Future Direction and Visual Analysis of Kano Model: A Literature Review

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Abstract

This paper takes WoS database and CNKI database as samples, uses the Hist-Cite to analyze the research status of Kano model, then analyzes the citation networks of Kano model and compares the topics and key points of Kano model research. Finally, the paper proposes the future direction of Kano model based on the citation networks and research topics.

Keywords

Kano Model, Citation Analysis, Term Frequency Analysis, Evolution Path

1. Introduction

In the late 1950s, American behavioral scientist Frederick Herzberg conducted research on what matters people would be affected and how these matters play a role in people's emotions during their work. Through in-depth investigation, he found that matters that make people feel satisfied are all belonging to work content, and matters that make people feel dissatisfied with their work are all work environment or relationship. He calls the former as the incentive factor, the latter is called the health factor. He believes that the method of improving people's job satisfaction should be combined with two factors. Not only playing the positive role of incentives, but also developing strategies for health factor at the same time, only in this way can eliminate negative effects and achieve the maximum satisfaction of workers. Hertzberg's theory of motivation is also called two-factor theory. Kano extrapolated Herzberg's two-factor theory and developed a model to identify the quality attributes that influence customer satisfaction, and suggested a non-linear relationship between them. The Kano model can be used to identify and classify the quality attributes based on their impact on customer satisfaction into must-be, attractive, one-dimensional, reverse, and indifferent

attribute categories [1]. The Kano model transforms the specific attributes of products and services into the benefits of customers. Based on the detailed classification of quality factors, it seeks and understands the customer's attitude towards these interests to guide the company's relevant management decisions in quality management, product innovation and service design.

The field has received extensive attention and practical application. However, with the application of practice and the development of related theories, more and more scholars have discovered that Kano model itself has some defects, such as the Kano model itself belongs to qualitative analysis methods, classification criteria relatively subjective [2]. In order to enhance the management of the Kano model in the role of support in practice decision, a large number of scholars have carried out related research from different perspectives, but the research directions are numerous and complex, and the research results are in a state of jungle, making it difficult to judge the main line of its development and evolution. In order to seek breakthrough points, some scholars have combed and summed up the relevant research of the Kano model: Josip (2007) reviewed the relevant literature of the Kano model in marketing research and application from 1984 to 2006, choosing 46 literature to analyze the Kano's application industry, the measurement methods of quality elements and difference of proposing types of Kano. He thinks future research should focus on the precise quality factor classification method and conduct the empirical research [3]. Löfgren (2009) extracted 33 papers from ABI/Inform, Emerald, and ISI databases for combing and analysis on selecting keywords as Kano, quality dimensions, attractive attribute, and customer satisfaction, then made a suggestion for Kano model including the quality dimensions and the wording of the questionnaire design, quality attribute classification to reflect the customer demand, the specific classification method of quality attributes and the life cycle type of quality attributes [4]. Rashid (2010) thought Kano model is widely used to analyze customer requirement in product development. By reviewing relevant research literature of Kano is beneficial to discovering further research trends and directions, and proposed that combining the Monte Carlo simulation method can circumvent the problem of missing data in the Kano model questionnaire survey [5]. Shain (2013) integrated and teased the research literature of Kano from 1979 to 2010 and pointed out that only 10% of the literature is to improve the weakness of Kano model. In this part of the research, Shain classified the related literature into three categories based on the classification criteria of the quality attributes. The quality attribute results differ from every type of classification method due to different criteria. Shain also proposed a new Kano model can accurately access customer-related requirements, which divide the quality attributes into: strict essential quality elements, necessary quality elements, incomplete essential quality elements, incomplete charm quality elements, attractive quality elements, and complete attractive quality elements [2]. Luor (2015) teased out relevant literature of Kano model study from 1998 to 2012 in the ISI and Web of Science databases, and focused on the analysis of 94 academic papers (Fifty-two articles

were published in SCI and SSCI journals). He found that during these 14 years, the number of relevant researches in the Kano model has been increasing, the research content has been deepening, and the influence of the Kano model has been growing. Research contributors are mainly distributed in Asia, Africa, Americas and Europe. At the same time, he pointed out that there is a lack of systematic literature on the research and application of Kano model, causing the future research direction of Kano model is foggy to grasp [6]. Materla (2017) teased the Kano model literature which applied to the medical and health service industry, publishing in Science Direct, Google Scholar, and Web of Science, setting the search keywords as "Kano model" "healthcare""service quality" during the period from 2002 to 2016. The related literature found that the application of the Kano model in the healthcare industry is still immature. To improve the service quality of the healthcare industry, it is necessary to integrate the Kano model with other methods (such as QFD, SERVQUAL, etc.) to obtain customer demand information effectively [7].

It can be seen that reviewing the relevant research literature of the Kano model is conducive to discovering the development trend and mainstream direction of the theoretical research. However, there is still a lack of research on the Kano model system in China. For this reason, this article combs the relevant research literature of Kano model through the visualization software and carries out comparative analysis, presents the development context of the current Kano model research, search the differences between domestic and foreign research, exploring the research direction that Kano model can expand in the future.

2. Data Sources and Research Methods

The English literature is from the Web of Science(WoS) database, search keywords: Kano；Document type: Article or Proceedings Paper; Document language: English; Time span: All years. Refined and retrieved the search records, and finally obtained 1261 English articles. The Chinese literature is from the China Knowledge Infrastructure Project (CNKI) database, search keywords: Kano, Attractive quality; Document type: Article or Proceedings Paper; Document language: Chinese; Time span: All years. After deleting invalid records, we obtained 757 Chinese articles. (The preliminary analysis through HistCite shows that correlation between the documents using keywords of Attractive quality in the WoS database is weak, and the citation of literature is low. Therefore, only Kano is set as a keyword in English document search, differing from Chinese.)

HistCite and CiteSpace visualization software are used to perform citation analysis and word frequency analysis. HistCite is citation based analysis software that can help shape the development history of a field and discover important documents from numerous sources rapidly. CiteSpace is software that analyzes research frontiers and is widely used in scientific literature to identify and display new tendency and new development in science.

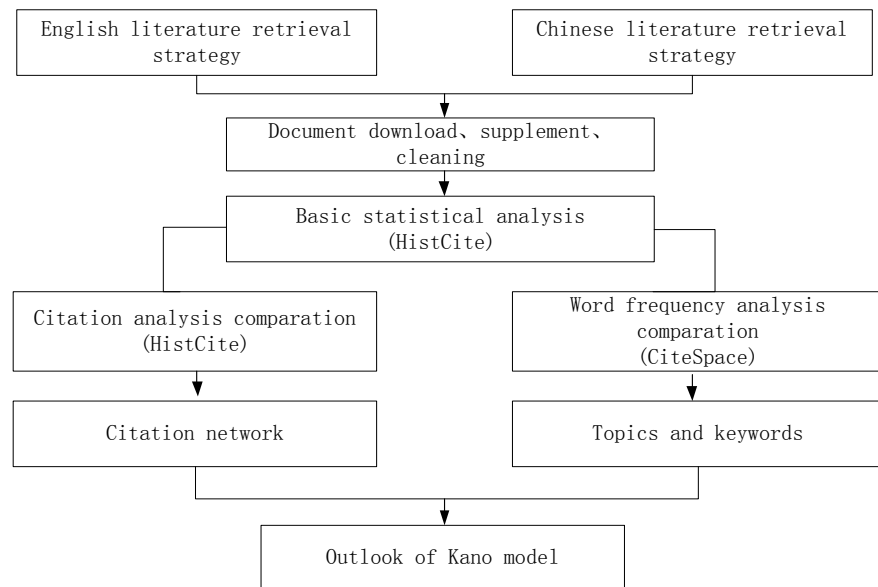The specific analysis content and process are shown in Figure 1.

Figure 1. Article analysis ideas.

3. Statistics and Comparison Analysis of Citation Date

HistCite citation analysis software can analyze the relationship between complex literature, and quickly delineate the development context of a certain research field, lock important documents of a research direction, and find some core papers with groundbreaking results. HistCite related parameters are: 1) GCS (Global Citation Score), total number of citations, which is the frequency of articles cited by the entire WoS database literature; 2) LCS (Local Citation Score), the number of local citations, which is cited in other documents in selected databases. The LCS value represents the importance of article among the field of research; 3) LCR (Local Citation References), the number of local references, the LCR value can reflect the degree of importance of the literature in the research field; 4) CR (Cited References), the number of references cited in a document in the entire WoS database, the higher the CR value, the more likely that it absorb the ideal of other articles. If the GCS value of an article is high, but the relative LCS value is very low, because that different fields researchers pay attention to the direction, so the article like this is not very significant. Calculate 1261 English literature records using HistCite. The publication period was distributed between 1891 and 2017. A total of 2179 authors were involved, with 15146 citations, 2110 keywords, LCS value of 1876, GCS value of 45. The statistics of 757 Chinese documents retrieved from CNKI were published. The publication period was distributed between 1993 and 2017. A total of 86 authors were involved, with 92 keywords, LCS value of 4098.

3.1. Publication Time and Citation Frequency Analysis

From Figure 2, we can see that the annual publication volume in the WoS database has been increasing year by year from 2002 to 2014, and the growth rate has
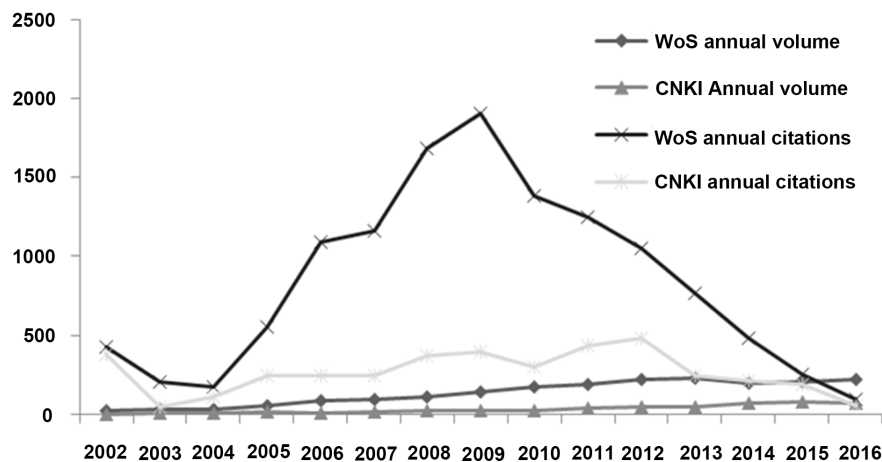
Figure 2. Literature publications and citations.

been particularly significant during the period from 2010 to 2011. In 2014, the number of issued articles has decreased obviously, although increased with flat growth rate since then. The annual citation frequency increased from 2005 to 2010, reaching the highest point of citation frequency in 2010, indicating that the research on the Kano model has received a lot of attention from scholars during this period. After 2010, the total number of citations showed a declining trend, indicating that the influence and attention of the Kano model is continuously weakening.

According to statistics from HistCite, literature with LCS value greater than 0 accounted for 45% in 1261 English articles, only 1.4% for LCS value greater than or equal to 10%, and maximum 67 for LCS value, which was published by Matzler K in 1998 on TECHNOVATION. The paper "How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment" proposed that Kano model and QFD should be integrated during product development in order to better obtain customer requirement and clarify product positioning, and achieve the ultimate goal of improving customer satisfaction [8]. As this paper proposed the integration method of Kano model and QFD earliest, it has a greater influence in this field. The citation statistics of Chinese literature are from CNKI. Among the 757 Chinese articles, 61% of articles' LCS value is greater than 0, 17% for LCS value greater than or equal to 10%, and maximum 287 was LCS value. The highest LCS article was published by Luo and Fang in Journal of GuiZhou College of Finance and Economics in 2002, which named "Common customer satisfaction research model and analysis of its advantages and disadvantages", the article carried out a comparative analysis of the Kano model and other customer satisfaction index measurement models, and proposed the advantages and limitations of the Kano model [9]. Relatively speaking, the paper published the research on Kano model earlier, and combed the customer satisfaction index model comprehensively and systematically. Therefore, it has received more extensive attention in this field.

3.2. Core Authors and Literature Analysis

At present, there is no unified method for determining the core authors, and the most commonly used method is referring to the authors' number of articles or the frequency of citations for evaluation. This paper selects the core authors from these two perspectives at the same time. The distribution of core authors under different standards is obtained by ranking domestic and foreign scholars according to the number of LCS and published articles in HistCite and CNKI respectively, as shown in Table 1.

In the WoS database, the research content of high cited scholars focuses on: Research on integration of Kano model and QFD. Quality Function Deployment (QFD) is a multilevel deductive analysis method that transforms customer requirements into design, process, and production requirements. It embodies the guiding ideology of market-oriented and product development [10] [11]. However, in traditional QFD, the product/service performance and customer satisfaction are considered to be a linear relationship, which leads to QFD unable to accurately and objectively identify customer needs. Therefore, the integration of Kano model and QFD can effectively improve the decision support role of QFD. Matzler (1998), Tan *et al.* (2000), Tontini (2007) and Ankur *et al.* (2010) discussed the integration of Kano model and QFD from different perspectives to accurately identify customer needs.

Table 1. Core authors analysis.

	Reference frequency				Article number			
	WoS	LCS	CNKI	LCS	WoS	number	CNKI	number
1	Matzler K	82	Luo Z Q	287	Iliyasu Z	15	Meng Q L	9
2	Tan K C	28	Hou Z	147	Agbenin J O	13	Shi G H	5
3	Xu Q.L	26	Meng Q L	98	Karaye K M	13	Cai L B	4
4	Chen C C	24	Li Y L	89	Kano M	12	Zou N J	4
5	Lee Y C	22	Wei L K	80	De C C	11	Geng X L	4
6	Prasuraman A	21	Tan Z J	79	Abubakar I S	10	Li Y L	4
7	Sireli Y	15	Duan L M	60	Abdulkadir A	9	Li F H	4
8	Tontini G	13	Shi G H	58	Aliyu M H	8	He L	4
9	Kuo Y F	13	He L	56	Kano Y	8	Jiang X J	3
10	Yang C C	13	Bai T	48	Jones L C	7	Gao M R	3
11	Chaudha A	13	Wang S	48	Matzler K	7	Zhang L	3
12	Chan L K	11	Chen B B	47	Mohammed A Z	7	Diao Y	3
13	Hauser J R	10	Zou N J	47	Abdu N	6	Qi X H	3
14	Li Y L	10	Yin S Q	46	Babashani M	6	Chen Q	3
15	Zadeh L A	9	Yao H	45	Buerkert A	6	Yao H Y	3

Research on methods of Kano model quality attribute classification. The Kano model provides a set of structural methods for the classification of quality attributes. Kano questionnaire, Kano classification table, and Kano final results table can be used to classify quality factors. However, the classification criterion is relatively subjective and the questionnaire survey is difficult to accurately reflect the customer's psychology and motivation. Therefore, some scholars carried out relevant research: Yang (2005) increased the attribute classification from 4 to 8 through the perspective of analyzing the importance of quality attributes [12]. Xu (2008) proposed an Analytical Kano (A-Kano) model to solve the problem of traditional customer demand classification methods with strong subjectivity, and improved the accuracy of customer demand classification [13]. Lee (2009) considered that the traditional Kano questionnaire ignores complex consumer psychology, so he designed a fuzzy Kano questionnaire method. The fuzzy questionnaire requires the customer to assign a value to the selected object, and then classifies the quality elements by the calculation results of the fuzzy algorithm [14].

According to the statistical analysis of CNKI data, the research contents of highly cited authors mainly focus on:

Related research on the specific application of Kano model. The Kano model is an important tool for effectively understanding customer needs and improving customer satisfaction. Domestic scholars continue to expand the application fields of the Kano model: Hou (2005) applied the Kano model to product manufacturing and design of lighters and combined quality function development (QFD) to maximize customer satisfaction [15]. Shi (2009) applied the Kano model to the analysis and evaluation of library service quality attributes [16]. Meng (2012) studied the quality factors of domestic express service based on the Kano model classification and decision problems [17].

Related research on the combination of Kano model with other methods. For the Kano model classification criterion relatively subjective, qualitative analysis methods and other defects, domestic scholars carried out the Kano model and other methods combined with the relevant research: Wei (2006) compared Kano model with SERVQUAL model and found that the combination of the two methods has a better guidance [18]. Li (2007) and Duan (2008) believed that customer requirement cannot be identified when only using QFD, though Kano model can effectively solve this problem [11] [19]. Bai (2012) introduced an importance adjustment function to solve the problem that the importance degree calculation in the traditional Kano model lacked the ability to process the demand classification, and combined the demand category with the importance degree calculation [20]. Meng (2014) integrated the Kano model with the IPA analysis method to determine the priority of product and service quality improvement [21]. Yang (2017) combined TRIZ with the Kano model to design a Kano-TRIZ product innovation design model in order to reflect the importance of customer needs in product innovation [22].

Related research on the dynamic change of quality attributes of Kano model. Meng (2015) carried out extensive research on Kano model improvement methods, paying particular attention to the dynamics of the Kano model quality factor classification, and proposed a dynamic forecasting model for the quality of express service elements based on GM(1,1), and further discussed the life cycle evolution of the quality attribute type of the Kano model [23].

4. Citation Analysis

Citation analysis refers to the use of a variety of mathematical and statistical methods for comparison, induction, abstraction, summaries. Analysis of citations and objects such as scientific journals, papers, and authors is helpful for clear and intuitive analysis.

The document record model is sorted according to the LCS value. The threshold is taken as 30, and the citation sequence diagram is generated according to chronological order, as shown in Figure 3. Each circle in the figure represents a document and the size represents the cited times of the document. The document pointed by the arrow is the cited document. The number in the circle is the number of the document in the document collection. The reasons for analyzing the first 30 articles of LCS are as follows: 1) the cited literature with high frequency can be considered as the center of future research evolution. 2) Use the highest cited literature to avoid the appearance of circular reference networks. 3) Limited quantity ensures clear visibility of HistCite results.

The citation chronicle not only reflects the relationship between the highly cited literatures, but also presents the overall picture of all the important research result in the Kano study, laying the foundation for analyzing and judging the
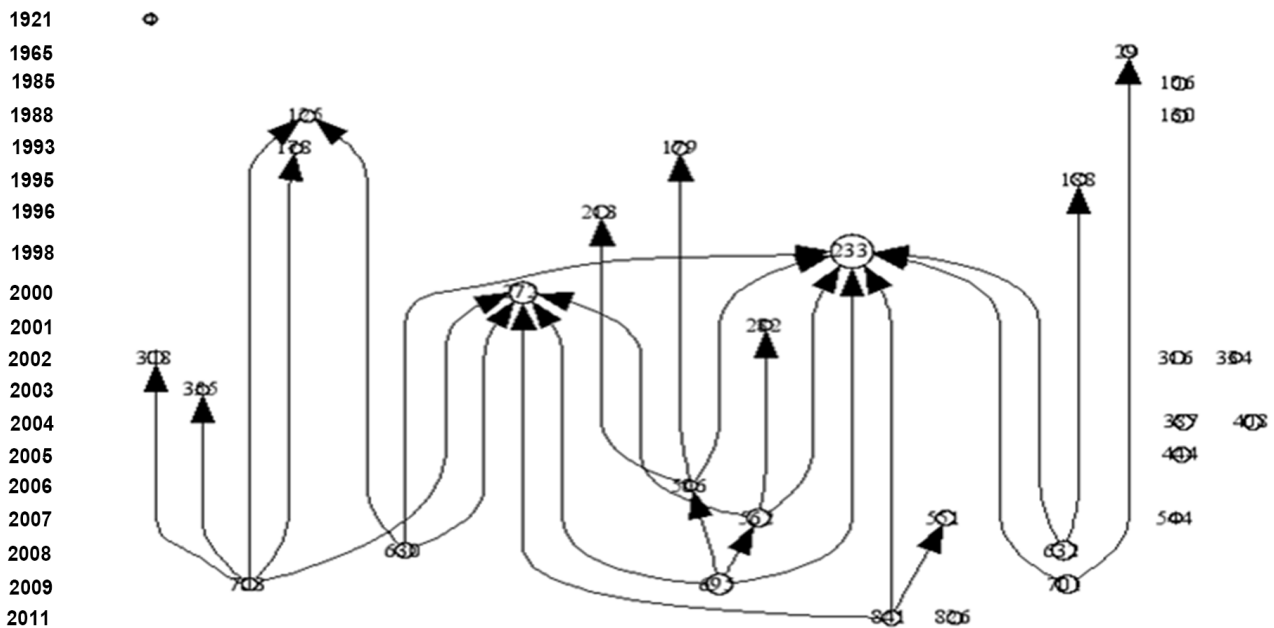

Figure 3. Citation sequence diagram.

development trend of Kano research. For example, document No. 233 was published by Matzler in 1998 named "How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment". This article first proposed the ideas and methods of integrating QFD with Kano models, which provided an important guidance for design and optimization of services. Document NO.272 was published by Tan KC in 2000 named "Integrating Kano's model in the planning matrix of quality function deployment". Tan believed that product quality is a direct expression of customer needs, and improving product performance can effectively improve customer satisfaction. Therefore, a transformation function was proposed to implement the effective integration of QFD and Kano models. This method has been widely used and improved in subsequent research [24].

5. Keywords Comparison Analysis

Importing the search results of Chinese and English documents into CiteSpace, the software can collect all the keywords of the literature, perform cluster analysis to a cluster map, and also display the specific keyword frequency by the number in the interface of the software. According to CiteSpace cluster analysis, the article lists the following Kano model keywords: 1) quality function deployment 2) product design 3) customer requirements 4) fuzzy Kano model 5) cost 6) medical risks. Domestic research focuses on the following research topics: 1) customer satisfaction 2) service quality 3) customer demand 4) quality function deployment 5) product design 6) fuzzy Kano model. It can be seen that there are many common themes for the research of the Kano model at home and abroad. Figure 4 and Figure 5 show the clustering results for Kano model themes and keywords.

1) Integration of Kano model and QFD. Quality Function Deployment (QFD) does not fully consider the priorities of customer demand elements in obtaining customer demand, and Kano model helps determine the relative importance of customer related demand elements by classifying customer demand elements. Therefore, integration of these two methods can be effectively improving its support role in management decision. It can be seen that the relevant research literature both at home and abroad on the Kano model focus on this issue and carry out deeply research. As mentioned earlier, Matzler (1998) first integrated QFD with the Kano model to provide effective method guidance for product design optimization [8]. Tontini (2007) assigned QFD to Kano by weighting the impact factors. The effective combination method helps companies to allocate limited resources to products or service attributes that can effectively improving customer satisfaction [25]. Lee (2008) combined the Kano model with QFD for the product life cycle design process to improve customer satisfaction in product design [26]. Domestic scholars Li (2007) and Duan (2008) also proposed approaches for integrating QFD and Kano model from different perspectives.

2) Research on the acquisition and classification of customer requirement. From the perspective of customer, the Kano model analyzes the nonlinear
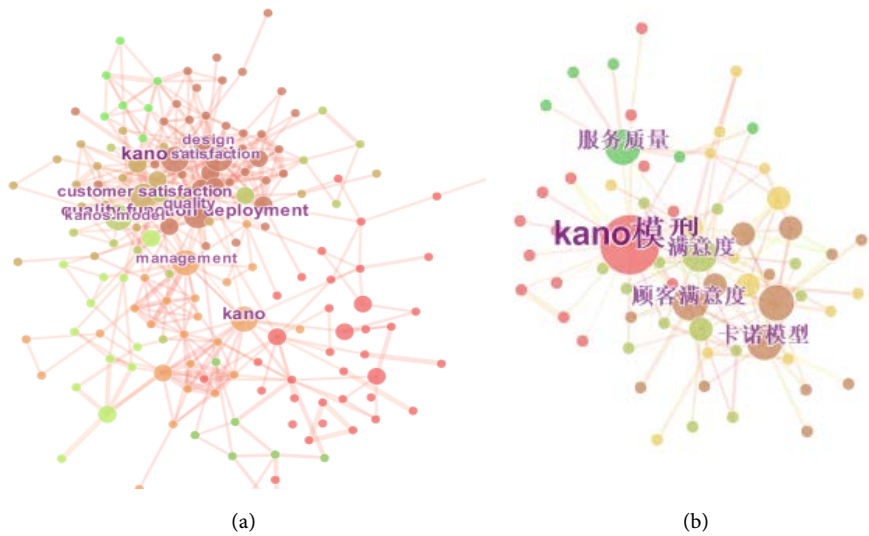
(a)   (b)

Figure 4. Analysis of Kano research topics. (a) English literature research topics clustering (b) Chinese literature research topics clustering.

(a)   (b)

Figure 5. Kano Research Keyword Analysis. (a) English literature keywords collection; (b) Chinese literature keywords collection.

relationship between customer satisfaction and product or service performance, and essentially obtains customer related factors. The effective acquisition and refined classification of customer demand elements are of great significance for improving product or service innovation performance, product or service quality. Scholars have carried out a large number of studies: Yang (2005) proposed the division of detailed quality factor attributes, and then subdivided the original single attribute classification to improve the accuracy of classification [12]. Xu *et al.* (2008) (2009) believed that the qualitative and subjective limitation of the Kano model cannot rigorously classify customer need. Therefore, an analytical Kano model is designed to quantitatively divide customer need [13] [27].

3) Research on the construction and application of fuzzy Kano model. In the process of confirming the classification result by the Kano model, there are two problems that must be faced: First, in the traditional Kano questionnaire, the customer can only select one answer as the evaluation of the service attribute, ignoring complex consumer psychology, as well as customers' specific identity positioning when participating in surveys. Second, in the traditional Kano model, the highest frequency is used as the criterion for determining the classifica-

tion result. This method is more appropriate when the result data is dispersed. In a situation where there is little difference from other values, the results obtained through this method are obviously not rigorous. Scholars at home and abroad combined with the advantages of fuzzy theory in dealing with uncertainty issues, and proposed the construction principle of fuzzy Kano model. Lee (2009) analyzed the advantages of fuzzy theory in dealing with uncertain events and proposed the feasibility and effectiveness of constructing a fuzzy Kano model [14]. Chan (2008) combined with fuzzy computing and analytic hierarchy process to determine the weight of customer needs in the process of ranking the importance of customer need, but the AHP itself has subjective limitations, this method cannot have a guidance function actually [28].

4) Research on integrating Kano model in product design decision. Introducing the Kano model in the product or service link can accurately grasp customer need in the process of product development and service design. Utilizing the Kano model can identify highly attractive quality attributes that enhance demand and make enterprises have limited resources. Tontini (2007) used the Kano model to analyze the customer needs of the beer cup and finally got a beer cup design solution that satisfied the customer [25]. Tang (2012) used the Kano model to design mobile phones. Firstly, the method of fuzzy clustering was used to identify and filter out customer requirements. Then the weight of each demand was considered and the order of importance of the demand is determined. Reference to this standard in the design of mobile phone can make the products satisfy customer and improve their competitive power [29].

6. Kano Model Research Future Outlook

This paper makes a prospect for the future development of the Kano model on the basis of the statistical analysis of the literature on the Kano model.

Study on integration and application of Kano model and other methods. The Kano model is essentially a research method for obtaining and classifying relevant elements of customer need. The acquisition and effective classification of customer need are the basis for companies to design products and services, improve product and service quality. To improve Kano decision support role, it is necessary to carry out the integration of Kano model and other methods. In addition, from the review of the literature in this article, this direction has achieved certain research results and is also a major research trend in the future. The current literature mainly involves the integration of QFD, SERVQUAL model, IPA analysis, and fuzzy theory, which greatly expands the practical application of the Kano model. The combination of other methods, such as TRIZ (innovation problem invention theory), FMEA, Cluster Analysis Method, and Multivariate Adjustment and Regression Analysis carries out effective acquisition of customer demand elements, customization and refined classification, charm demand element mining and the relationship between Kano model customer satisfaction and product performance relationship function fitting will undoubtedly have a

broad prospect for perfecting the Kano model related theory and further improving its decision support role.

Study on improving the accuracy of the classification of quality elements in Kano model. The Kano model provides a set of structured methods for detecting non-linear relationships between customer satisfaction and product performance, and has important guiding value for management practices. However, whether the Kano model questionnaire, the Kano model classification table, or the Kano model final classification results table will have some defects in the process of application, such as the questionnaire is too formatted and emphasizes a single answer; Different question wording affects the respondents; The Kano model classification table is too simple and indifferent quality elements are too many; The final classification results table emphasizes determining the final classification according to the frequency and so on. Only above problems are solved, can the quality elements achieve refined classification. Therefore, it is necessary to carry out relevant research from multiple perspectives combined with multidisciplinary theories of psychology, statistics, design and so on.

Study on the dynamic evolution of the life cycle of quality elements in Kano model. As Dr. Noriaki (2001) said, the quality factor classification result of Kano model will change dynamically, and it would have a life cycle characteristics, but it needs to combine different scenarios to conduct research [30]. In addition, Martin (2008) also proposed that life cycle-related research on the quality elements of the Kano model is an interesting issue for charisma quality theory research [4]. Scholars at home and abroad combined with different industry situations and enterprise characteristics, and discussed the dynamic evolution of the life cycle of quality elements, and proposed two life cycle modes: successful quality attribute life cycle model (I-A-O-M) and stability life cycle model (I-O-I). Domestic scholar Meng *et al.* (2015) proposed the use of GM(1,1) to predict the dynamic evolution of quality elements of the Kano model, and proposed different types of products and services, and the life cycle evolution of its quality elements would present complex features [23]. Therefore, how to combine the specific product or service type, explore the life cycle evolution process of the quality elements of the Kano model, and diversify the life cycle model based on analysis methods such as Time Series and Markov chain will be a meaningful and challenging future research topics.

Study on Kano model application field expansion. As shown before, the Kano model has the advantages of analyzing the customer demand elements from the perspective of customers, taking into account the non-linear relationship between customer satisfaction and the performance of products or services, and emphasizing the advantages of taking into account the customer's consumer psychology and consumer motivation in the decision-making process. It is widely used in practice. However, from the perspective of literature review, it is necessary to further expand its application areas, such as the current research hot spots of medical and health services, customized tourism services, smart

manufacturing, and smart services, to maximize the advantages of the Kano model theory and methods, expand application to further supplement and improve its theoretical system.

7. Conclusions

The Nineteenth National Congress proposed that the economy and society should develop in a good and fast manner. The implementation of the strategy of "strengthening the quality of the country" and improving the overall level of quality are not only the internal driving force for improving enterprise quality optimization, but also the efforts to improve the ability of independent innovation and brand building of enterprises, and the research and development capabilities of original products and technologies. The quality difference between products forms a virtuous circle of enterprise competition, and the quality directly reflects the degree to which the company grasps customer needs. Taking into account the relationship among quality, business, and customer needs, the evaluation of product quality and product design characteristics require a scientific evaluation method, which provides a reference standard for quality management. This article systematically analyzes the current situation of Kano research, and provides some perspectives on the development direction of Kano research. The main conclusions are as follows: first, through basic statistical analysis, it is found that the highest cited citations at home and abroad are different from those of authors; Secondly, through comparative analysis of keywords, it is found that the themes of Kano research at home and abroad are roughly the same, but there are also their respective focuses; Thirdly, Future research directions of Kano model are proposed through topic analysis.

There are still some deficiencies in this study. The amount of documents selected by the database is limited. The selected literature is limited to both Chinese and English. To some extent, these reasons will lead to a one-sided conclusion. This is also the limitation of citation analysis and word frequency analysis. In addition, the uneven distribution of the literature in the database can also affect the analysis conclusions. Therefore, in the future, we can consider extending the search scope of the database, language constraints of loose documents, and further analyze the evolution path of Kano from different perspectives to more accurately grasp the research dynamics of the Kano model.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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