Historical Review, Current Situation and Trend of Scenario Analysis Theory at Home and Abroad

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Abstract: At present, there is no systematic and complete scenario analysis theory at home and abroad, and scenario analysis appears more as an analysis method. Nevertheless, scenario analysis is gradually changing to an independent theoretical system. At present, foreign countries focus on discussing the basic concepts and methods related to "scenario" and perfecting the theory of scenario analysis from various perspectives, while domestic countries mainly introduce and directly apply foreign theories and methods, and the basic theories and methods related to scenario analysis are relatively scarce.

1. Introduction

So far, a relatively systematic theory of scenario analysis has not been formed. Scenario analysis is a kind of analysis method. Scholars pay more attention to the development and innovation of technology. The theoretical construction of scenario analysis is relatively inadequate. However, after decades of development and reference to other disciplines, situational analysis is gradually forming an independent theoretical system.

Scenario analysis began in the late 1940s. At that time, Rand Company described various situations in which nuclear weapons might be used by hostile countries, which was regarded as the beginning of scenario analysis research and application.

Scenario analysis combines qualitative analysis with quantitative analysis. It solves semi-structured problems through manual intervention in the whole process and by means of reasonable dispatch and combination of various mathematical models and expert experience knowledge. It provides multi-dimensional prediction results for decision-making. It is applicable to many uncertain factors and cannot make the only accurate prediction. The situation can provide decision-makers with ideological simulation and exercise, so that decision-makers and managers are ready for events, to take positive and effective action to ensure that events develop in the desired direction.

The steps of Applying Scenario Analysis include: identifying key factors; defining decision focus; analyzing and sorting driving forces; constructing scenario logic; enriching scenario content; selecting main indicators and standards; feedback scenario content; forming execution plan; disseminating scenario content, etc. In the application of scenario analysis, each step needs to be supported by one or more supporting methods. For example, scenario axis theory, scenario

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description (script method), SPEET method, SWOT method, Delphi method, stakeholder theory, sensitivity analysis theory, risk theory, probability theory, model theory, simulation and simulation theory, etc.

Scenario analysis can be used in policy analysis, risk assessment, decision-making management, strategic management, sustainable evaluation and many other fields. When applying scenario analysis, it is often necessary to combine relevant theories and methods in the above fields (such as policy theory, decision theory, strategic management theory, sustainable evaluation theory, etc.). Therefore, with the increasing application of scenario analysis, the theoretical system of scenario analysis has been expanding. For example, van der Heijden of Shell and his colleagues first studied the relationship between scenarios and strategies, and introduced the concept of "Wind-tunnelling" in aeronautics into scenario analysis, suggesting that managers test them before implementing strategic choices to reduce decision-making risks. For example, some international organizations are more and more inclined to combine scenario analysis with sustainable development theory, so Backcasting (retrospective) method, which is very useful in sustainable development research, is widely used in scenario analysis.

2. Research Status and Trends Abroad

Overseas research on scenario analysis theory mainly focuses on discussing the basic concepts and methods related to "scenario", perfecting scenario analysis theory from various perspectives, thus forming a series of basic theories of scenario analysis, mainly including the concepts, connotations and characteristics of scenario and scenario analysis, scenario rules, etc. Scenario theory; Situational typology theory; Situational thinking theory (such as mental model, cognitive map, systematic thinking); Situational analysis theory of various schools (such as intuitive logic school, probability correction trend school, perspective school), uncertainty theory, prediction theory, etc.

2.1. Concept of "Scenario".

Scenario first appeared in the book The Year 2000: A Framework for Speculation on the Next Thirty-Three Years written by Herman Kahn and Wiener in 1967. They believe that the future is diverse, and several potential outcomes are likely to be achieved in the future. The way to this or that future outcomes is not the only way. The description of the possible future and the way to achieve this future will constitute a scenario. "Scenario" is a series of factual descriptions of the future situation and the development of the situation from the initial state to the future state.

Scenario analysis is one of the decision-making methods. Shell first used it in the late 1960s to formulate the company's strategic plan and achieved great success. Later, Pierre Wack of Shell formally put forward "scenario analysis" in 1971. "Scenario analysis" is based on the diversity of things' development trend, through the systematic analysis of related issues inside and outside the system, it designs a variety of possible future prospects, and then describes the development situation of the system from beginning to end by means similar to the writing of film scripts. Scenario analysis can be used in policy analysis, risk assessment, decision-making management, strategic management, sustainable evaluation and many other fields. The application steps generally include: identifying key factors; defining decision focus; analyzing and sorting driving forces; constructing scenario logic; enriching scenario content; selecting main indicators and standards; feedback scenario content; forming execution plan; disseminating scenario content, etc.

2.2. Scenario Planning.

Many scholars and managers focus their research on scenario analysis theory on scenario planning. Michael, for example, in his book Learning to Plan and Planning to Learn, proposes three concepts that challenge traditional planning: recognition of uncertainty, tolerance of errors, and deep self-reflection.

2.3. Situational Typology Theory.

Since the emergence of scenario analysis, different researchers, decision makers and managers have developed a variety of scenario analysis methods according to their needs. Some scholars have summarized the types of scenarios, notten's scenario classification method is more representative.

Table 1 Scenario types

Classification criteria	Situational characteristics
A Classification by Scenario Objectives: Inquiry or decision support	I Type: Descriptive or normative II Path: Prediction or Backtracking III Theme: Problem-based; Regional-based; Institutional-based IV Time: Long-term or short-term V Space: global/supranational or national/regional
B Classification by scenario design: Intuition or objectivity	I Data type: qualitative or quantitative II Data collection methods: participatory or desk research III Resources: extensive or limited IV Institutional Conditions: Open or Conservative
C Classification by situational content: Complex or simple	I Variability: diverse or single II Strength: marginal or mainstream III Deviation: unconventional or conventional IV Integration: high or low

2.4. Uncertainty Theory and Prediction Theory.

As a forecasting method, the main purpose of scenario analysis is to deal with uncertain future and effectively identify key uncertainties. Therefore, uncertainty theory and forecasting theory are also important theoretical basis of scenario analysis.

3. Current Situation and Trend of Domestic Research

The domestic research on scenario analysis started late. After 1990s, some scholars in China began to pay attention to this research field. In the 1990s, domestic scholars mainly introduced the theories and methods of scenario analysis abroad, such as the article "scenario analysis in strategic forecasting" published in the magazine Forecast in 1994. After 2000, the domestic research on scenario analysis began to increase, but mainly applied to foreign theories and methods. There are still few studies on the theory and methods of scenario analysis itself. Some foreign Monographs on scenario analysis have been translated into Chinese successively, such as Scenario Planning: Integration between Future and Strategy, Scenario Planning: Planning for the Future for an Uncertain World, etc.

4. Conclusion

At present, there is no systematic and complete theory of scenario analysis, and scenario analysis appears more as an analytical method. But after decades of development, scenario analysis is gradually forming an independent theoretical system. Specifically, foreign countries focus on the basic concepts and methods related to "scenario" and improve the theory of scenario analysis from various perspectives. Domestic research mainly focuses on the application of foreign theories and methods, while there is little research on the theory and methods of scenario analysis itself.

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