

Research on the Evaluation Model of Market-oriented Transformation Process of Military Enterprises

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Abstract: Facing the increasing market competition, military enterprises are escalating the market-oriented transformation. This paper adopts the value tree to construct the evaluation index system of market-oriented transformation process and Delphi method to calculate the index weights and build evaluation model of market-oriented transformation process. The aim is to evaluate the market-oriented transformation degree in an objective way and discover the gap between the transformation process and the target goals so that the basis can be provided for the effective formulation of the next step work plan.

1 INTRODUCTION

With the vigorous implementation of the national civil-military integration policy and a more open and fierce competitive market environment, military enterprises gradually increase the pace of market-oriented transformation based on their own development strategic plans (Lu 2016). The implementation of each five-year plan becomes an important task for the market-oriented transformation of military enterprises (He 2016).

It is a long-term process for enterprises to become more market-oriented. The measurement of market-orientation degree has a strong dynamic nature (Liang 2015). In order to track and analyze the market-oriented transformation process and identify its weaknesses, this paper conducts a study on the evaluation model of the market-oriented transformation process to highlight the guidance on the direction of market-oriented transformation.

2 RESEARCH METHODOLOGY

2.1 Design Approaches

Since the 1990s, domestic and international research has been conducted to evaluate the degree of market-orientation, and the common practice is to measure the market-oriented process by constructing a specific index system. The Heritage Foundation of

the United States has developed a method for measuring economic freedom in 10 areas: trade policy, taxation, government intervention, monetary policy, capital flow and foreign trade policy, finance, wage and price control, property rights, rules and black market. The Fraser Institute of Canada created a way of evaluating seven areas: the size of government, economic structure and market use, monetary policy and price stability, freedom to use different currencies, legal structure and guarantees of private rights, freedom of foreign trade, and freedom of exchange in the capital market (Peng 2013).

The studies by the American Heritage Foundation and the Canadian Fraser Institute are consistent in their basic logic. They both follow a process to integrate basic indicators with composite indices. The result of doing so is to more fully reflect the richness of economic freedom. In terms of the definition of economic freedom, the former is relatively narrowly defined, while the latter is relatively broadly defined. In terms of the content of the measure, the former focuses on the reflection of policy and institutional content and on the input side of economic freedom; the latter focuses on the output side of economic freedom (Zhang 2000).

The construction of the model to evaluate the market-oriented transformation process of enterprises is based on the relevant research results of market-orientation at home and abroad as well as the connotation of the market-orientation of enterprises. It starts from the national policy direction and basic aspects of economic activities of enterprises. The

model consists of four dimensions: domain, factors, sub-factors, and indicators. The domain covers the basic aspects of the economic activities of enterprises; the factors reflect the main contents of the market-oriented business activities of enterprises; the indicators are the specific measures of the market-oriented degree of enterprises. The domain level is embodied by the factor level, and the factor level is characterized by the specific indicator level.

2.1.1 Construction of Domain Level

The evaluation model of market-oriented transformation process can be divided into three fields: market-oriented production elements, market-oriented organization and operation, and market-oriented products. These three fields cover all economic activities carried out by military enterprises under market rules, and each area reflects an important aspect of market-orientation.

Market-oriented production elements mean that enterprises acquire and manage production elements in accordance with market mechanisms to achieve the optimal allocation of resources and maximize the value of production elements.

Market-oriented products mean that enterprises develop and produce products, set prices, and sell products in a market-based manner following the laws of the market to meet customers' demands and further guide and nurture the market.

Market-oriented organization and operation means that enterprises establish the enterprise structure and let the market mechanism play the role in the internal operation and management activities as much as possible following the concept of modern enterprise system. This can regulate the enterprise operation and improve the organization efficiency.

2.1.2 Construction of Factors Level

The first is the market-orientation of production elements. Based on the realities of military enterprises, two factors under the field of production elements-labor and capital-can be chosen and decomposed into basic indicators to evaluate the market-orientation degree.

Market-oriented labor forces show that the hiring and employment mechanism of the enterprises are market-based. Market-oriented capital refers to the more efficient ways of allocating and using capital in economic organization in accordance with the market mechanism.

The second is the market-orientation of products. In the construction of market-oriented products field,

Jerome McCarthy's 4P marketing theory can be selected to design factors to evaluate the degree of products market-orientation and select four factors of product development, pricing, channels and sales based on the realities of military enterprises.

Market-oriented product development means that the tangible and intangible products and product portfolio developed and produced by enterprises can meet the needs and desires of target customers. This generally includes factors such as product input and output, product portfolio, quality, trademark, brand, etc.

Market-oriented pricing refers to the ability of enterprises to set and adjust product prices in accordance with the requirements of the law of value in order to increase sales revenue and improve profits. It generally includes independent pricing rights, basic prices, discount prices, payment terms, commercial credit and other factors.

Market-oriented channel refers to the enterprise's independent selection of target markets and intermediaries according to market demands, as well as the degree of openness of target markets and intermediaries. It generally includes factors such as channel establishment, channel maintenance, and target market revenue.

Market-oriented sales refer to the introduction of market mechanisms into the field of product sales by enterprises to increase the pressure on sales staff, with the aim to reduce inventory, expand product sales, and get payback in due course. It generally includes factors such as sales results, product inventory levels, promotions, etc.

The third is the market-orientation of organization and operation. As one kind of organization form, the enterprise organizes and operates mainly in two aspects. One is the corporate legal entity governance structure in the legal sense of external control, which focuses on the setting of authority at the top of the hierarchy and thus determines the form of authority separation at the top of the organizational structure. The other is the organizational management in the internal operational sense of the authority allocation and carrying out operational activities. Therefore, under this area, the two factors of governance structure and organizational management are selected to evaluate the degree of market-orientation.

Market-oriented governance structure is a management system of decision-making and the rights for operation management supervision established by economic organizations with reference to the requirements of modern enterprise system under market economy conditions, thereby ensuring efficient operation and competitiveness of

enterprises. The governance structure is the product of the combination of a mandatory external system and a spontaneous internal system. The basic content of the governance structure regulates the relationship of power, responsibility and benefits among the subjects of interests in the enterprise. Its goal is to solve the problems resulting from interests, risks, incentives and constraints among different subjects of interests, so as to realize the three mechanisms of scientific decision-making, effective motivation and supervision.

Market-oriented organization management means that economic organizations are designed to form organizational structures under market economy conditions in accordance with the concept of scientific, streamlined and efficient operation. It is to ensure the clarity of responsibilities and authority of each department and the smooth operation of the

organization's internal processes. It can finally realize the reasonable distribution of operation and management authorities and the supervision and control of management rights at all levels, while at the same time it can optimize the organization efficiency.

2.1.3 Construction of Indicator Level

The value tree model was used to further decompose each factor into sub-factors, and then find the most critical indicators of the market role in each sub-factor. All the indicators are tested in four aspects: measurability, credibility, low-cost accessibility, and market relevance so as to filter and determine the subordinate indicators of each sub-factor. The details are as follows in Table 1.

Table 1: Indicators Validity Test Table.

No.	Assessment Indicator	Measurability	Credibility	Low-cost access	Relevance to the market
1	Management talents ratio	Y	Y	Y	Y
2	Marketing training investment to training cost ratio	Y	Y	Y	Y
3	Labor remuneration per capita as a share of operating income	Y	Y	Y	Y
4	Maintenance and appreciation of state-owned assets rate	Y	Y	Y	Y
5	Total asset turnover ratio	Y	Y	Y	Y
6	Total R&D investment as a percentage of operating revenue	Y	Y	Y	Y
7	Revenue share of stereotyped products	Y	Y	Y	Y
8	Percentage of revenue from main business	Y	Y	Y	Y
9	Percentage of revenue from horizontal projects	Y	Y	Y	Y
10	Share of revenue from international business	Y	Y	Y	Y
11	Share of the two funds in operating income	Y	Y	Y	Y
12	Asset liability ratio	Y	Y	Y	Y
13	Security surplus cash multiples	Y	Y	Y	Y
14	Total labor productivity growth rate	Y	Y	Y	Y
15	Cost rate	Y	Y	Y	Y

On this basis, 15 variable indicators were identified. The Delphi method was used to calculate the weights of each indicator following the

integration process of "indicator, sub-factor, factor and domain". The details are as follows in Table 2.

Table 2: Evaluation Model and Indicator Weights of Market-oriented Transformation Process.

Domain	Factors	Sub-factors	Indicators	Indicator Weight
Market-oriented production elements (30%)	Labor force (50%)	Staff structure (60%)	Management talents ratio (100%)	9.00%
		Talents inputs (40%)	Marketing training investment to training cost ratio (60%)	3.60%
			Labor remuneration per capita as a share of operating income (40%)	2.40%
	Capital (50%)	Capital return (50%)	Maintenance and appreciation of state-owned assets rate (100%)	7.50%
		Capital efficiency (50%)	Total assets turnover ratio (100%)	7.50%
Market-oriented products (45%)	Products development (30%)	Products R&D investment (50%)	Total R&D investment as a percentage of operating revenue (100%)	6.75%
		New products development (50%)	Revenue share of stereotyped products (100%)	6.75%
	Pricing (20%)	Pricing (100%)	Percentage of revenue from main business (100%)	9.00%
	Channel (30%)	Horizontal project markets (60%)	Percentage of revenue from horizontal projects (100%)	8.10%
		International markets (40%)	Share of revenue from international business (100%)	5.40%
	Sales (20%)	Two funds (100%)	Share of the two funds in operating income (100%)	9.00%
Market-oriented organization (25%)	Governance structure (50%)	Risk control (100%)	Asset liability ratio (50%)	6.25%
			Security surplus cash multiples (50%)	6.25%
	Organization management (50%)	Management efficiency (60%)	Total labor productivity growth rate (100%)	7.50%
		Management benefits (40%)	Cost rate (100%)	5.00%

2.2 Calculation Methods

According to the constructed model, the base value of market-oriented transformation evaluation is calculated as:

$$Mab = \sum_{c=1}^n Vabc \times fc \tag{1}$$

Mab is the base value of market-oriented transformation evaluation. Vabc is the value of the cth evaluation index of a military enterprise b in year a. fc refers to the weight of the cth index, and n refers to the number of evaluation indexes.

The degree of market-oriented transformation of military enterprises is calculates as:

$$\xi_{ab} = [(Mab - Mtb) / Mtb] \times 100\% \tag{2}$$

ξ_{ab} is the degree of market-oriented transformation of a military enterprise b in year a, and t is the data base period of market-oriented transformation evaluation of a military enterprise. Ideally, it is between 0 and 100%, but in actual operation, there are cases that some enterprises' market-oriented transformation is greater or less than 100%.

2.3 Evaluation Procedure

The evaluation procedure of market-oriented transformation can be divided into the following three steps. First, the 15 evaluation indicators of market-oriented transformation are calculated. Secondly, the base value of market-oriented transformation evaluation is calculated based on the weights of each indicator. Finally, a comparison is made with the data base period to calculate the degree of market-oriented transformation.

3 RESEARCH RESULTS

This paper takes Beijing Orient Institute of Measurement and Test as the sample and uses 2015 as the data base period for the evaluation of market-oriented transformation. The degree of market-oriented transformation is calculated based on each year of the 13th Five-Year Plan period.

The 15 base values of market-oriented transformation evaluation from 2015 to 2020 are calculated according to Equation 1. The details are as follows in Table 3.

Table 3: Base Values of the Institute's Market-oriented Transformation Evaluation From 2015 to 2020.

No.	Domain	M ₂₀₁₅	M ₂₀₁₆	M ₂₀₁₇	M ₂₀₁₈	M ₂₀₁₉	M ₂₀₂₀
1	Market-oriented production elements	0.150	0.167	0.173	0.164	0.153	0.159
2	Market-oriented products	0.189	0.247	0.214	0.200	0.237	0.212
3	Market-oriented organization	0.074	0.026	0.069	0.096	0.078	0.156
Total		0.413	0.440	0.456	0.459	0.468	0.527

Base values of the Institute's market-oriented transformation evaluation are shown in Figure 1. It can be seen that base values of market-oriented transformation evaluation increase year by year during the 13th Five Year Plan period.

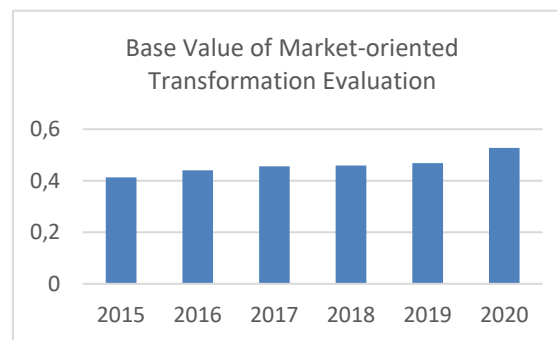


Figure 1: Base Values of Market-oriented Transformation Evaluation From 2015 to 2020.

Taking 2015 as the data base period, the degree of the Institute's market-oriented transformation during the 13th Five Year Plan period is calculated in accordance with Equation 2. The details are as follows in Table 4.

Table 4: Degree of the Institute ' s Market-oriented Transformation from 2016 to 2020.

Categories	2016	2017	2018	2019	2020
Degree of market-oriented transformation	6.5%	10.5 %	11.2 %	13.4 %	27.6 %

It can be seen from Figure 2 that the degree of the Institute's market-oriented transformation during the 13th Five Year Plan period has increased year by year.

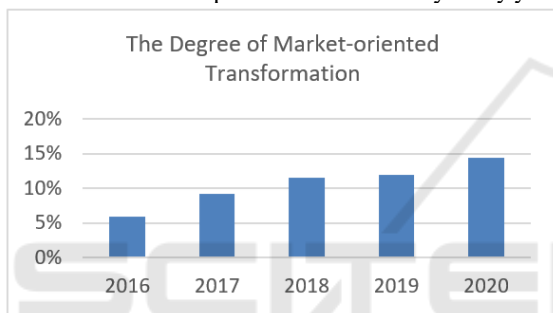


Figure 2: Degree of the Institute ' s Market-oriented Transformation From 2016-2020.

From the evaluation results of the Institute ' s market-oriented transformation from 2015 to 2020, it can be seen that the evaluation model of the market-oriented transformation process can objectively reflect the actual situation of the Institute's market-oriented transformation. This verifies the rationality of the indicator design. At the same time, it also shows that the Institute has well accomplished its 13th Five-Year Plan, and the measures related to market-oriented transformation have been effectively implemented.

4 CONCLUSIONS

As the country continues to deepen its market-oriented reform and reinforces its requirements for improving basic management capabilities, it will be increasingly important to quantitatively evaluate the degree of market-oriented transformation of each work unit. This paper constructs an evaluation model

of market-oriented transformation process which includes evaluation index system, evaluation algorithm, and evaluation procedure, etc. It can provide excellent references for market-oriented transformation work.

This evaluation model can be used for both horizontal comparisons of different units in the same period and for time sequence comparison of related units as well as for comprehensive comparison of sample data from each unit across periods. Especially, it can provide strong support for the midterm adjustment of the plan since it can make a vertical comparison analysis for the market-oriented process of each military unit during each five-year plan period.

Analyzing the degree of market-oriented transformation of military enterprises through the market-oriented transformation evaluation index system can prompt military enterprises to clarify their own development, provide policy reference and decision-making support for releasing their internal creativity and enhancing their external influence. It can guide them to identify their gaps and weaknesses in the process of market-oriented transformation and take active measures to accelerate the market-oriented transformation process.

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