

# Visualization Analysis of Evolution Path of Ambidextrous Innovation Research

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## **Abstract:**

In this paper with 1990-2017 ambidextrous innovation literature in Web of Science database as the example, knowledge graph of foreign ambidextrous innovation research contents was focused and visualized using Cite Space software, thereby generating space-time distribution of countries, institutions, and important authors in ambidextrous innovation research literature as well as keyword co-occurrence knowledge graph, so that the development trajectory, hotspots, and future trends of ambidextrous innovation research could be systematically explored. Research shows that: (1) British and American scholars have led the research frontier of ambidextrous innovation, while research in this field demonstrates rapid development in China. (2) The development trajectory of ambidextrous innovation research presents increasingly richer research contents and elements, shift from static and stable research hypotheses to research in dynamic and changing complex environment, with research method shifted from empirical research to combination of case study and empirical research. (3) The current hotspots in ambidextrous innovation research: the relationship between ambidextrous innovation and corporate performance (value creation), the intermediary role of ambidextrous innovation, the fusion of intellectual capital element and ambidextrous innovation, establishment of enterprise ambidextrous innovation balance in uncertain and high risky environment.

**Keywords:** *Ambidextrous innovation, Cite Space, Evolution path, Focusing analysis*

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## I. INTRODUCTION

The ambidextrous innovation research, which is attracting more and more attention from domestic scholars, is in an accelerated development stage. Seen from the retrieval of SCI, SSCI, and CNKI databases, the number of published articles shows a rapid increase. Meanwhile, it is also found that there is little research on overall development trend of ambidextrous innovation creation in foreign countries in recent years. Therefore, it is quite necessary to understand the overview of global ambidextrous innovation, and fully grasp development history, subject

context, and frontier trend of its research. By analyzing the 1990-2017 overview of the ambidextrous innovation research, it is hoped that this study can provide intelligence support for domestic scholars to better conduct research and scientific decision-making.

## **II. DATA SOURCES AND RESEARCH METHODS**

### **2.1 Data Sources**

Considering influence and content coverage of database, Web of Science was selected as the data source in this paper, and 915 documents were screened from core journal sample database of Web of Science with “ambidextrous Innovation” as the key word for a time span of 1990-2017.

### **2.2 Research Methods**

As a product of the combination of citation analysis with data and information visualization, knowledge graph showcases a series of graphs about the relationship between knowledge development process and structure with knowledge as object to tap into and analyze the interrelationships between knowledge [1]. Citespace software is a citation visual analysis software developed under the background of scientometrics, data, and information visualization to analyze the potential knowledge contained in scientific analysis [2].

Using the combination of Citespace software and Excel with time span of 1987-2017 and time slice set to 1, this paper detects and analyzes the variation trend of ambidextrous innovation research frontier over time and the relationship between research frontier and knowledge base through correlation analysis and processing of literature data.

## **III. SCIENTIFIC RESEARCH COOPERATION NETWORK OF AMBIDEXTROUS INNOVATION LITERATURE**

### **3.1 Space-time Distribution of Ambidextrous Innovation Literature**

Citespace provides research in three levels: national and regional cooperation, institutional cooperation and scholar cooperation. The node size represents the number of papers published by authors, institutions, countries and regions. This research first analyzes national and institutional cooperation networks of ambidextrous innovation.

As shown in the integrated statistical chart (Figure 1), ambidextrous innovation research has undergone four stages of development. The first stage (1990-2003) is a stagnation period in which research is basically in a stagnation phase though the early ambidextrous research

literature began in 1990; the second stage (2004-2007) is a period of slow development in which only some British and American scholars have carried out research; the third stage (2008-2013) is a period of steady development witnessing rapid growth of researches; the fourth stage (2014-to-date) is a period of rapid development as scholars from not only European and American developed countries, but also many developing countries or regions have joined in the research since 2014, with explosive growth in annual research results. It suggests that ambidextrous innovation research has begun to arouse widespread concern from scholars in the fields of innovation and management globally, becoming a new research hotspot.

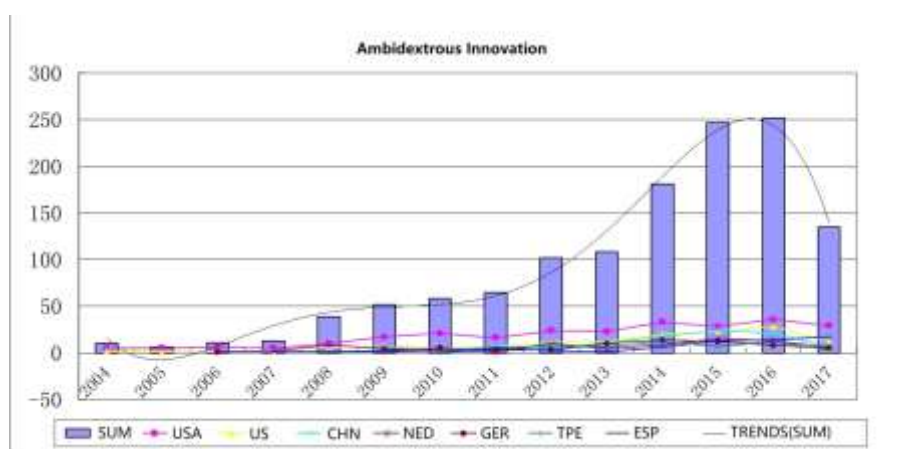


Fig 1: Time-space distribution of ambidextrous innovation research literature.

Meanwhile, combination with national cooperation and centrality network graph (Figure 2) shows that research results are mainly concentrated in the three countries of the United States, the United Kingdom, and China, of which the United States ranks the top with 233 articles, followed by the United Kingdom with 113 articles. Compared with the international developed countries, China has a late start in ambidextrous innovation research, but its published articles recently show a rapid increase trend, 92 articles cumulatively. European developed countries like Netherlands, Germany, Spain, Italy and Switzerland are closely followed. The centrality network graph shows the highest centrality of the United States (0.34) and the United Kingdom (0.16), indicating the direct or indirect close cooperation between the United States, the United Kingdom and many countries in the co-occurrence network.

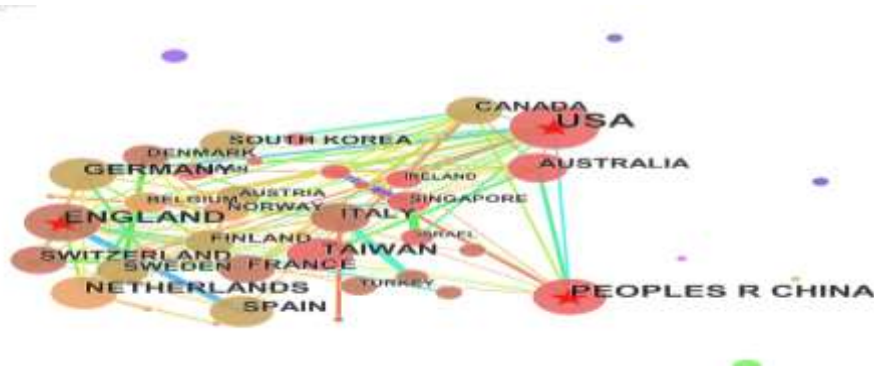


Fig 2: Time-space distribution of ambidextrous innovation research literature.

### 3.2 Distribution of Research Institutions and Journals

Seen from space-time distribution, research literature publication institutions are mainly distributed in universities in Europe and the United States before 2013 (Figure 3). The representative European and American research institutions mainly include Erasmus University (Netherlands), St. Gallen University (Switzerland), Warwick University and London Business School (UK), Copenhagen Business School (Denmark); Harvard University, Georgia State University, University of Minnesota and University of Connecticut, etc. (USA). After 2013, our research institutions publish a constant rising number of articles, like Xi’an Jiaotong University, Renmin University of China, Zhejiang University, Southeast University and so on.

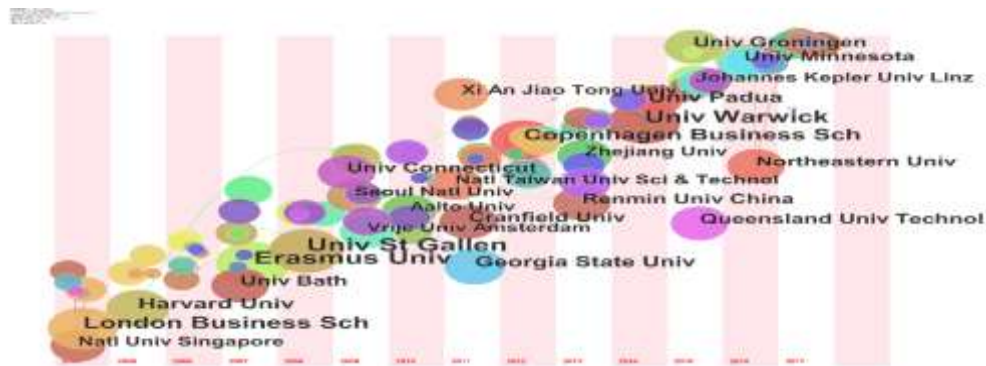


Fig 3: Distribution graph of publication institutions in ambidextrous innovation research

Seen from the published journals and citation frequency (Figure 4), “Academy of Management Review” and “Academy of Management Journal” have led the ambidextrous innovation research as top management journals whose relevant papers represent the research frontiers and hotspots in this field. “Organization Science”, as the most cited core journal (673

times), publishes the most representative research results in the field of ambidextrous innovation. In addition, “Harvard Business Review”, “Journal of Management Studies” and “California Management Review” are more application-oriented in publication. It can thus be seen that ambidextrous innovation research not only has high theoretical research value, but also is becoming a focus of attention in the corporate practice field.

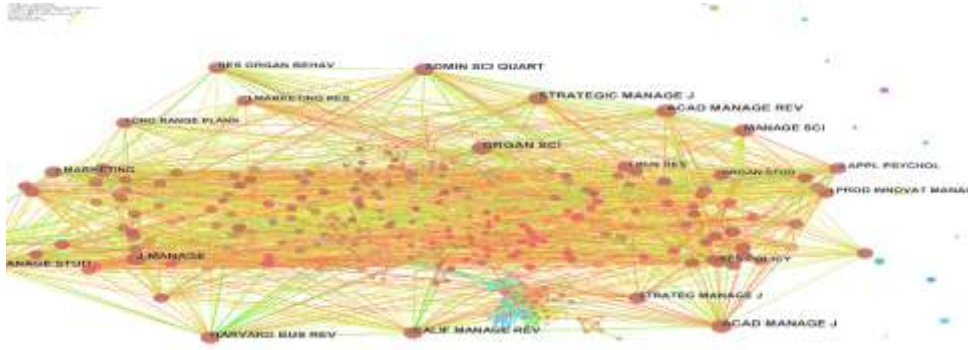


Fig 4: Periodical distribution network graph in ambidextrous innovation research

### 3.3 Analysis of Important Research Authors and Core Literature

Through the space-time analysis of scholars' cooperation network (Figure 5), we can intuitively understand the important scholars in the field of ambidextrous innovation research, and identify the classical basic literature and core literature in the research field, thereby grasping key literature, achievements and development process of ambidextrous innovation research. The TOP5 high-frequency authors are Raisch (2008, 2009), Cao (2009), Gibson (2004), Gupta (2006), He (2004), etc.

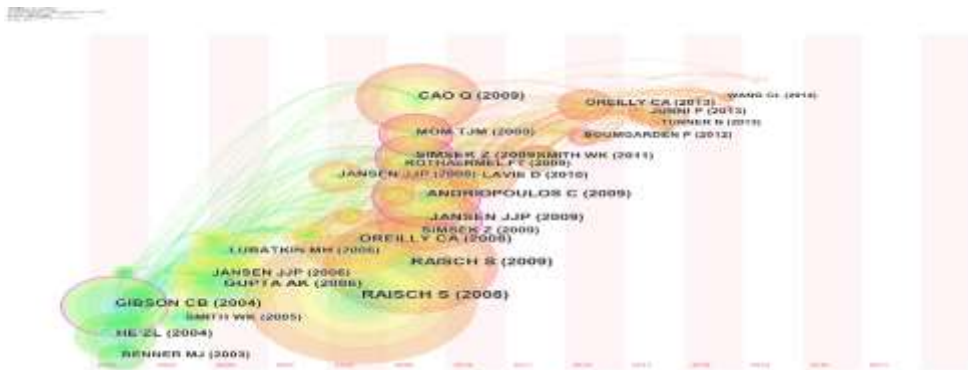


Fig 5: Scholars' cooperation network in ambidextrous innovation research

The “Organizational ambidexterity: Antecedents, outcomes, and moderators” (2008) published by Raisch et al., which ranked the first, constructed a comprehensive research model of antecedent, intermediate and outcome variables for organizational ambidextrous innovation [3], summarized the existence of central conflict in the organizational ambidextrous innovation research, pointed out the areas and directions for further in-depth organizational ambidextrous innovation research. Another highly-cited article entitled “Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance” (2009) studied in depth on the issues of whether organizational ambidexterity is achieved through separation or discontinuous equalization, whether ambidextrous innovation is at the individual level or the organizational level, whether organizations need to take static or dynamic ambidextrous strategies and how to externalize ambidextrous innovations.

Cao (2009) proposed balanced and interactive organizational ambidextrous-combination types in “Unpacking Organizational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects”. He believed that the two organizational ambidexterity models of ambidextrous innovation under different resource environment can adapt to different organizational environments [4], and based on this, analyzed the impact patterns of organizational ambidexterity in different practices.

Gibson (2004) first proposed the concept of situational ambidexterity in the article “The antecedents, consequences, and mediating role of organizational ambidexterity” which classified the coexistence of organizational exploratory innovation and exploitative innovation into two types of ambidextrous balance and intermittent balance, and demonstrated the possibility of achieving coexistence of exploratory and exploitative activities while and gaining mutual benefits [5]. In the article “Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis”, He (2004) conducted empirical test on the effect of the balance between organization and implementation of ambidextrous innovation on organizational performance using data from 206 manufacturing companies.

#### **IV. FOCUSING OF AMBIDEXTROUS INNOVATION HOTSPOTS AND TRENDS**

Research hotspot means one or more topics receiving common attention from scholars in a certain field. Plotting of keyword co-occurrence time zones using CiteSpace can not only showcase evolution map of ambidextrous innovation research in the time dimension, but also show layout characteristics of the keywords in different time periods, so that the research hotspot and development trend of ambidextrous innovation can be accurately grasped as shown in Figure 6.



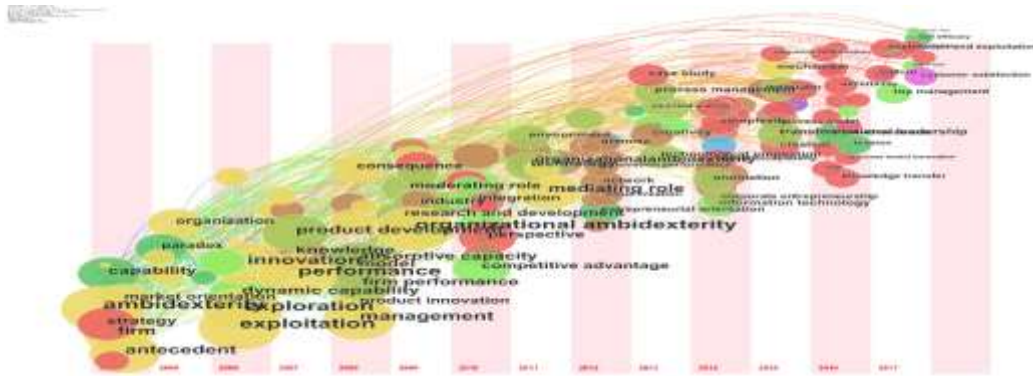


Fig 6: Space-time distribution of high-frequency keywords in ambidextrous innovation research  
 The keyword co-occurrence time zone view shows the distribution characteristics of ambidextrous innovation research in different time zones. The layout of keywords is subject to constant changes with the progression of time. To more clearly analyze the development trend of ambidextrous innovation research, high-frequency keywords are summarized in a table with 2 years as a time cut-point, as shown in Table I.

**TABLE I. High frequency keyword list in terms of ambidextrous innovation**

Year	High frequency keywords
2004-2005	Firm/ strategy/organization capability /ambidexterity /paradox /antecedent
2006-2007	Management/performance /innovation /exploration/ exploitation /knowledge dynamic capability/ product development
2008-2009	Performance/ absorptive capacity/consequence/ empirical test/model organizational ambidexterity /moderating role/ industry
2010-2011	Organizational ambidexterity/competitive advantage/integration /mediating role/ technology /environment
2012-2013	Dilemma / adoption/ discontinuous innovation/ Entrepreneurial orientation innovation performance / management practice /adaptation /value creation financial performance/ case study
2014-2015	information technology /entrepreneurship /open innovation/ contextual ambidexterity/ mediating role/ complexity/ intellectual capital/ Value creation/top management team/transformational leadership /empirical examination/ business model
2016-2017	innovation stream/ knowledge transfer/ innovation ambidexterity/ social capital/ uncertainty/ top management/ exploration & exploitation/culture/customer satisfaction

It can be seen from Table I that the research focus of ambidextrous innovation in 2004-2005 is to study the ambidextrous contradictions and antecedents in organizational development from the perspective of microscopic corporate strategic management, that in 2005-2006 is to focus on exploratory and exploitative innovation and its effect on corporate performance, system capabilities and product R&D; that in 2008-2009 shifts to the perspective of industry research, and studies organizational ambidexterity, corporate absorptive capacity, consequences, and performance using empirical methods; that in 2010-2011 is still laid on organizational ambidexterity, but the research perspective is more based on enterprise competitive advantage, with more attention paid to the impact of technology and environment on the implementation of organizational ambidexterity as well as the integration of ambidextrous innovation; the 2012-2013 research hotspots are more focused on corporate practices, adaptability of ambidextrous innovation, dilemmas of entrepreneurs, innovation performance and value creation, etc.; the 2014-2015 research hotspots are more extensive, covering information technology, environmental complexity impact on ambidextrous innovation, scenario ambidexterity, open innovation, intellectual capital, senior management team, value creation; the 2016-2017 research tends to study ambidextrous innovation under uncertain environment, high risk and cultural background, which involves such research elements as social capital, knowledge transfer, senior management team and customer satisfaction.

## V. CONCLUSION

To closely follow the international frontier and provide empirical evidence in our ambidextrous innovation research, the research literature data is subject to visualization analysis in this paper using Citespace software, the research status and evolution trends in the field are demonstrated from the perspectives of time-space distribution, important authors, evolution paths, research hotspots and frontier analysis. The following conclusions are obtained:

- The time-space distribution analysis of ambidextrous innovation literature in international journals reveals that ambidextrous innovation is increasingly attracting the attention of scholars worldwide. In particular, 2014 witnessed an explosive growth of the research results. The United States ranks the top in the number of published articles, while the United Kingdom leads the ambidextrous innovation research in Europe. Currently, ambidextrous innovation research institutions are mainly distributed in universities in developed countries in Europe and America. China started late in ambidextrous innovation research, but its research results grow rapidly.



- The development trend of ambidextrous innovation research: The research content will become richer and richer, with static and stable research hypotheses evolved to research under dynamic, changing complex environment, and research methods shifted from empirical research to a combination of case study and empirical research.
- Current hotspots in ambidextrous innovation research: research on the relationship between ambidextrous innovation and corporate performance (value creation), research on the integration of intellectual capital elements and ambidextrous innovation; the ambidextrous innovation balance in uncertain and high-risk environments, the mediating effect of ambidextrous innovation

## REFERENCES

- [1] Wang W J, Cai G P. Information analysis methods and applications. Beijing: Beijing Jiaotong University Press, 2010.
- [2] Li J, Chen C M. Cite Space Scientific Text Mining and Visualization. Beijing: Capital University of Economics and Business Press, 2016.3.
- [3] Raisch S, J Birkinshaw. Organizational a ambidexterity: Antecedents, outcomes, and moderators. *Journal of management*, 2008, 34(3): 375-409.
- [4] Gibson C B, Birkinshaw J. The antecedents consequences, and mediating role of organizational am and mediating role of organizational ambidexterity. *Academy of Management Journal*, 2004, (47): 209-226.
- [5] Lubatkin M H, Simsek A, Yan L, et al. Ambidexterity and performance in small-to medium-sized firms: the pivotal role of top management team behavioral integration. *Journal of Management*, 2006, 32(5): 646-672.
- [6] Raisch S, Birkinshaw J, Probst G, et al. Organizational ambidexterity: balancing exploitation and exploration for sustained performance. *Organization Science*, 2009, 20(4): 685-695.
- [7] Jansen J J P, Bosch Fajvd, Bolberda H W. Exploratory innovation, exploitative innovation, and performance: effects of organizational antecedents and environmental moderators. *Erim Report*, 2006, 52(11): 1661-1674.
- [8] Jansen J J P, Verad D, Crossan M. Strategic leadership for exploration and exploitation: the moderation role of environmental dynamism. *Leadership Quarterly*, 2009, 20(1): 5-18.