

Cause Analysis of Institutional Obstacles of CM Integration Innovation Based on Grounded Theory

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Abstract: The Civil-Military integration and innovation system is the guarantee of cm integration and collaborative innovation, but the existing institutional obstacles seriously reduce the implementation effect of the system. In this paper, the relevant management personnel and managers are selected as the interviewees. Using the Python and Nvivo 11 software, based on Grounded Theory, the causes of the institutional obstacles in the innovation process of cm integration are analyzed. Research found that participants' fusion idea, main body fusion force, effectiveness and applicability of integration policies are the reasons for the institutional obstacles. Finally, suggestions are put forward from three aspects.

Keywords: cm integration; institutional obstacles; grounded theory; integrated innovation

1 Introduction

In the 1990s, the integration thought of "cm combination, combining the military and the people" promoted the integrated development of national defense construction and economic construction, which attracted wide attention by scholars. With the support of policy documents such as *The Opinions on Strengthening the Rule of Law in CM Integrated Development* and other policy documents, the integration between military technology and civilian technology has been gradually deepened. The development of cm integration is undergoing a profound change that breaks down the original systems and systems, redivides its powers and responsibilities, and adjusts its interests.

Under the background of the rapid progress of science and technology, the change of the life cycle of emerging technologies, and the increasingly fierce market competition, the military's demand for new materials, new technologies and new equipment is becoming increasingly urgent, but cannot met, while the people has a relatively mature technology and production

capacity. However, subject to the long-term military and civilian "dual-track" various system norms ^[1], China's cm integration innovation still suffers from a series of obstacles brought by the system implementation process of market access, confidentiality requirements, intellectual property distribution and financing system, which makes China's military and civilian sides still unable to achieve the goal of deep integration and collaborative innovation. It is necessary to fundamentally identify the institutional factors that restrict the innovative development of cm integration in China, solve the obstacles and obstacles faced from the source, consolidate and deepen the achievements of reform, and promote the in-depth development of cm integration and innovation.

2 Literature review

In recent years, in order to explore the reasons for the problems of "surface integration and internal unintegration" in the process of cm integration and innovation in China, many experts and scholars have carried out rich research on the cm integration and innovation system and the existing obstacles.

Jiang Luming (2009) pointed out that because China's cm integration is developed in the process of social and economic system transition, the instability of economic, legal and policy environment and the imperfect top-level design restrict the innovative development of China's cm integration ^[2]. Gansler (2013) pointed out that most of the obstacles to cm integration innovation come from the unique nature of the military industry ^[3] Such as information disclosure, property rights protection and policy regulation.

The first is the ownership of national defense intellectual property rights. Hou Yuanyuan et al. (2020) pointed out that The National Defense Law only stipulates that the scientific and technological achievements generated by the state financial input to the state, but who will exercise the power on behalf of the state is not clearly stipulated, resulting in unclear rights and responsibilities and unclear interests ^[4]. The contradiction of property right ownership arising under this regulation leads to the lack of unified leadership among departments, resulting in the mutual restriction of various interest subjects in the innovation process ^[5] (Gui Zeyu et al., 2020), the overall innovation efficiency of the industry is not high ^[6] (Li Na, Chen Bo, 2021).

The second is the transformation of national defense intellectual property rights. Many defense patent information has not timely disclosed due to the idea of "valuing secret-level setting and neglecting decryption" (Nordhaus, 2009) ^[7], a large number of national defense research achievements cannot be transformed in time and put into civil production (Yang Meilan, 2015) ^[8]. Jiang Manyuan (2007) pointed out that there are problems such as low utilization efficiency and relying on administrative orders for the transformation of achievements ^[9]. Zhu Keyu et al. (2015) also pointed that the decryption work reflects the weak awareness of transformation and application of right holders ^[10].

Finally, the military industry entry and financing issues. Under the current military market access and review system, there is a phenomenon of inconnection (Wan Bingcheng, 2018) ^[12], setting a high entry threshold for civil enterprises to enter the military industry, and produces a high transaction cost. It is difficult for most enterprises to absorb social funds into it. The government has promulgated few laws on relevant financing, and made insufficient preferential

tax policies and subsidies, single financing method and means. As a result, the process of cm integration innovation often faces large capital gap and economic pressure.

To sum up, the institutional obstacles are more prominent. Most of the literature focus on the institutional barriers in the process of cm integration innovation, but few literature pay attention to the fundamental cause of these obstacles. This paper focus on the causes of the institutional barriers of cm integration innovation, through in-depth interviews, using the method of Grounded Theory to find the root causes, then provides targeted countermeasures and suggestions to improve the current situation of integration innovation.

3 Study design

3.1 Research Methods

Since the relevant research on the cm integration innovation system is still in its infancy, no formed theories can be directly used, and quantitative methods cannot be directly used to complete the research. The Grounded Theory can explore and establish the theory behind it by using systematic data collection and analysis on the basis of empirical data. Using the Grounded Theory to analyze the causes of the institutional barriers of cm integration innovation can make the results more scientific and comprehensive.

According to the research process of Grounded Theory method (Figure 1), on the basis of the interview data after purposive sampling, the institutional obstacle cause model of cm integration innovation was constructed through three stages of open coding, axial coding and selective coding, and the theory was established after saturation test.

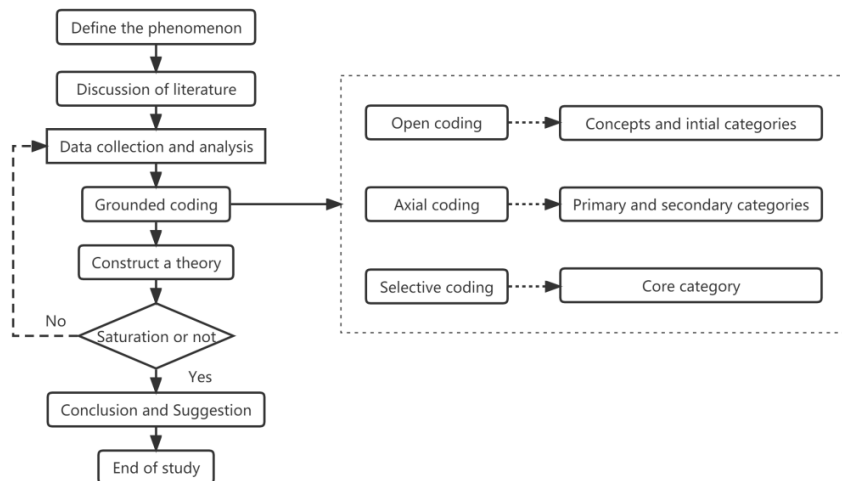


Figure 1 The operation process of the Grounded Theory

(1) Open coding

Open coding refers to the process of decomposition, comparison, conceptualization and categorization of the data (Chen Xiangming, 2000) ^[18]. In the process, researchers should keep

an open mind, constantly compare between events and between events and concepts, form more categories and characteristics, and complete the conceptualize process of the obtained data.

(2) Axial coding

The task of axial coding is to discover potential logical connections between categories and develop the main category and its subcategories. When analyzing, researchers need to consider the interconnection of the categories themselves and what interviewees want to express.

(3) Selective coding

The process of selective coding is an analysis of all discovered concepts or categories, and then selecting a "core category" and concentrating those codes related to the core category on the above.

3.2 Sample selection

This study adopts the purposive sampling method. The interviewees are the managers of the relevant units in a cm integration demonstration area and some management personnel. The required materials were collected by telephone interview, field research and interview.

3.3 Data processing

This study follows the following data processing process:

(1) Data collection

First, set up a research group. Secondly, the members conducted a comprehensive study, discussed and formulated the preliminary interview outline and interview plan. Finally, after pre-survey, improved the interview outline and carried out interviews.

(2) Data analysis

The researchers mainly used Python and NVivo11 to decompose and summarize the case data, extract keywords and word frequency.

(3) Complete the saturation test

The actual causes of the institutional obstacles of cm integration innovation were gotten and form the database. Then the saturation verification of the formed database was tested.

4 Construction of the cause model of institutional barriers to cm integration innovation based on grounded theory

4.1 Open coding

According to the Grounded Theory research paradigm, and use the original words of the interviewees as the label to explore the initial concept from it.. In the process of categorization, the initial concept with very little frequency (less than 2 times in frequency) is eliminated, and only the initial concept with a repetition frequency of more than 3 times is selected. Table 1 presents examples of the initial concepts and several categories.

Table 1 Example of open coding categorization

Original data statement	Conceptualization	Categorization
Maybe the risk of the decryption work is high, no one wants to bear the risk of early decryption, everyone is very conservative. In the case that the technology itself is no longer a secret, it still prefers to follow the original secret period.	High Risk Conservative sense	Risk aversion consciousness
Early decrypt influences little, but after may cause problem. There's nothing wrong with being conservative	Liability Risk aversion Relationship	Responsibility consciousness
The military technology should be freely used by civilian. The innovation of military projects are owned by the state, not by individuals "Stop the paid services" reduces the enthusiasm	Personal interests Conflict of property rights	Distribution of property rights and interests
The military is unwilling to external exchange. Private enterprises have a strong willingness to transform our research results into the military The military has this monopoly to make profits.	Subject interests Interest driven Profit monopoly	Military interests monopoly

4.2 Axial coding

In this study, different categories were classified according to their interrelations and logical order at the conceptual level, and four main categories were summarized. The main categories and their corresponding axial coding categories are shown in Table 2.

Table 2 Main categories formed by the axial coding



Fundamental category	Corresponding category	The connotation of the relationship
Participants integrate ideas	Risk aversion consciousness	Participants' perception of the risk, importance and necessity of industry will affect the formation of participants' integration ideas
	Responsibility consciousness	Participants' sensitivity and responsibility to the industry will affect the formation of their participant integration concepts
Main body fusion power	Distribution of rights and interests	The distribution of property rights and interests of cm integration innovation participants will affect the integration power of cm integration subjects
	Military interests monopoly	The monopoly of cooperative interests by the military will affect the power of cm integration
	Partner dependency	The subject of cm integration will affect the power of subject integration

	Existing barriers of integration	Regulations on talent, confidentiality, qualification affect the power of subject integration
Effectiveness of integration policies	State financial dependence	National fiscal dependence will affect the integration policies, especially the effectiveness of financial support policies.
	Platform construction level	The construction and role of provincial, industrial and stage fund platforms will affect the effectiveness of integration policies
	Limited financing channels	Restricted financing channels will affect the injection of social funds and affect the effectiveness of integration policies
Applicability of integration policies	Lacks in regulatory standards	Defects in regulations and standards will affect the applicability of cm integration innovation policies
	Organizational mechanism	Organizational mechanism constraints will affect the applicability of the cm integration innovation policy
	Policy pertinence	The breadth of the areas of policies covered and the detail of the provisions will affect the applicability of cm integration policies

4.3 Selective coding

Selective coding is to explore the core category from the main category, analyze the connection relationship between the core category and the main category and other categories, and describe the behavior phenomenon and context conditions in the way of "Story line". In this study, the typical relational structure of the main category is shown in Table 3.

Table 3. Typical relational structure of the main category

Classify	Typical relationship structure	Connotation of relationship structure
Extra-institutional factors	Ideas-Motivation	Participants' ideas of integration are a direct external drive factor.
Extra-institutional factors	Concept-Motivation- -Behavior	Subject fusion power is the concentrated embodiment of participants' concept of fusion affecting behaviors.
Factors within the system	<p>The effectiveness of integration policies</p>  <p>Concept-Motivation- -Behavior</p>	The low effectiveness of the integration policy affects the intensity and direction of the relationship between concept, power and behavior.
Factors within the system	<p>Integration policy adaptability</p>  <p>Concept-Motivation- -Behavior</p>	The applicability of the integration policy affects the intensity and direction among concept, power and behavior.

Determine the core category of "the causes of institutional barriers to cm integration innovation". The "story line" around the core category can be summarized as follows: the four main categories of the concept of participants' ideas of integration, the power of subject integration, the effectiveness of integration policies and the applicability of integration policies have a

significant impact on the institutional barriers of cm integration innovation. Based on this "story line", this research constructs a theoretical structure for the formation of institutional barriers of cm integration innovation, and calls it the "cause model of institutional barriers of cm integration innovation", referred to as "Concept-Power-Effect model", as shown in Figure 2.

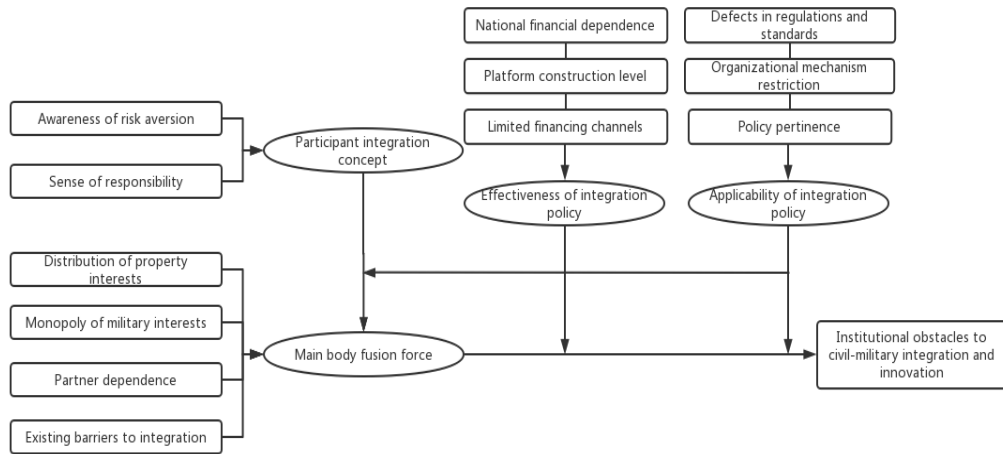


Figure 2 Concept-Power- -Effect model

4.4 Theoretical saturation test

Theoretical saturation tests was performed using another 1/3 of the interview records. The results show that the categories in the model has developed very rich. No new components were also found within the four main categories. "Concept-Power-Effect" is theoretically saturated.

5 Analysis of the causes of institutional barriers to cm integration innovation

It is found that using the "Concept-Power-Effect" model can effectively explain the formation mechanism of institutional barriers to cm integration innovation. The causes includes the following four main categories, participants fusion idea, main fusion power, fusion policy effectiveness and fusion policy applicability, but their action mechanism for the institutional barriers of cm integration innovation are not consistent.

5.1 Participants' concept of integration is not strong

Participants' concept of integration covered the psychology of risk aversion and the sense of responsibility. The research results show that the integration concept of the Chinese cm integration innovation participants is not strong, and in the actual process, they are mostly affected by risk avoidance and responsibility taking consciousness, (1) too strong awareness of personal risk avoidance; (2) lack of understanding of the importance of integrated innovation.

5.2 Lack of main body fusion power

The power of subject integration is affected by the distribution of property rights interests, military interest monopoly, the dependence of partners and existing cooperation barriers. The weak power of subject integration can be explained from the following two aspects: (1) subject fusion objectives are different;(2) uneven distribution of main body interests.

5.3 The integration policy is not well effective

Most of the current policies are not fully considered and coordinate the "dual-track parallel" problem due by the long-term separation of the military and the civilian, which causes the effectiveness of the policy means in the development of cm integration is limited, and cannot achieve the desired effect of the policy. Specifically reflected in:(1) poor overall planning ability of fiscal policy (2) the policy support mode is single and insufficient;(3) insufficient effective supervision over the implementation of regional policies

5.4 Poor applicability of integration policies

At present, there are defects in the relevant regulations and policies in China, the difficulty to break the constraints of the organizational mechanism and the lack of policy pertinence are still relatively prominent. Specifically, the poor applicability of China's cm integration policy is mainly reflected by (1) The top-level design goal of cm integration innovation is not clear enough; (2) the existing policies and systems are defective; (3) Macro policy does not well consider the heterogeneity of regional resources and industrial development.

6 Conclusions and suggestions

6.1 Study conclusion

This paper studies the causes of the institutional barriers of cm integration innovation according to the research paradigm of Grounded Theory. The causes of the institutional barriers of cm integration innovation can be divided into three aspects: micro, meso and macro, as integration and innovation concept, the behaviors of the subjects and the release and implementation of policies.

6.2 Countermeasures and suggestions

In view of the current research found that there are still problems in the innovation process of cm integration in China, such as weak integration concept of participants, insufficient lack of motivation for subject integration, poor effectiveness of integration policies and poor applicability of integration policies, the following system construction needs to be carried out.

(1) enhance the participants' concept of integration

Through more detailed new systems such as The National Defense Decryption Law and The Punishment Regulations on Decryption, more participants in cm integration and innovation can feel the country's determination to develop cm integration, thus fundamentally changing the enthusiasm and initiative of integration and innovation.

(2) increase the driving force of subject integration

The improvement of the cm integration intellectual property system will fully mobilize the enthusiasm of all sectors, provide a more efficient channel for private capital to participate in the development of national defense scientific research projects, and provide a more efficient channel for the transformation of military technology into civilian use.

(3) Improve the pertinence of policies and systems

On the basis of the clear top-level design, the national government urgently needs to provide different policy support for the regional cm integration and innovation according to the characteristics of the regional economic development to support and subsidize the innovation subjects of cm integration from multiple angles.

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