

6-20-2022

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Recommended Citation

YANG, Bin and SHI, Biao (2022) "Theoretical Thinking on Practical Application of Double Helix Methodology in Think Tank Research," *Bulletin of Chinese Academy of Sciences (Chinese Version)*: Vol. 37 : Iss. 6 , Article 2.

DOI: <https://doi.org/10.16418/j.issn.1000-3045.20220324003>

Available at: <https://bulletinofcas.researchcommons.org/journal/vol37/iss6/2>

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Theoretical Thinking on Practical Application of Double Helix Methodology in Think Tank Research

Abstract

The Double Helix Methodology regards think tank research as a relatively independent and special research topic, from the analysis, fusion, and restoration process of think tank research, based on the process fusion method of DIIS and the logical hierarchy method of MIPS iterating with each other, analyzing the spiral coupling relationship between them, and forming a complete and systematic theoretical framework and methodological system from the characteristics of time and space. This methodology comes from the founder's long-term strategic and policy research practice, and is also effectively applied to many national major research projects, national high-end think tank projects and several thematic research fields. There are still many theoretical problems to be discussed in the practical application of the Double Helix Methodology. From the perspective of epistemology, this study puts forward the need to eliminate the misunderstanding in the use of the methodology, understand the real role of the methodology in the work of think tanks, build a solid knowledge foundation and endow professional content according to the research problems. At the practical level, we should master the entry point of Double Helix Methodology in think tank analysis, avoid average force and prevent infinite nesting. From the perspective of the research subject, we should jump out of our own thinking limitations, constantly expand the use scenario of the Double Helix Methodology, and create real think tank value. Thinking about the practical application of the Double Helix Methodology from the theoretical level aims to explore the research law of think tanks, develop new theoretical methods of think tanks, construct the research paradigm of think tanks, and continuously deepen the research of the Double Helix Methodology.

Keywords

Double Helix Methodology, decision-making consultation, paradigm, think tank value

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Citation: Theoretical Thinking on Practical Application of Double Helix Methodology in Think Tank Research[J], Bulletin of Chinese Academy of Sciences, 2022 (6): 792–738.

Theoretical Thinking on Practical Application of Double Helix Methodology in Think Tank Research

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Abstract: The double helix methodology regards think tank research as a relatively independent and special research topic. From the analysis, fusion, and restoration process of think tank research, it analyses the spiral coupling relationship between the process fusion method of DIIS and the logical hierarchy method of MIPS and forms a systematic theoretical framework and methodological system from the characteristics of time and space. This methodology comes from the founder's long-term strategic and policy research practice and is effectively applied to many national major research projects, national high-end think tank research projects, and several thematic research fields. There are still many theoretical problems to be discussed in the practical application of the double helix methodology. From the perspective of epistemology, this study puts forward the need to eliminate the misunderstanding in the use of the methodology, understand the real role of the methodology in the work of think tanks, build a solid knowledge foundation and endow professional content according to the research problems. At the practical level, we should master the breakthrough point of double helix methodology in think tank analysis, avoid average force and prevent infinite nesting. From the perspective of research subject, we should jump out of our own thinking limitations, constantly expand the use scenario of the double helix methodology, and create real think tank value. Thinking about the practical application of the double helix methodology from the theoretical level, we aim to explore the research law, develop new theoretical methods, and construct the research paradigm of think tanks, thereby deepening the research on the double helix methodology. **DOI:** 10.16418/j.issn.1000-3045.20220324003-en

Keywords: double helix methodology; decision-making consultation; paradigm; think tank value

The development of think tanks with Chinese characteristics needs scientific theoretical methods and special research paradigms to provide prospective advices and systematic solutions for serving the decision-making and producing high-quality think tank outputs. Based on years of experience and practice in strategy and policy research, Pan Jiaofeng at the Institutes of Science and Development, Chinese Academy of Sciences proposed the think tank double helix methodology. According to the inherent requirements of problem-oriented, evidence-oriented, and science-oriented think tank research, the double helix methodology externalizes think tank research into the external loop of analysis, fusion, and restoration, and the internal double helix of interacting process fusion method [“data-information-intelligence-solution” (DIIS)] and logical hierarchy method [“mechanism analysis-impact analysis-policy analysis-solution” (MIPS)]. DIIS and MIPS are nested and iterative. A complete and systematic theoretical framework and methodological system for think tank research can be established based on temporal and spatial characteristics^[1]. From the start point of epistemology and the perspective of philosophy, the double helix methodology provides an epistemological approach of “analysis-fusion-restoration” for the full understanding of

think tank research problem. From the start point of methodology and the perspective of science, double helix methodology summarizes the laws of think tank research as well as the rules to be followed in think tank research from the aspects of research steps and logics. From the start point of practice and the perspective of application, double helix methodology provides the corresponding methods and tools for think tank research on specific problems and supports the solutions obtained from think tank research^[2]. Think tank double helix methodology provides a cognitive perspective and theoretical basis for the construction of novel think tanks with Chinese characteristics, which is a systematic and pioneering effort to establish think tank research paradigms. The strong vitality of double helix methodology is reflected in practical applications.

1 Eliminating the misunderstanding in think tank research

Many researchers believe that it is possible to support policy-making without theories in think tank research practice. This view is correct without consideration of the quality

Received: 2022-5-20

and efficiency of research. In the real world, practice often precedes theory, which is in line with the general principle of dialectics. For example, the history of management practice is much longer than that of management as a discipline. Therefore, it is incorrect to state that human beings cannot engage in management activities without the discipline of management. With the development of management theories and methods, the efficiency of human in guiding management practice has been greatly improved. Meanwhile, some key hypotheses in management theories have been verified and improved in practice. In the early practice of Frederick Taylor's scientific management theory, empirical management approaches were replaced by scientific and standardized management methods, which greatly improved the management efficiency. Henry Ford developed the world's first assembly line in 1913, which not only changed the way of car manufacturing but also had a huge impact on modern society and culture. Huawei has made great changes in organization by learning from IBM in the United States and has developed the ability to serve customers all over the world. Before the creation of think tank research theory, think tank practice had emerged with the development of human civilization. For example, the advisory system serving and assisting decision-making of the state governance has existed for thousands of years in China. The decision-making consultation system is an important part of Chinese traditional political culture, which involves and integrates a variety of schools of thoughts including Confucianism, Daoism, Mohism, Legalism, School of Yin-Yang, and School of Diplomacy, presenting a splendid sight. In short, there are methods of think tank research for supporting decision-making in practice, while these methods had not been systematically reviewed and summarized. The unconscious use of these methods in the past could produce excellent think tank outputs, whereas it would be difficult to support the consultation service for decision-making. Given the current new requirement for building think tanks with Chinese characteristics, it is particularly important to explore think tank theoretical methods and build a scientific system for think tank research.

2 Understanding the role of methodology in the work of think tanks

The role of methodology in think tanks' consultation service for decision-making resembles the relationship between philosophy and natural sciences after the Middle Ages in Europe. Since modern times, the momentum for the vigorous development of science is from the popularization of the formal logic system invented by ancient Greek philosophers (tools for model construction) and the precise experimental methods (methods for model validation). With these tools and methods, science can discover the causal relationship between things to understand and modify the world ^[3].

Immanuel Kant stated that "philosophy of science without history of science is empty; history of science without philosophy of science is blind" ^[4], which means that specific science is the basis of philosophy and philosophy provides guidance in terms of world views and methodology for specific science. Albert Einstein ^[3] said that "The reciprocal relationship of epistemology and science is of noteworthy kind. They are dependent upon each other. Epistemology without contact with science becomes an empty scheme. Science without epistemology is—insofar as it is thinkable at all—primitive and muddled." The relationship between think tank double helix methodology and think tank consultation service for decision-making is like that between philosophy and science. Think tank consultation service for decision-making can still occur without the support of a systematic methodology, while it is often blind and muddled. On the contrary, think tank research methodology must originate from and rely on abundant think tank practice, otherwise the methodology would be empty and boring. Based on the practical experience obtained from extensive and long-term think tank research (e.g., *Innovation 2050: Scientific and Technical Revolution and the Future of China*), the systematic thinking of the basic logic system of think tank research, and the innovation of think tank research methods, the creative think tank double helix methodology was proposed by Pan Jiaofeng through repeated induction and deduction. The think tank double helix methodology involves the orientation, process, and logic of research in think tank science, revealing how different tools can be used in the framework of analyzing the intrinsic mechanisms of things. The methodology is not exclusive. For example, in the different steps and the whole process of DIIS, different research tools and methods, such as bibliometrics, scenario analysis, social survey, brainstorming, and Delphi method, should be adopted according to the research conditions to ensure the scientific nature of research. The practice and application of think tank can be further clarified by these methods and think tank double helix methodology becomes meaningful because of practice.

3 Building a solid foundation of knowledge and endowing professional content according to specific conditions

Think tank double helix methodology is a set of tools suitable for solving various problems in think tank research. However, in the consultation practice for decision-making, the content of specific problems identified by analysis should be provided based on the field/industry and the underlying discipline knowledge. The methodology only makes the solution more scientific, systematic, and effective, which does not mean that the theoretical methods of think tank

research can solve all problems once and for ever following up a clue. Think tanks' consultation service for decision-making requires to integrate all kinds of knowledge to make the final decision. For example, there are different perspectives in innovative policy research. Policy science provides a framework and dimension for understanding innovation policy, which targets optimization of policy process, improvement of the policy-making system as a social command system, and prevention of government failure. However, policy science does not provide the understanding of innovation itself. Instead, we should go back to innovation to investigate the development of science and technology, the change of economic growth mode, and the transformation of government system and mechanism, so as to generate the content. The effectiveness of innovation policy research can be improved through the integration of science and technology with economics and political science. In fact, the methodology does not provide content but only catalyzes the generation of content, just like what Socrates called "spiritual midwifery". In other words, think tank double helix methodology only provides a platform or a toolbox, based on which various applications can be developed by content providers to include various think tank research problems, find the solution that best suits the characteristics of the problem, develop a healthy competitive ecology for decision-making consultation, and produce various and abundant think tank outputs. The *Innovation 2050: Science and Technology and the Future of China* was issued by the Chinese Academy of Sciences in 2009, which basically clarified China's strategic needs until 2050 in 18 important areas such as energy, population health, agriculture, space, and ocean. The report designed corresponding roadmaps for science and technology development based on China's national conditions. Knowledge varies in these areas, while the methodology for project implementation is the same.

4 Mastering the breakthrough point of double helix methodology and applying process logic on a case-by-case basis

The real world is complex and changeable, leading to a wide range of think tank research problems. Different problems in the consultation service for decision-making have different breakthrough points when they are solved using the think tank double helix methodology. Things include the known and the unknown, and the known can be classified into the identified and the unidentified. Obviously, the breakthrough point will be different for different objects in research. (1) Policy makers and researchers have relatively clear perceptions and consensus on the identified objects, such as building up China's strength in science and technology. The key is how to solve the problem, which needs a

thorough analysis and decomposition of the problem. (2) Unidentified known objects refer to the things that already exist but have not been discovered or recognized, and even policy makers have different opinions or are unaware of. Solving such problems should start with survey and investigation to obtain scientific conclusions. An example is the haze in big cities. Comrade Mao Zedong attached great importance to survey and investigation. He likened the investigation to pregnancy and the solution to childbirth, emphasizing that no investigation, no right to speak^[5]. (3) As for the unknown things which have not been created but are important, the analysis should start from the known things that are potentially related to the unknown things. The breakthrough point is usually mechanism analysis, such as some kind of future-oriented prediction. The MIPS in think tank double helix methodology is actually the study of the ontology of things, the understanding of things and their laws, the clarification of the relationship between object and the outside environment, analysis of the influence of things on other aspects, exploration of the policy effects that result from human intervention or policy regulation of things, and finally generation of solutions or policy recommendations for the think tank research problem. For the think tank research with good result, an appropriate breakthrough point is usually accurately identified based on the problem, and profound analysis is performed to solve the problem and provide the answer.

5 Avoiding average force and determining the application according to scale

Think tank double helix is a complete system of methodology, including the analysis, fusion, and restoration of problems and guiding the research process and logic regarding the whole process and whole perspective. Meanwhile, it is a specific operation method, which involves the coupling, iteration, and interaction of DIIS and MIPS to obtain a scientific, standardized, and systematic solution to a think tank research problem. To solve a problem with double helix methodology, think tank should consider the characteristics and scale of the problem. It is not necessary to use all the steps and methods in a comprehensive manner, which is unrealistic and unscientific and prone to dogmatism. Because of the differences in the mechanism and situation of different think tank research problems, the applicability of methods varies in different problem-solving steps. In the specific application of think tank double helix methodology, we should avoid average force on all aspects. How to build a new development pattern of "dual circulation", for example, is a think tank proposition in which the key is to find the breaking point by mechanism analysis of the think tank double helix methodology. Therefore, MIPS will be the focus of studying this proposition. If think tank research problem is considered

as a system, solving the problem should focus on the analysis of the decisive factors involved in the development of things and also take other factors into account. President Xi Jinping stressed that the key areas could affect the whole system and the key steps could activate the entire situation, and repeatedly emphasized to hold the “nose of an ox”. For instance, scientific and technological innovation can be regarded as the “nose of an ox” that leads the overall development of China, and dispersion of the non-capital functions of Beijing can be regarded as a “nose of an ox” that promotes the coordinated development of Beijing-Tianjin-Hebei ^[6]. Key breakthrough and overall advancement are unified, and overall advancement does not mean putting the same amount of effort and advancing side by side. Instead, we should grasp the principal contradiction of the overall situation, highlight the core issues related to the overall situation and the direction of development, and find out the “small incision” that affects the whole system.

6 Preventing infinite nesting and mastering the convergence conditions according to logic

According to the think tank double helix methodology, DIIS and MIPS are coupled and nested in think tank research. However, we need to avoid infinite nesting in the application of DIIS and MIPS. Infinite nesting is like the infinite reflection of an object by two mirrors facing each other. For example, the three logical processes of mechanism analysis, impact analysis, and policy analysis are involved in data, information, and intelligence. The three logical processes also involve data, information, and intelligence. Any step has the potential to be included in DIIS, such as the mechanism analysis in the “data” of DIIS. To avoid infinite iteration, it is necessary to clarify the main body and the method during the initial analysis in the application of double helix methodology. When the research problem is solved based on the “data-information-intelligence-solution”, each step is the main body, and MIPS is the method used in each step. When the research problem is solved based on the logic steps of “mechanism analysis-impact analysis-policy analysis-solution”, each step is the main body and DIIS is the method used in each step. The nesting and iteration of MIPS and DIIS involve the elements in research process and research connotation, completing the whole process of “analysis-fusion-restoration” through spiral rise and converging to the solution. The nesting and convergence of DIIS and MIPS are inevitable when think tank double helix methodology is used to solve complex problems, but general problems can be solved by one layer of nesting and helix.

7 Jumping out of thinking limitations and breaking self-imposed restrictions

In the practical application of think tank double helix

methodology, many researchers have learned and mastered the methods and can easily use them to explain the results of think tank research, which is commonly known as post-hoc analysis. There is nothing wrong with this while it is not enough to use the methodology at this level. The double helix methodology is a scientific approach for think tank research. If researchers continue to use their thinking habits in future research, the role of double helix methodology in guiding and improving think tank research cannot be achieved. A set of methods only for understanding but not for solving problems will fail to discover and expand the scenarios and conditions for the use and deduction of these methods. For example, the famous “Whig history” in historical studies, which explains the past and history according to the present, is actually not only used by the Whigs. It is more subtle than ideological prejudice and is a mental habit that may occur in any historian without caution ^[7]. The majority of researchers are likely to be trapped in prejudice and thinking habits and to stick to their positions. Therefore, the main goal of using think tank double helix methodology should be breaking their thinking limitations and discipline patterns and going beyond themselves in terms of mechanism analysis and the historical, realistic, and future domains. Researchers should adopt an open attitude to discover and clarify the difference between the past and the present. In this way we can act as an intermediate of viewing both the past and the future to deduce the future and make scientific decisions.

8 Avoiding metaphysics and serving decision-making to create think tank value

The ultimate goal of think tank double helix methodology is to create think tank value. Although scientific theoretical methods facilitate think tank research, they are not the ultimate goal of think tank construction. A key task of think tank is the application of policy research in reality to achieve policy goals and value output, so as to expand the influence of think tanks for the benefit of human beings and society. Think tank double helix methodology can provide a cognitive perspective and a theoretical basis in understanding the positioning, function, and role of think tanks, ensuring the quality of policy output and the neutrality of research outcomes, and organizing systematic think tank research to expand the impact. As shown in the structure of double helix methodology, think tank research involves the professional study about the basis of disciplines, comprehensive integration based on problem investigation and expert wisdom, and systematic and engineering organization and management ^[8]. In think tank research, we should see the nature of things through numerous and complicated phenomena, identify problems, motivate experts, and integrate wisdom. Outstanding think tank researchers with rich experience and deep insight and thinking ability who can find the key to solving the problem are important guarantee for the quality of think

tank research. Correct value, open mind, scientific method, and drawing a conclusion through objective analysis of facts represent the basic premise to carry out think tank research projects and ensure the independence of think tank outputs. Finally, the influence of think tank can be enhanced by setting the agenda, leading the discussion, and designing policies. Double helix methodology has been used to improve the quality, independence, and influence of think tank research. To constantly create think tank value, we should constantly explore the laws of think tank research in practice, develop new think tank theories and methods, and construct think tank research paradigms.

References

1 Pan J F. Double helix structure of think tank research. Bulletin of Chinese

- Academy of Sciences, 2020, 35 (7): 907–916 (in Chinese).
- 2 Pan J F. Promote the scientific development of think tanks with the double helix methodology of think tanks as a paradigm. China Science Daily, 2021-09-28(04) (in Chinese).
- 3 Einstein. Einstein Anthology. Translated by Xu L Y. Beijing: Commercial Press, 2009 (in Chinese).
- 4 Imre Lakatos. Methodology of Scientific Research Program. Translated by Lan Z. Shanghai: Shanghai Translation Publishing House, 2005 (in Chinese).
- 5 Mao Z D. Mao's selected works (Volume 1). Beijing: People's Publishing House, 1991: 109 (in Chinese).
- 6 Publicity Department of the CPC Central Committee. Reader of General Secretary Xi Jinping's Series of Important Speeches. Beijing: Learning Press, People's Publishing House, 2014 (in Chinese).
- 7 Butterfield. Whig Interpretation of History. Translated by Zhang Y M, Liu B C. Beijing: Commercial Press, 2012 (in Chinese).
- 8 Pan J F, Lu X, Liu H H. "Ten key issues" of think tank double helix methodology. Bulletin of Chinese Academy of Sciences, 2022, 37 (2): 141–152 (in Chinese).

(Translated by ZHAO B)



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