# Optimizing the Industry–University Cooperation Process from the Perspective of Seamless Government Theory

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## Abstract

*At present, industry–university cooperation lacks innovativeness and fails to form a real force because divisional and functional situations have not been changed. This paper draws the gap map of industry–university cooperation from Russell M. Linden's seamless government theory perspective. The theory of change introduced by Kurt Lewin is then used to optimize the technical route of the cooperation process based on the deep analysis of major gaps in industry-university cooperation. There are three steps filling the gaps resulting in a seamless process: thaw, fill the gaps, seamless freeze.*

**Keywords:** industry–university cooperation; seamless; process optimization

## *Introduction*

Industry–university cooperation is an important issue in national innovation policy. Some experts and scholars even think that industry–university cooperation is one of the main factors that influence national competitiveness. Currently, industry–university cooperation in China is in a critical period of optimization and upgrading. In recent years, a large number of theoretical and practical results achieved certain success, but the situation is not optimistic because of the late start, low-level, and exploratory stage of creep. Several "gaps" exist in industry–university cooperation, such as specialization division gap, time-sensitive gap, interest-driven power gap, market-oriented gap, mode selection gap, risk-taking gap, matching safeguard gap, and others. The existence of these gaps has led to negative effects. Industry–university cooperation is not smooth; the relationship is not close; and cooperation is not complementary and lacks longevity.

The current prevailing theories are the "triple helix" model and the "cooperative network" model. The "triple helix" model is the study of university–industry–government relations based on the concept of a national innovation system. This model emphasizes that cooperation organizations need to understand the external demand before strengthening contact and mutual cooperation. An industry–university cooperation network has two basic characteristics, namely, scale-free network growth and optimizing connectivity. Scholars mainly study cooperative network structure, function, operation, and nurturing mechanism. Scholars then put forward small-world networks and scale-free networks to explain the formation mechanism of an industry–university cooperation network.

Based on cooperation networks, the concept of symbiosis network has been proposed in recent years. The symbiosis network enriches cooperation relations between subjects and the connotation of cooperation interface. However, studies on the "triple helix" model and industry–university cooperation symbiosis network in China focus mostly on building models and networks. Existing studies ignore the gap of cooperation from the angle of macroscopic analysis. Cooperation has no specific processes, steps, or strong practical operation manuals. Available theories are still unable to cope with the difficulties of cooperation process gaps. With the deepening of the practice, industry-university cooperation gaps make further cooperation difficult. A kind of theory, which fundamentally solves the problem of the gaps in the cooperative system, should be introduced.

Based on the above analysis, this paper uses Russell M. Linden's seamless government theory from a more comprehensive perspective to explore the path of industry–university cooperation process optimization, from overall planning to the implementation of specific steps (namely, thaw, look for gaps, and then "gaps filling" and "frozen" process). Given the new perspective to study industry–university cooperation, process optimization, and integration of different systems, a seamless industry–university cooperation will be formed.

## *1. The New Connotation of Industry–University Cooperation under the Angle of Seamless Government Theory*

The rise of the customer society in the 1990s and the application of new technology stimulated private organizations to change. The government and other public sectors were also affected by the trend to promote transformation. Similarly, At the same time, a new form of organization was widely respected on the basis of bureaucracy, i.e., "seamless organization." Flowing, flexible, complete, transparent, and coherent are words to describe this kind of organization. A service-oriented seamless government is put forward on the basis of "seamless organization." The core ideas of the seamless government theory are "global," "integrity," "integration," and "seamless service." The main planning principles include planning around results rather than function to organize several stages and at the same time replace order, phase information, and timely feedback to the front stage, collect information from the source, and ensure the flow of the "main sequence." The core thought and planning principles are very suitable for industry–university cooperation system in our country because of the seamless government theory. Thus, using this theory to optimize industry–university cooperation process is of great significance.

The construction of a "seamless government" provides a good perspective to solve gaps in the industry–university cooperation process. The construction not only fills research gaps in seamless industry–university cooperation, but also has some practical value in enhancing the cooperative relationship and effects.

## *2. The Map of Industry–University Cooperation Process*

A complete industry–university cooperation process generally starts from technology research. The decision-making process before technology research activities is mainly dependent on the market. Market demand should be the beginning and motivation of the whole industry process. Directly applying the success of technology R&D to production is generally difficult. Technology transfer, which transforms and develops original technology, forms the actual production capacity, including equipment and production lines.

After a particular technology forms capacity, enterprises begin to carry out production activities, sell new products in the market, make profits, and complete the products of the industry process. Researchers and universities are important participants in technology research, and enterprises are important participants in the production. According to in-depth analysis of current contradictions and difficulties existing in industry–university cooperation, this paper considers the following seven major gaps hindering in the development of industry–university cooperation.

### 2.1 Specialization Division Gap

Industry–university cooperation is dominated by enterprises. Universities and research institutes play supporting roles. However, the status quo is that many companies often play relatively passive roles. In recent years, some enterprises' participation in cooperation is increasing. However, given the less effort they exert, the reputation and cooperation spirit of enterprises still need improvement. Research institutions and universities often provide a single technology or product. Thus, they cannot provide accurate and high quality service to large-scale production technology of enterprises.

Companies then feel hopeless about cooperation and look for another way to cooperate. Fragmentized cooperation is due attributed to industry–university cooperation specialized operation, which has not established a complete set of coordination mechanism.

### 2.2 Time-Sensitive Gap

Enterprises first need to research market demand, find out the market details, and communicate and exchange information with technology suppliers (universities or research institutions). Technology suppliers focus on research and development when enterprises negotiate technicalities or products with them before applying and promoting products. Furthermore, the market needs time to recognize new products. Eventually, cooperative agencies obtain market information feedback, and a complete industry–university cooperation circulatory system is formed. Time is volatile and uncertain in every phase. The time sensitivity of the cooperation is low because each subject plans according to their own procedures and experience. The increasing cooperation cost is caused by conservatism and low efficiency, which is not conducive to long-term cooperation.

### 2.3 Interest-Driven Power Gap

The intention of enterprise participation in cooperation is profit, but the starting points of universities and research institutions are driven by their own functions. The key is to clarify individual interests; otherwise, it will be an obstacle of the cooperation, which is difficult to realize in rational division. The interest relationship becomes more complicated with the deepening of cooperation, and the driving force extends multi-directionally. The main body of cooperation emphasizes on their own interests, not form a consistent goal and plan.

### 2.4 Market-Oriented Gap

Every year, many important scientific and technological achievements are produced in and by universities and research institutions. However, many of them do not meet the market demand and the success of technology transformation rate is low. Generally, the nature of an enterprise determines itself as a market body detector. Other collaborative agents are blind to and have assumptions of the market. The choice of a product or service is influenced by personal preferences even an enterprise cannot avoid. Investigation results are one-sided and not representative. Collaborative agents even do not enter their target markets to conduct research.

### 2.5 Mode Selection Gap

Many models on industry–university cooperation exist, and they range from the simple transfer of technology to complex technology alliance of industry. At present, the main way of cooperation in China is project-based, "short, flat, fast" pursuit. Most cooperation modes are low-end. If the cooperation model selected is not the best or must suitable, the industry chain and knowledge chain are disjointed and imbalanced, and the biggest value is not created. Thus, the choice of a cooperation model directly decides the gap size of industry–university cooperation.

### 2.6 Risk-taking gap

Cooperation is used to complete innovation activities because independent agencies cannot run the whole innovation system, which means that collaborative agents do not have the ability to take risks that may arise from activities. If cooperation fails, no matter which agency chooses to avoid responsibility, all must be condemned. However, the reality is that collaborative agents often make excuses to avoid responsibility. Eventually, cooperation breaks up.

### 2.7 Matching Safeguard Gap

In recent years, government support for industry–university cooperation has been enhanced. However, the policy formulation and implementation when compared with actual needs result in cognitive gap. Operational policy is not enough coordination, and yet no specific and sufficient funding exists to support cooperation. Intellectual property protection started late in China.

Thus, punishments are insufficient, and the standard and sub-stage development co-exist. The system construction lag abuses are not conducive for smooth cooperation. Policy and legal gaps are huge, and a set of relatively perfect security is imminent.

In conclusion, the gap map of the industry-university cooperation process is shown in Figure 1. Gaps are not fixed and they exist in the cooperation process. This problem seems to be a huge project. The bigger the gap, the more severe the situation of industry-university cooperation is. By contrast, the smaller the gap, the smoother the cooperation is. Thus, forming a seamless process of cooperation is the best approach to narrow the gap.

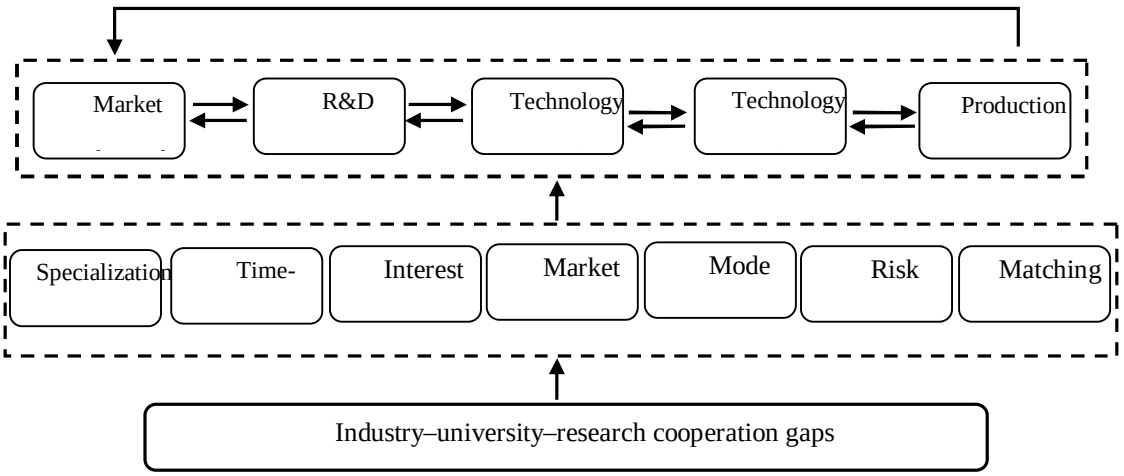


**Figure 1: The Map of Industry–University Cooperation Process**

### *3. The Technical Route of Optimizing Industry–University Cooperation Process*

To optimize the industry–university cooperation process, the gaps in the process of cooperation and change the structure of the old chimney-like process should be addressed. This paper uses the theory of change put forward by Kurt Lewin, one of the founders of organizational development theory, to optimize the process and eventually achieve a seamless cooperation. Essentially, Lewin thinks that the change in social organization system is a great progress of society and that the change in productivity depends on the qualitative leap. According to Kurt Lewin's change theory, the technical route of optimizing industry–university cooperation process can be done through thawing, filling the gaps, and seamless freezing, as shown in Figure 2.

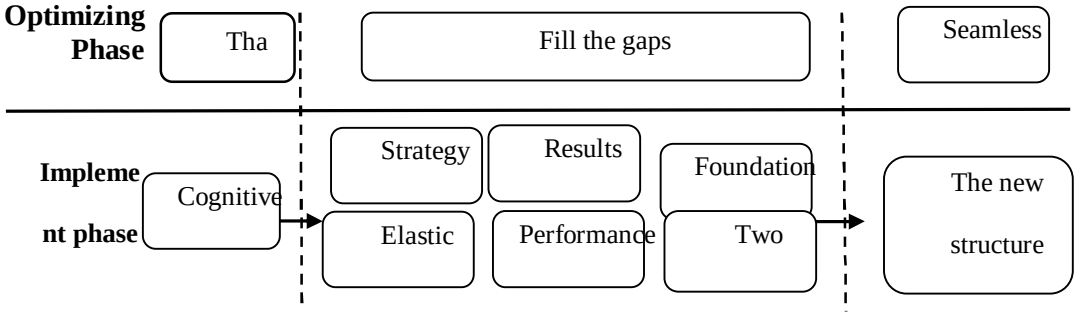


**Figure 2: The Technical Route of Optimizing Industry–University Cooperation Process**

#### 3.1 The First Stage: "Thaw"

Some organizations have tried to change but failed because they began the second phase without fully understanding the situation. Organizations are always reluctant to reform because they are trying to maintain the status quo until the situation cannot be controlled, which forces them to optimize. Thawing is to recognize the deficiencies of the existing method of cooperation and to recognize the need for change. The methods for recognition include keeping in touch with cooperators; gaining market and customer feedback; comparing with the same kind of cooperation; conducting polls in enterprises, universities and research institutes, superiors and subordinates in face-to-face communication; and others. The first stage mainly involves facts to prove that the cooperation needs to be optimized and to help the cooperator become aware of the need for change. This stage is also called the "cognitive demand" stage.

#### 3.2 The Second Step “Fill the Gaps”

This stage is the key of the whole optimization process because it provides contextual information to integrate all parties of different system for filling gaps.

#### 3.2.1 Strategy Team

As the leader, enterprises build the strategy team, establish partnerships, and negotiate rules. If the leaders of each cooperator do not pay attention to the broader question, they will be caught in the daily affairs. Thus, a strategy team composed of representatives of all cooperators should be established.

The role of a strategy team is to provide leadership, vision, strategy, and overall guidelines for the entire process of cooperation. The strategy team also has coordination and communication functions. The strategy team is dominated by enterprises, which is familiar with the goal and actual effect of each stage, and guarantee itself and the market demand. Enterprises undertake the task of transferring the technological achievements of universities and research institutes and promoting innovation activities. The relationship of industry–university–institute cooperation is weak in China. The strategy team needs to firmly grasp the value of the common goal and form a solid cooperation foundation.

### 3.2.2 Results Oriented

The right direction for process optimization of industry-university cooperation is organized by centering on the results. The objective of industry-university cooperation is the satisfaction of market demand and the improvement of customer satisfaction. The seamless industry-university cooperation focuses on the orientation of markets and consumers promotes the transformation from a producer society to a consumer society. For these purposes, the top priority is researching the demands of consumers who use the final products or services, and then offering the services they need, which reverses the direction of process optimization and promotes being results-oriented.

### 3.2.3 Foundation Structures

The process optimization of industry-university cooperation needs a stable foundation structure, which can support the seamless services of "anytime and anywhere." For this purpose, a convenient information sharing and management system needs to be established, which can realize multi to multi communications between participants of the industry-university cooperation. With this system, the traditional pyramid decision structure will be abolished, and communication between enterprises and universities (or research institutes) can be made regardless of time and space limitations. Therefore, the demand of participants and markets can be conveniently collected, and the bottlenecks in cooperation can be easily identified. Finally, the cooperation becomes more efficient and transparent.

### 3.2.4 Performance Contract

The process optimization of industry-university cooperation should be matched between the performance of contract and integration of training. Leaders of the main bodies of the cooperation should sign a performance contract, which is based on the strength and innovation ability of the leaders. Another performance contract can then be signed between the leaders and their own functional departments, as well as between the departments and their staff. In this way, a cascaded distributed target control system is established, which is a top-down system from overall goal to point goal, and total strategy to specific strategy.

### 3.2.5 Elastic Shared

The elastic risk-sharing mechanism is an important element for the establishment of a long-term partnership in industry-university cooperation. In a seamless industry-university cooperation, the risk is shared based on the ascription of responsibility. An enterprise invests to R&D, and universities (or research institutes) have the responsibility to innovate and offer mature technical support. Universities (or research institutes) do not need to worry about the guarantee of their own interests before the products or services get market rewards, which is in accordance with the principle of equivalence of investment returns. The responsibility and risk are shared by all parts in the cooperation, and the risk one shares is confirmed by the specific situation of cooperation.

### 3.2.6 Two Wheel Driving

The two wheels driving of policy and law guarantee the smooth cooperation of the university–industry. Policy should propose specific steps and suggestions to guide the cooperation, instead of defining according to their own understanding.

Specific content include selection system of cooperative mode, raise financing system, division of labor and coordination system, training and exchanges system, intellectual property ownership system, risk management system, etc. At the same time, the government gives some benefits back to university–industry, for example giving preferential policy, tax breaks, subsidies, risk investment, setting up special funds to support innovation activities of enterprise, supporting the scientific work of universities and research institutions, through all of these to form a benign dynamic mechanism. Making up the gap of law and improving the relevant provisions of Intellectual Property Law to guarantee the legalization of effective policies of industry-university cooperation.

Strengthen the enforceability and authority to form a systematic and normative legal protection and earnestly guarantee the interests of cooperative subjects and avoid the violations of law. Increasing the positivity of cooperation body and setting up a trust relationship.

### 3.3 The Final Phase: "Seamless Freeze"

Optimized industry-university cooperation process needs to be maintained by stable system and rules. A complete set of process which provides seamless products or services to customers and market need to be fixed so that the stability can be lasting. So the new system, the new structure and culture need to be fixed to be a complete set to provide seamless products and services for customers and market process and to be freeze again, which will form a long-term effective and seamless industry-university cooperation process. It has a very good enlightenment function for future university–industry.

## *4. Conclusion*

Seamless is the future-oriented and self-optimizing model for industry–university cooperation, which is a "win-win" action for all cooperators. To find the existing gap in the process of cooperation and to make process optimization according to three steps, which will create more practice. The seamless industry–university cooperation process will make up the blank which is unable to be coordinated by divisional and functional cooperators before. The vision will be broader and the program will be smoother. With the continuous development of the cooperation, it may encounter a variety of problems, the research will continue to find problems in the future and then fill the gaps. Optimization is not an easy thing, it tests the thinking ability and insight ability from many aspects. The above several measures for seamless processing and process optimization may not comprehensive enough. In the future research, we will try to comb the process of seamless industry–university from data and processing tools, to fill the gaps more scientifically by gap calculation which will deal the aperture size problem more quantitatively.

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