



Constructing the Mechanism of Production-Learning-Research Integration

Henglong Ding, Jiayun Zou & Weixin Wang

Jiangsu Polytechnic University

E-mail: yzdhl@126.com

Abstract

The key of the effective run of production-Learning-research combo is to set up and perfect its integration mechanism of cooperative process. The main contents include bidirectional selection, R&D, interest harmonization, personnel training and service security and the primary requirements are Compatibility, harmony and symbiosis.

Keywords: Enterprise, Production-learning-research combo, Mechanism, Research and development (R&D)

1. Introduction

In China, the cooperation of production-learning-research started from the township enterprises in the southern Jiangsu during 1960-1970 when they invited "Sunday Engineer" from Shanghai to solve technological problems. After Reform and Opening, it was further intensified, which promoted the technical progress and increased the economic benefit. In the mid to late 1990s, the cooperation of production-learning-research entered into the stage of production-Learning-research combo. Production-learning-research combo refers that for common desire, manufacturing enterprises, colleges and research institutions combine respective preponderant resources to organize the economic entity which is advantage mutually complementing, benefit sharing and risk bearing. They explore the new product, new techniques, new technology and new materials to implement the transform of technological achievements for mutual development. (DING, 2008) Now production-learning-research combo has become the main development form of the cooperation of production-Learning-research in China.

One important characteristic of production-learning-research combo is symbiotic. Advantage mutually complementing is its engendering premise. Common interests are its existing base and scientific management is its developing guarantee. To exert its symbiotic effect better, the integration mechanism of cooperative process of production-learning-research should be set up and developed according to the demand of integration of science and technology economy and following the rule of market economy. The key point for run is to establish the following mechanisms

2. The Mechanism of Bidirectional Selection

Production-learning-research combo is the cooperation of bodies with different interests. Therefore, the selection of partner is the premise to get the project success. In the process of selection, the focused problems are the complementation and compatibility of knowledge property, the technology innovation ability and the reputation of partners.

2.1 Choice of partner

The following aspects should be considered when choosing the partners.

One is that the field of the management or research should be convergent. The second aspect is the strength of cooperation. Enterprises need good social image, strong economic power, and extensive marketing distribution channels. The research party needs strong ability of R&D. The achievements in scientific research have advanced nature and market value. Researchers have the time to instruct in person and have the characteristics of cooperation and hard working. The third aspect is credibility which is the moral norms obeyed by all cooperation parties. Each party should insist on credibility and care about the interests of other parties and the public interest when carrying on the cooperation agreement. Cheating with hiding the truth to or concealing the illegal purpose with the legal behavior must be prohibited. The above are crucial to the transform of R&D and innovation achievements.

After choosing the partners with the principles of vantage mutually complementing and class matching, the cooperation parties will decide the modes of production-learning-research combo by patient negotiation. They discuss the details about resource sharing, risk bearing and benefit taking to make the basis for the normal operation of

production-learning-research combo in the future.

2.2 The conception of core value

Production-learning-research combo is the cooperation with the different management mechanisms, different enterprise systems and different culture backgrounds by two dependent entities. It is the organic unity working for the common goal. If the tangible production factors combine without the amalgamation of values and affections, the combination of factors will only be the representation. Therefore the common value conception is the guarantee of successful cooperation.

The core value conception of cooperation is social responsibility. During the process of innovation, there is such a situation that colleges and research institution seek academic value while enterprises pursue the commercial value. The effective method to solve this conflict is the integration of the social value, academic value and commercial value. The common goal of science and technology innovation is to satisfy the peoples' increasing physical and cultural demands, upgrade the industry level and accelerate the economy development. With this premise, enterprises as the principal part select the pivot project with innovation value according to the market demand and cooperate with college and research institutions to realize both goals of win-win and developing together.

3. Mechanism of Research and Development

3.1 Top Design

The top design of production-Learning-research combo is to make the overall design for its development from the top level, construct the energetic new mechanism, exhibit the blue print between the goal and the practice, identify the development procedure and measure and cooperate with each other for the common goal.

As for management system, production-Learning-research combo is the new economy entity organized by all the parties, so it should found the leading organizations with the common benefit to realize the uniform leading, intensify the collaboration and resource sharing in term of the requirement of corporation management structure. The combo needs to establish the management constitutions, divide the work reasonably, define the responsibility and work to the constitutions to make the good basis for the long-run higher level cooperation.

The strategic plan of the combo should be made carefully. Forming the combo needs to progress by stages. The development goals and stresses differ at the different stages, the same as the degree of the mutual trust and independence and the stability of the combo.

The management level of the combo should integrate the industry overall situation and development trend to design the stable development strategy. It should propose a set of development plans to upgrade the ability of strategic management and implementation and to guarantee the fulfilling of the strategic plan.

3.2 The choice of project

Colleges and research institutions have strong research power, but they do not know the sufficient demand information of local industry and enterprises. Generally the technological achievements lack the right market positioning while stressing on the upriver experimental research. In addition, their financing ability is very limited, so the transition of the project is infeasible.

Although enterprises have not enough power to innovate, they know the market and the development trend of the industry. They are familiar with the exploration of the market. Therefore the construction of the production-learning-research combo should

Therefore, in the building production-learning-research combo, we should ally with strong forces and complement mutual advantages. Enterprises can not simply adopt "take-ism" to research projects. They should accurately identify the focus, in conjunction with features of industrial development, enterprise development planning and market demand prospects, cooperate actively with the major universities and institutions, propose research direction and issues boldly, and associate with experts and scholars to conduct product research and development to form the industrialization rapidly.

3.3 Building a high-level innovation team.

Creative team is a research group formed on the basis of cooperation. In the production-learning-research combo, the misunderstanding should be eliminated that the innovation is the matter of research side and the production is the business of enterprises. In fact, the research side should work together with enterprises to determine the direction of technological innovation and development of innovative products based on market needs and production issues. To accelerate technological innovation, enterprises and universities, research institutes can jointly set up project innovation team to effectively combining all the best talents. Project's innovative team building needs to choose the right leader and absorb the staffs with relevant academic knowledge and innovative capabilities. The leadership of the team should be strengthened to shorten the chain of command and to ensure the direct and fast transmission of information. The

goals of the team should be identified to implement self-management and to strengthen internal unity and cooperation. The performance appraisal system should be established to intensify responsibility of team members and to stimulate innovation initiative. In addition, the combo should strive to meet the demands of the project's innovative team for personnel, financial, and material. In short, by building the project's innovative team, team members will produce more innovative ideas and achieve greater innovation power on this innovative platform with the exchange of the collision sparks of wisdom to maximize the team's an integrated force and collective advantages.

4. Coordination Mechanism of Interests

The distribution of interests is the most critical problem when running the production-learning-research combo and plays a vital role to its development. In practice, a number of production-learning-research combos have enterprises with strong power and the colleges or research institutions with technology, but the cooperative outcome is not satisfactory. One of the important reasons is that conflicts occur due to the distribution of benefits or ownership of intellectual property which leads to low quality of the development results, hard in-depth development of innovation and some even broke up. Therefore, the partners should deal with the relationship between short-term interests and long-term interests, partial interests and the overall interests, tangible benefits and intangible benefits based on the match principle of responsibilities, rights, and interests. The reasonable mechanism of interest distribution should be built up to impel the development of innovation activities and to arouse enthusiasm and creativity of innovators furthest.

Property right system is the core to build the mechanism of interest distribution.

The interest structure of the combo is subject to the institutional arrangements of property right. Their property right structure and the institutional arrangements of interest structure also restrict the distribution ways of the innovative proceeds of the combo. Generally, for the joint-stock Combos, enterprises invest with its equipments, capitals and labors, universities and research institutes invest with their own patented technology. No matter which type of the combo, the issues of pricing shares on the scientific research achievements, the investment ratio of all parties and their interest distribution, the ownership of the achievements should be clearly stated by contracts. In particular, intellectual property should be treated as the central link to solve the problem of interest distribution mechanism. Around all aspects such as creation, application and protection of intellectual property, all parties should identify their responsibilities, rights and interests to guarantee the interests of all parties to realize risk-sharing and benefit-sharing. (Wang, 2008)

Reward system is the basis of the mechanism of interest distribution.

The combo should set up effective, long-term incentive reward distribution system based on the establishment of the modern enterprise system with clear relationship of property rights, diverse main bodies of property rights and comparatively perfect corporate governance structure to motivate managers and technological backbones involved in innovation effectively and consistently through distribution methods such as the employee stock ownership, technology shares and stock options, etc..

The risk system is the key to build the mechanism for the benefit distribution

The risk of cooperation in the combo comes mainly from two aspects. First, the uncertainty of the maturity of technical results brought about technological risks. Second, the inaccurate prediction of product markets brought about marketing risks. In the production-learning-research combo, enterprises, universities and research institutes become main sources of investment. The cooperative parties should share the risks through consultations and form the cooperation mechanism to share benefits and risks. Therefore, in order to shape the situation of true joint ventures and integrative interests, the universities and research institutes should invest in shares with funds as much as possible besides with patented technology to closely linked their own interests to the development of the Combo.

The financial system is a guarantee to build the mechanism of benefit distribution

The independent financial accounting system should be established by the production-learning-research combo. In financial management, financial accounts should be open to the main body of investment and be consciously accepted the supervision of the relevant departments for savings and for reduction of consumption. The remuneration of R & D side should be linked to the economic benefit of the combo and a one-time settlement should not be taken to share profits, which is conducive to innovation and sustainable development of production and research co-operation

5. Mechanism of Talent Cultivation

The process to set up the production-learning-research combo is the process to graft their advantages. Grafting the existing advantages will complement advantages for resonance and create more advantages. The advantages of universities and research institutes are mainly embodied in human resources, technology and information, etc. The advantages of enterprises lie in providing the stage to display their talents and to transform new technology, certainly including a financial advantage. Thus the production-learning-research combo as a carrier is conducive to organic integration of talent development, talent training and talent use.

5.1 Attracting and gathering talents

The production-learning-research combo is a platform for technological innovation. In the process of scientific research and new technology application, the production-learning-research combo makes full use of research strength of universities and research institutes to organize joint research, and to demonstrate decision-making for major projects and management. The researchers of universities and research institutions also look for research projects initiatively from the combo or promote the application of the research achievements in the combo. In this way, the production-learning-research combo as a platform for technological innovation has attracted and gathered a group of talents needed for corporate research and development, which provides a pool of talents for the new product R&D.

5.2 Accelerating the training of personnel

Production-learning-research combo is the cradle to cultivate talents for university and research institutions and enterprises are the base for training and improving all kinds of talents. The various talents of universities and research institutions are received training to improve the practical application of knowledge and technology through the platform of the production-learning-research combo. In particular, universities make use of the combo as the platform to drive and lead the development of teaching and research with discipline construction, targeted to train technical personnel with practical abilities to meet the employment needs of university students better. Enterprises of the production-learning-research combo can give the continuing education to the workers by universities and research institutes, especially giving the training of new theories, new knowledge and new skills to the high-level personnel. In short, with the production-learning-research combo, the exploitation, cultivation and use of human resources can be speed up and talent advantages can be grafted as soon as possible, in order to build the foundation for the Combo's overall advantage.(Deng, 2008)

5.3 Establishing the mechanism of talent input and talent use

The production-learning-research combo should make innovation to the mechanism of talent input and talent use, pay high attention to talent input and change talent input from a soft task to a hard indicator. It should carry out more flexible measures of talent mobility to attract more researchers to do the part-time jobs with salaries in the combo and play a greater role in the innovation and entrepreneurship. The talent incentive mechanism should be innovated upon according to performance and contribution to total compensation and the incentive mechanism of property rights should be actively explored. The incentive system of options and equity should be improved and the paying transfer system of talent capital and scientific research achievement should be established. The first-class talents and first-class contribution should get the first-class remuneration. The competitive advantages of the development of production-learning-research combo will be created and supported by the talent advantage.

6. Service Security Mechanism

In promoting the building of production-learning-research combo, the government should promote the service support and the focus on building good "three platforms".

6.1

The docking platform for cooperation. Promoting the cooperation between production and research and strengthening construction of carrier platform is an important part. The carriers of Production and research docking activities are diverse, such as the science and technology trade fairs, the achievement exhibitions, scientific and technological advance and other forms to provide the cooperation platforms for enterprises and research institutes.

6.2

The technical service platform. Besides docking platform for the cooperation, the technical service platform is also the key for science and technology innovation. The Government can establish the service center for the production and research co-operation, with the "Six databases" (project database, expert database, service agency database, school-enterprise database, risk investment and venture capital organization database, strategic cooperation partnership database), "Two platforms" (integrated data platform, integrated service platform) and "a website" (production-learning-research service website) to provide enterprises and universities with information issuance, project recommendation and publicity, benefit assessment and market forecast, school-enterprise interaction, technology entrepreneurship and other services.

6.3

Innovative supporting platform. The local government can vigorously develop science and technology business with the high-tech park as the core area to strengthen infrastructure construction for science and technology and to improve the supporting policies. It is committed to creating the first-class platform for innovative services, creating a sound environment conducive to production and research cooperation to promote the colleges, various types of research institutions and local businesses to gather to carry out production and research combination.

In short, government promotion is the essential external condition for the healthy development of production-learning-research combo. The Government should create the environment and build a platform by developing policy to guide and support this compact cooperation of the production-learning-research combo. It should co-innovate upon the means of management and allocation of resources and continuously improve the policies and measures to continue in-depth innovation in production-learning-research combo.

References

- DENG, Kai & Jiang, Yunsong. (2008). Discussion of Production and research cooperation in personnel training. *Technology and industry*, (4): 84.
- DING, Henglong. (2008). Study of the building of production-learning-research combo from symbiosis perspective. *Scientific management research*, (4): 1.
- Wang, Wenhua. (2008). The research of benefit distribution mechanism of production-learning-research combo. *Modern economy*, (9): 4.