian participation in the military, and so on, to measure the difficulty of entering and their own strength in regional military-civilian integration; the depth of integration refers to the level of military-civilian integration within the region, which is the core content of measuring the level of military-civil-military integration. The integration effect refers to the regional competitiveness, economic and social cooperation brought directly or indirectly by the integration of military and civilian enterprises, including the scope of integration, the scale of integration, the benefits of integration, and so on; the integration effect refers to the regional competitiveness, economic and social cooperation brought

directly or indirectly by military and civilian integration. The impact of the effectiveness of the conference. As far as the relevant studies in the field of civil-military integration, especially quantitative research, are concerned, the evaluation of the level of development and the ability to develop is mainly focused on the effect of integration between the military and the civilian. That is, the contribution of civil-military integration to regional economic and social development is analyzed, which includes two aspects: the analysis of the external effects of civil-military integration industry and the analysis of the competitiveness of civil-military integration industry itself. The overall evaluation of the ability of military and civilian integration development mostly focuses on the regional economic effect, and lacks the macro-efficiency analysis of regional resources input-output, while the efficiency analysis in the field of civil-military integration is mostly the specific analysis of micro-military enterprises, lacking of the country. Because of the analysis of the overall external benefits of home industry, it is difficult to form regional comparative evaluation and overall policy guidance on the ability of military and civil integration development. In view of this, this paper bases itself on the level of national military and civilian integration development strategy and development planning. From the perspective of overall external benefit and regional economic efficiency, this paper attempts to study and analyze the capability of military and civil integration development, which is of great practical significance to the evaluation system of military and civil integration development ability.

2. The measurement of the overall external effect of the national military and civilian integration

Based on the Fidel-Ram two-sector model, the spillover effect of civil-military integration enterprises is studied. The economic output of these two enterprises are recorded as M_t and Q_t respectively. The output of non-military-civilian integration enterprises is influenced by the common factors of production, such as human resource, capital, technology T, and spillover effect of military-civilian integration industry. Therefore, the following equations are constructed:

$$\begin{cases} M_{\mathrm{t}} = G_t\left(K_{M_t}, L_{M_t}, T_{M_t}\right) \\ Q_t = F_t\left(K_{Q_t}, L_{Q_t}, T_{Q_t}, M_t\right) \\ Y_t = M_{\mathrm{t}} + Q_t \end{cases} \tag{1}$$

Among them, $K_{M_t}, L_{M_t}, T_{M_t}$ were the capital, labour and technology inputs of the civil-military integration sector in the T period; $K_{Q_t}, L_{Q_t}, T_{Q_t}$, respectively, the amount of capital, labour and technology invested by the civil-military integration sector in the T period; Y_t is a total of two economic production.Assume that the marginal factor ratio between the non-military-civilian integration industry and the military-civilian integration industry is 1+δ, that is:

$$F'_{K_{Q_t}}/G'_{K_{M_t}}=F'_{L_{Q_t}}/G'_{L_{M_t}}=F'_{T_{Q_t}}/G'_{T_{M_t}}=1+\delta \tag{2}$$

At the same time, the total amount of regional economic factors is equal to the sum of the inputs of the two sectors:

$$K_t = K_{M_t} + K_{Q_t}, L_t = L_{M_t} + L_{Q_t}, T_t = T_{M_t} + T_{Q_t} \tag{3}$$

Shall be obtained by way of (3):

$$\dot{K}_t = \dot{K}_{Q_t} + \dot{K}_{M_t}, \dot{L}_t = \dot{L}_{Q_t} + \dot{L}_{M_t}, \dot{T}_t = \dot{T}_{Q_t} + \dot{T}_{M_t} \tag{4}$$

On the derivation of time, the following results are obtained:

$$\dot{Y}_t = F'_{K_{Q_t}}\dot{K}_{Q_t} + F'_{L_{Q_t}}\dot{L}_{Q_t} + F'_{T_{Q_t}}\dot{T}_{Q_t} + G'_{K_{M_t}}\dot{K}_{M_t} + G'_{L_{M_t}}\dot{L}_{M_t} + G'_{T_{M_t}}\dot{T}_{M_t} \tag{5}$$

Substituting (2), (3), (4) for (5) and dividing the equation on both sides by Y_t, then we can get the equation :

$$\frac{\dot{Y}_t}{Y_t} = F'_{K_{Q_t}}\frac{K_t}{Y_t}\frac{\dot{K}_t}{K_t} + F'_{L_{Q_t}}\frac{L_t}{Y_t}\frac{\dot{L}_t}{L_t} + F'_{T_{Q_t}}\frac{T_t}{Y_t}\frac{\dot{T}_t}{T_t} + \left(F'_{M_t} + \frac{\delta}{1+\delta}\right)\frac{\dot{M}_t}{M_t}\frac{M_t}{Y_t} \tag{6}$$

Assuming that there is a linear correlation between the marginal productivity of factors and the input-output ratio of each factor in the non-military-civilian integration sector, then $F'_{K_{Q_t}}\frac{K_t}{Y_t}$, $F'_{L_{Q_t}}\frac{L_t}{Y_t}$, $F'_{T_{Q_t}}\frac{T_t}{Y_t}$ are all constant. Respectively, Set them to α, β, γ, which reflect the marginal contribution rate of capital, labor and technical factor input in regional economic growth.

In order to measure the external effects of civil-military integration industry on other economic sectors, we choose Taking the elastic coefficient ρ of economic output of other sectors to the economic output of military and civil integration departments as its reflection index, and assuming that elastic ρ is a constant constant in a certain period of time, then the formula (6) can be transformed into:

$$\frac{\dot{Y}_t}{Y_t} = \alpha\frac{\dot{K}_t}{K_t} + \beta\frac{\dot{L}_t}{L_t} + \gamma\frac{\dot{T}_t}{T_t} + \rho\frac{\dot{M}_t}{M_t} + \left(\frac{\delta}{1+\delta} - \rho\right)\frac{\dot{M}_t}{M_t}\frac{M_t}{Y_t} \tag{7}$$

At the same time, Romer (1990) believes that technological innovation relies heavily on existing knowledge stocks, because future researchers can get "time series" knowledge spillovers from the knowledge stock to help them develop. Therefore, it is advisable to convert the amount of technology inputs T_t into the cumulative technical stock N_t, R_t calculations, and to measure the economic M_t of the spillover effects of the civil-military integration sector, and to add technical depreciation factors on the basis of the actual indices based on the practices of David and Helpman (1995), Calculated through the perpetual inventory method, namely:

$$\frac{\dot{Y}_t}{Y_t} = \alpha\frac{\dot{K}_t}{K_t} + \beta\frac{\dot{L}_t}{L_t} + \gamma\frac{\dot{N}_t}{N_t} + \rho\frac{\dot{M}_t}{M_t} + \left(\frac{\delta}{1+\delta} - \rho\right)\frac{\dot{R}_t}{R_t}\frac{R_t}{Y_t} \tag{8}$$

Of which:

$$\begin{cases} N_t = L_t + N_{t-1}(1-d) \\ N_0 = L_0/(g_1+d) \\ R_t = M_t + R_{t-1}(1-d) \\ R_0 = M_0/(g_2+d) \end{cases} \tag{9}$$

L_0 and M_0 respectively represent the regional technical inputs and the economic output of the civil-military integration sector in the initial year of the sample, d indicates the technical depreciation rate, g_1, g_2 represent the technical inputs and the average annual growth rate of the output of the civil-military integration sector respectively. Then ρ is the economic output driven by the externality of military and civil integration, while (δ/(1+δ)-ρ) reflects the economic spillover resulting from the difference in productivity between the civil-military integration industry and the civilian-military integration sector.

3. The measurement of the competitiveness of military and civilian integration in the regions

Data Envelopment Analysis (DEA) is a common method for effectiveness evaluation, which was first proposed by Charney Cooper and Rhodes (1978) under the assumption of fixed scale reward invariant (CRS). And gradually developed from the original CCR model to the later BCC, C^2GS^2, C^2W, C^2WH, C^2WY and so on. Since the traditional DEA model can only carry out the horizontal comparison of the decision making units in a single period, Fareh (1992) Based on the research of Malmquist productivity index, the author redefines it and measures the change of productivity by calculating the geometric average of productivity index in periods t and T1. Therefore, the efficiency analysis is extended from a single annual cross-section analysis to a continuous panel analysis. Because the Malmquist exponential model based on the DEA method can analyze the effectiveness of multi-input-multi-output decision making units even for non-uniform dimensions. And is able to measure dynamic technological progress efficiency and scale efficiency, so the method is currently It is widely applied to the empirical analysis and research of economics. This paper mainly uses this

method to evaluate and analyze the development level and capability of interregional civil military integration, and the specific models are as follows:

$$M_0^{t+1} = \left[\frac{D^t(X_0^{t+1}, Y_0^{t+1})}{D^t(X_0^t, Y_0^t)} \times \frac{D^{t+1}(X_0^{t+1}, X_0^{t+1})}{D^{t+1}(X_0^t, Y_0^t)}\right]^{1/2} \quad (10)$$

$$= EC \times TC = \frac{D^t(X_0^{t+1}, Y_0^{t+1})}{D^t(X_0^t, Y_0^t)} \times \left[\frac{D^t(X_0^{t+1}, Y_0^{t+1})}{D^{t+1}(X_0^{t+1}, Y_0^{t+1})} \cdot \frac{D^t(X_0^t, Y_0^t)}{D^{t+1}(X_0^t, Y_0^t)}\right]^{1/2} \quad (11)$$

Among them, the EC expresses the change of comprehensive efficiency of the civil-military integration industry from t period to t+1 period, and the EC>1 shows that the comprehensive efficiency is improved. EC =1 shows that the comprehensive efficiency is unchanged. EC<1 shows a decline in overall efficiency. TC indicates that from t phase to t+1 period, the technical change of civil-military integration industry, TC<1 expressed relative to t period, t+1 technology progress; TC=1 indicates that the technology of t+1 period is unchanged relative to t phase. TC<1 indicates that t+1 technology has regressed relative to t phase. M_0^{t+1} represents the change in total factor productivity during the t+1 period, which can be decomposed into the product of the Efficiency Change index EC and the technical Change index TC. $D^t(X_0^t, Y_0^t)$ represents the range function of civil-military integration output in the region T, that is, the maximum percentage of output that can be obtained with the same input, whichever is the T period. Similarly, $D^{t+1}(X_0^t, Y_0^t)$ represents the regional civil-military integration output distance function for each region in phase T of the reference set, $D^t(X_0^{t+1}, Y_0^{t+1})$, by the input and output of the N regional decision units in the t+1 period, represents the input-output distance function of each region in the t+1 period, which is based on the inputs and outputs of N region decision units of t period.In addition, the VRS is based on the variable scale reward (VRS) condition. The efficiency change index (EC) is further reduced to the product of the scale efficiency change index (SEC) and the pure technical efficiency change index (PEC), that is:

$$EC = SEC \times PEC \quad (12)$$

When SEC > 1, it shows that the production scale tends to be optimal, and when SEC < 1, the production scale tends to deviate from the optimal production scale. PEC indicates the change of efficiency caused by the improvement of production management from period t to period T1, and the efficiency of management tends to optimize when SEC < 1.If less than 1, the efficiency of production management is reduced. In summary, the change of the competitiveness of military and civilian integration within the region can be measured.

4. Conclusion

In order to evaluate the development ability of military and civilian integration objectively and comprehensively, it is necessary not only to grasp the efficiency of micro management of military and civil fusion industries and enterprises, but also to make a reasonable estimate of the comprehensive economic effect of military and civil integration from the macro perspective of the state. Based on the regional differences in production efficiency, the resources of civil-military integration industry can be allocated reasonably. Only in this way, the coordinated planning of civil-military integration can be carried out accurately and effectively, and the strategy of civil-military integration can be promoted deeply.

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