

装备科研生产 组织规模优化研究

A Study of Scale Optimization of
Armaments Researching and
Manufacturing Organizations

■ 张跃东 王锦娜 著



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内 容 简 介

本书以现代经济理论为分析工具,紧紧围绕如何以提高装备建设资源效率和效益为目标优化装备科研生产组织规模这一主线,从横向、纵向和多元化三个不同角度,就装备科研生产组织规模的确定、调整、优化路径等一系列问题进行探讨,以深化和拓展对装备科研生产组织规模优化问题的研究并为装备科研生产组织和相关政府部门(包括军方)提供科学决策的参考。

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前 言

装备科研生产组织规模问题,既关系到装备建设资源经济效率和效益的高低,也影响其军事效率和效益的高低。纵观世界各国国防科技工业发展的历史,从一个侧面看,装备科研生产组织发展的历程就是装备科研生产能力规模以扩张为总趋势在波动中不断调整 and 优化的过程。改革开放之后,我国国防科技工业经历了两次大规模战略性重组,主要目的之一就是通过重组装备科研生产能力解决装备科研生产组织规模不合理问题。两次重组之后,组织规模在很大程度上得到了优化,装备建设资源效率和效益也因此得到了很大提高。不过,战略性重组并没有从根本上解决规模不合理问题,而且在解决了某些规模不合理问题的同时又导致了一些新的规模不合理问题,规模不合理问题依然十分突出。重组装备科研生产能力和优化装备科研生产组织规模需要理论的指导,“摸着石头过河”必然要付出高昂的成本,因此从理论上理清如何以提高效率和效益为根本出发点和归宿点,优化装备科研生产组织规模具有重要的现实意义。

本书以现代经济理论为分析工具,密切结合装备科研生产实践,紧紧围绕如何提高效率和效益为目标优化装备科研生产组织规模这一主线,从横向规模、纵向规模、多元化规模及规模优化路径四个不同视角,就装备科研生产组织规模的确定和调整及优化路径、引起规模变动的因素、科研生产组织和政府在装备科研生产组织规模问题上的正确行为取向等一系列问题进行探讨。

在本书撰写和出版过程中,得到了德高望重的国防大学马克思主义教研部原主任、中国国防经济学开拓者之一库桂生将军的无私指导,得到了国防工业出版社军事科教图书事业部崔晓莉主任、尹艳编辑的大力帮助,在此表示衷心的感谢。

在本书撰写过程中,作者参考了大量国内外文献和相关研究成果,从中受到了启示并借鉴了其中一些有益的观点。除书后列出的参考文献外,还有一些,恕不一一列出,在此一并表示诚挚的谢意。

优化装备科研生产组织是一个涉及经济、军事和政治,宏观、中观和微观,生产力和生产关系,经济基础和上层建筑,国内和国际等多种因素的复杂系统工程。由于各种客观和主观因素限制,尽管本书从构思到最终付梓历经数年并反复修改,书中难免有不当甚至是错误之处,恳请读者不吝赐教。

编 者

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于北京中国人民解放军装备学院

ABSTRACT

The scale of the armaments researching and manufacturing organization (ARMO) is related to both the economic efficiency and safety efficiency of the resources in defense industry. In the book, with modern economic theory combined with practice in defense industry and attention centered round how to optimize the scale of the ARMO so as to maximize the efficiency of defense industry's resources, discussed and studied are how to adjust and decide on the scale, what factors may bring about changes in scale, what the reasonable actions are that the ARMO and government should perform, and the like, so that the ARMO and government could be enlightened as to making decisions on scale.

In the book, firstly the horizontal-scale, vertical-scale and diversification-scale of the ARMO are discussed and studied respectively, and then on the basis of the discussions and studies above, roads to the optimization of ARMOs' scale are discussed.

I

The optimum horizontal-scale of an ARMO is at the lowest cost point, i. e. the principle for optimizing the horizontal-scale is to bring economies-of-scale into play as full as possible.

A reasonable horizontal expansion is a prerequisite for the full play of economies-of-scale, but is not enough to bring economies-of-scale into full play or sure to cause a rise in efficiency. To enhance ARMOs' quality with the expansion is more indispensable to the full play than the horizontal expansion is. It is just an appearance that the average cost declines with the horizontal expansion, and the essence is that the ARMO makes full use of the favorable conditions created by

the horizontal expansion and the positive effects of the horizontal expansion outweigh the negative effects. Only by making full use of the favorable conditions created by the horizontal expansion and enhancing ARMOs' quality, could an ARMO bring economies-of-scale into full play, and a horizontal expansion without ARMOs' quality enhancement would lead to diseconomies-of-scale. There are long-term economies-of-scale and short-term economies-of-scale. In order to bring economies-of-scale into full play, an ARMO should have its eyes not only on the future and raise efficiency by adjusting the amount of both its fixed and variable resources and enhancing its quality to optimize the long-term scale, but also on the present and raise efficiency by adjusting the amount of its variable resources alone with the amount of its fixed resources unchanged to optimize the ratio of its variable resources to its existing fixed resources and making reasonable use of the existing fixed resources. ARMO economies-of-scale consists of plant economies-of-scale and firm economies-of-scale. The former shows the relationship between material input and material output, and the latter shows the relationship between input and output measured in money. Only when plant economies-of-scale and firm economies-of-scale both go into full play, could ARMO economies-of-scale go into full play, so in order to bring ARMO economies-of-scale into full play, an ARMO will have to try hard to bring both plant economies-of-scale and firm economies-of-scale into play as full as possible.

On one hand, ARMOs' horizontal expansion could help to bring economies-of-scale into full play, but on the other hand it is likely to lead to a strong monopolization, and monopolists often seek gain at the expense of social welfare and the efficiency of the resources in defense industry. It depends on the ratio of the minimum efficient scale of the ARMO to the whole demand in the category market whether the full play of economies-of-scale is followed by a strong monopolization or not. In an economies-of-scale and strong-competition category market, the minimum efficient scale is very small in comparison with the whole demand, so the full play is not followed by a strong monopolization, and economies-of-scale

goes into full play without a decline in efficiency resulting from a strong monopolization. In an economies-of-scale and strong-monopolization category market, the minimum efficient scale is not very small in comparison with the whole demand, even as large as or larger than the whole demand is, so the full play is followed by a strong monopolization, that is to say “the Marshall’s Dilemma” exists, and it is impossible to profit from the full play of economies-of-scale without a decline in efficiency resulting from a strong monopolization or with a rise in efficiency coming from a strong competition. In “the Marshall’s Dilemma”, the ARMO can only choose the second best, and the principle for choosing the second best is that the full play of economies-of-scale is a top priority, and to follow the principle can help maximize the efficiency of defense industry’s resources.

II

The principle for optimizing the vertical-scale of an ARMO is to minimize costs, i. e. to choose the more economical of the two transactions—the inner transaction (transaction in a hierarchical ARMO) and the outer transaction (market transaction).

Defense industry assets’ being more specialized than civil industry assets are, the supply and demand’s being more uncertain in the defense industry market than they are in the civil industry market, researching and manufacturing organizations’ (including both ARMOs and civil researching and manufacturing organizations) lacking credit to a large extent at present in China, and so on, have resulted in transaction costs’ being all too high in the defense industry market, and thereby have given impetus to ARMOs’ vertical expansion. Although ARMOs can reduce costs to the “minimum” by expanding vertically with the existing conditions unchanged, the “minimum” is larger than it is in more favorable conditions and ARMOs can not profit from social division of labor or economies-of-scale to the full. The government and the ARMO should take active measures to mitigate assets’ specificity and uncertainty of supply and demand, and to make market environment better, so that transaction costs could decrease and the AR-

MO could profit more fully by adjusting its scale to a lower “minimum” point. To mitigate assets’ specificity demands the development of commonly-used technology and commonly-used manufacturing technology, and the elimination of the systematic factors that may stops potential common use of assets from turning into actual common use. To mitigate the uncertainty of supply and demand needs the establishment of a standard system for information exchange and the use as full as possible of modern information technology. To enhance ARMOs’ credit requires the establishment and improvement of a legal system for researching and manufacturing organization’s credit improvement, a modern property-right system and a system for the exchange of the information about ARMOs’ credit, and the cultivation of credit culture, which is indispensable to the establishment and improvement of socialist market economy.

ARMOs’ market power may get greater and greater with vertical expansion, and ARMOs’ pursuit of market power by expanding vertically may lead to the vertical scale’s being away from the “minimum cost” point, so the government should try hard to prevent the vertical expansion that will bring about monopolization and a net loss of efficiency. The interest-conflict between the principals and agents of ARMOs’ assets is an important factor leading to ARMOs’ expanding to an extent as large as possible and the scale’s being away from the “minimum cost” point, for agents’ gains increase with the expansion of ARMOs as a general rule. By comparison with the interest-conflict between the principals and agents of privately-owned assets, the conflict between the principals and agents of state-owned assets in defense industry is intense, so state-owned ARMOs are more inclined to expand and go away from the “minimum cost” point than privately-owned ARMOs. In order to alleviate the interest-conflict between the principals and agents of China’s state-owned assets in defense industry and prevent the expansion bringing about a decline in efficiency, the reform of the defense industry system will have to be pushed ahead with. For the moment, we should start with the following four: firstly push forward with the reform of property-right system

and make property-rights diverse, secondly develop a highly efficient mechanism for encouragement and supervision, thirdly develop a manager market full of competition and train professional managers, finally straighten out the relationship between the principals and agents of state-owned assets in defense industry to make principal-agent links and agents less.

The social supply of inputs and social demand for outputs, indispensable to the normal operation of ARMOs, underlie the vertical contraction and horizontal expansion of ARMOs. For now, both China's whole social supply and demand are large enough for ARMOs to contract vertically and expand horizontally to a larger extent than they have done, and the horizontal-and-vertical-division system of China's defense industry undermines the support of the social supply and demand for their vertical contraction and horizontal expansion artificially. As a result, ARMOs are "large and comprehensive", "medium and comprehensive" and "small and comprehensive" still. Therefore in order to contract ARMOs vertically and expand them horizontally, and raise efficiency, before all others we will have to solve the problem of the horizontal-and-vertical-division system.

III

Diversification-expansion is an important development strategy that ARMOs can adopt. It is both necessary and possible for ARMOs to expand diversely to some extent. Diversification-expansion is a doubled-edged sword and can produce both positive and negative effects.

Economies-of-scope is one of the positive effects produced by diversification-expansion, and it results from making full use of surplus commonly-used resources by expanding diversely. There are a lot of surplus resources in ARMOs, because the demand for such military goods as weaponry and military equipment will fluctuate often and sharply as a general rule, the capacity of defense industry will have to be larger than is needed in peacetime, some resources are technically indivisible, and there is a limit to the demand for any military product. The birth, development and employment of modern commonly-used manufacturing

technology make the resources of ARMOs less specialized. The military hi-techs and good credit that an ARMO boasts, the excellent skill at selling weaponry and military equipment that the persons concerned in ARMOs have, and the good relations between the persons concerned in ARMOs and purchasers of weaponry and military equipment are in itself much commonly-used. Therefore it is not only necessary but also possible for an ARMO to expand its diversification-scale reasonably.

Development-effect is another positive effect produced by diversification-expansion. There are a lot of factors hampering the sustained and stable development of ARMOs, such as the lifetime of weaponry and military equipment's getting shorter and shorter due to the acceleration of the development of science and technology, the demand for weaponry and military equipment's fluctuating often and sharply, the capacity of defense industry's having to be larger than is needed in peacetime, and a limit's existing to the demand for any military product. Diversification-scale expansion could counteract some negative effects of the factors above mentioned and help ARMOs resolve the contradiction between a finite demand for any military product and ARMOs' tendency to an infinite expansion, decentralize investment risks, transfer resources strategically from one industry to another to raise efficiency and increase profits, and thereby develop continuously and stably.

There are some negative effects inherent in diversification-expansion, such as making management and decision-making much difficult, and decentralizing resources, and unreasonable diversification-expansion will produce some extra effects.

Whether diversification-expansion could produce positive effects as many as possible and negative effects as few as possible or not depends on whether ARMOs put diversification-expansion into practice reasonably or not. If the ARMO puts diversification-expansion into practice reasonably, it may benefit from the expansion, or else it will suffer an interest-loss. The ARMO should diversify ac-

cording to a series of principles, the most important of which are “to diversify according to the capability”, “to choose the product or industry as attractive as possible to set foot in, and “to diversify around the core competences”.

IV

The ARMO could optimize its horizontal-scale, vertical-scale, and diversification scale not only by adjusting the amount of its own resources—a traditional road to the optimization of scale, but also by cooperating with other ARMOs and making use of the resources owned by other ARMOs, i. e. by establishing a symbiotic-net-organization—a new road to the optimization.

In the traditional ARMO theory and practice, it is the quantity and quality of the resources owned by an ARMO that determine its capacity, and to adjust the amount of its own resources is the only road to the optimization of scale. Only by adjusting the amount of its own resources reasonably could the ARMO profit from economies-of-scale, economies-of-scope, learning-effect, development-effect and risk-avoiding-effect. With the traditional road dominating, the market and the hierarchical ARMO are the two and only alternative means, by which resources are allocated, and there is only a classical competition of an “atom-style”. When the economic environment was simple and the quantity of the resources owned by an ARMO was not very large, the traditional road and two-poled market-organization frame of system were conducive to the development of productive forces, the rise in efficiency and the meeting of the demand for weaponry and military equipment. As the economic environment has been getting more and more complicated and the quantity of the resources owned by an ARMO has been becoming larger and larger, more and more limitations of the traditional road and two-poled market-organization frame of system have been showing clearly.

Being a mixture of the market and hierarchical organization, the symbiotic-net-organization not only shares the strong points of both the hierarchical organization and market, but also boasts its own features and some distinctive functions. It has developed what are positive and discarded what are negative of the

hierarchical organization and market, and therefore could help to overcome the shortcomings of the traditional road, the hierarchical organization and market, and to resolve the contradictions resulting from ARMOs' expansion by the traditional road. In a symbiotic-net-organization, the capacity of an ARMO is founded on both its own resources and the resources owned by other ARMOs concerned; an ARMO not only pays attention to the amount and adjustment of the amount of its own resources, but also attaches much importance to the employment of the resources owned by others; the greater part of attention is devoted to the core competence and dominant business; emphasis is laid on the variety, high quality, optimization, sharing and complementing each other of the resources in the symbiotic-net-organization, and on the specialization, high quality of the resources owned by an ARMO, not on the variety of resources owned by an ARMO. With the new optimization road dominating, the classical competition of an "atom-style" is replaced by a competition accompanied by cooperation and a joint competition. The establishment of a symbiotic-net-organization could not only contribute to the rise in efficiency resulting from economies-of-scale, economies-of-scope, learning-effect, development-effect, a reduction in transaction costs, and the like, within an ARMO, but also help economies-of-scale, economies-of-scope, learning-effect, development-effect, a reduction in transaction costs, and the like, stretch outside an ARMO and into the whole symbiotic net-organization. With the establishment of the symbiotic-net-organization, a rise in efficiency could happen within an ARMO not only when the amount of resources owned by the ARMO has gotten larger, but also when it is constant or even has gotten smaller.

In China's defense industry, there are a lot of factors hampering the establishment and optimization of the symbiotic net-organization, some of which are that the government and ARMO are integrated, there are too many state-owned assets, there is a close administrative relationship between group corporations and their subsidiary organizations, the R&D and production resources of the same kind or kind alike are unreasonably scattered, there are too many production links

of one product in the same ARMO, and medium-sized and small ARMOs are being edged out.

The government and ARMO should try hard to overcome these unfavorable factors and take vigorous action to establish and optimize the symbiotic-net-organization consisting of ARMOs. We should adjust the property-right structure and reduce state-owned assets, push forward with the separation of the government from the enterprise, standardize government's behavior, divide or merge ARMOs' resources according to the demands of economy-of-scale and specialized production, push ahead with the opening of the defense industry market, try hard to help medium-sized and small ARMOs grow, devote more attention to the building of the information net-platform.

Key Words: armaments researching and manufacturing organization, scale, optimization

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