A CONFIRMATORY FACTOR ANALYSIS OF BUSINESS MODEL INNOVATION IN CHINA'S GREEN FOOD INDUSTRY

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ABSTRACT
This research aims at analyzing the confirmatory factor of business model innovation in China's Green Food Industry. The samples were of 422 employees in the Green Food Industry of China. Questionnaire survey is to collect data and adopt a convenient sampling method. Data analysis adopts structural equation model. The result indicated that model was fit: χ^2 is equal to 43.200, p-value is equal to .056, χ^2/df is equal to 1.440, GFI is equal to 0.980, AGFI is equal to 0.963, CFI is equal to 0.996, NFI is equal to 0.986, RMR is equal to 0.006, and RMSEA is equal to 0.032. This model identifies the following three components: 1) Value Creation Innovation: The factor load of this part is 0.997, and there are four sub-index variables, including new capabilities, new technology/new equipment, new partnerships and new process. 2) Value Proposition Innovation: The factor load of this part is 0.994, and there are four sub-index variables, including new offerings, new customers and markets, new channels and new customer relationships. 3) Value Capture Innovation: The factor load of this part is 0.976, and there are two sub-index variables composed of new revenue models and new cost structures.
Keywords: Business Model Innovation, Value Creation Innovation, Value Proposition Innovation, Value capture innovation, Green Food Industry

INTRODUCTION

Innovation plays a vital role in the social and economic aspects of enterprises and human life (Kahn, 2018). Enterprises are determined to create or develop innovations and provide new products or services to consumers. However, if these innovations cannot generate economic profits, they are considered mere inventions. Note that innovation can be divided into three forms: product innovation, service innovation, and process innovation (Goffin & Mitchell, 2017). Innovation also leads to the emergence of a new business model called business model innovation (BMI), which is used by business professionals and scholars as a tool to boost sales, improve profitability, and surpass competitors (Hossain, 2017).

BMI has brought great benefits in both practice and theory. Researchers in various fields realize that this innovative business model can create competitive advantages even in a saturated market. Therefore, the use of measurement tools to evaluate business model innovation to design businesses in line with the new era has a profound impact on publishing, innovation management, entrepreneurship, and marketing (Andreini, Bettinelli, Foss, & Mismetti, 2022). Therefore, the objective of this study is to conduct confirmatory factor analysis (CFA) comprehensively to explore the crucial dimensions of business model innovation in the context of China's green food industry. Through CFA, this study attempts to investigate the potential structure and relationship between the variables that drive value creation and support the sustainable and environment-friendly practices of the green food industry in China. This analysis aims to strengthen understanding, support the establishment of business model innovation in China's green food industry, and promote value creation and sustainable development to be at the forefront of the global stage. Entrepreneurship in this industry can be used as a guideline for formulating policies and promoting the sustainable development of green food companies.

This study aims to analyze the confirmatory factors of business model innovation in the green food industry in China.

LITERATURE REVIEWS

Concepts and Theories of Business Model Innovation

Business model innovation research first appeared in the late 1990s or early 2000s, and there has been continuous research since then. After the 2000s, the study of business models entered a serious development stage. Domestic and foreign scholars have interpreted and studied different definitions of business model innovation. Most of these explanations come from the composition and structure, the functions and characteristics of business models, and the principles of evolution and development (Wirtz, 2019).

Concepts and Theories of Value Creation and Innovation

Innovation is the discovery of something new that has never existed, been used, or been known before, and this new discovery should be beneficial to humanity (Kahn, 2018). The content related to the new era of retail has been widely expanded. The objective is to improve and enhance the consumer experience to an appropriate level and to increase customer satisfaction. This leads to cost reduction and improved operational efficiency (Gothelf, 2013).

Value Creation and Foundation of Innovations

First, it starts with generating ideas to explore potential product requirements. The next step is to create product concepts, target specific market segments, and develop new products based on these ideas. Finally, efforts are made to transform these new products into marketable goods (Dyer, Singh, & Hesterly, 2018). Zhang Lei, the founder and CEO of Hillhouse Capital, stated, "in every crisis and every risk, it is the best test for the initial inspiration of entrepreneurship, and it is only by continuously moving forward to create long-term value that entrepreneurship can succeed" (Shapiro, Mirchandani, & Jang, 2018).

Based on a literature review, it is evident that value creation and innovation are crucial for businesses of all types to succeed in the digital age. Value creation refers to presenting products and services that align with customers' needs and provide a superior experience compared to competitors. Innovation involves inventing new products and services or developing novel methods to serve customers. Enterprises that can create value and innovation have competitive advantages and greater chances of success in the digital age.

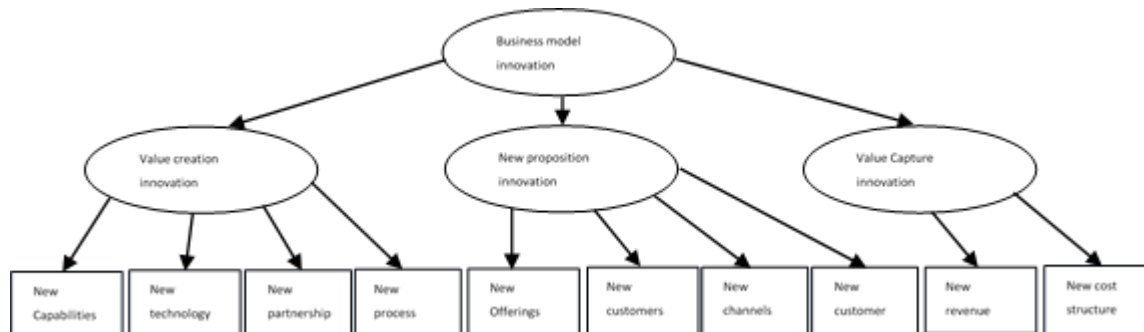From the literature review, the conceptual framework can be drawn as shown in Figure 1.

Figure 1 Conceptual Framework

RESEARCH METHODOLOGY

The population of this study is employees of the green food industry in China. According to the data from the China National Enterprise Credit Information Publicity System, there are 11,674 green food enterprises in China. This study aims to analyze the confirmatory factors of business model innovation in the green food industry in China. The statistical method used is structural equation modeling (SEM), which is an advanced statistical technique. Hair, Black, Babin, Anderson, and Tatham (2010) pointed out that the sample size is appropriate and sufficient for building structural equation models. The sample size is required to be at least 20 times the number of observed variables, or at least 200 samples. There are 10 observed variables in this study, and the sample size is 200 people. To reduce the error level and increase the reliability of data collection, the sample size was multiplied by a factor of 3, resulting in a sample size of 600 people. After the actual data collection, it was found that there were 422 complete and usable questionnaires, accounting for 70.33%, which was significantly greater than 50%. Therefore, it can be considered sufficient for data analysis. This study uses a convenient sampling method, allowing researchers to visit the sample group within a specified research period.

A questionnaire that the researchers created in accordance with the pertinent theories outlined by the study's objectives served as the research tool. The conceptual framework of the study includes defining the operational definition of questionnaire items using defined terms. There are 10 observation variables and 37 questionnaire items in this study. The questionnaire for measuring business model innovation was adapted from Clauss (2017) and modified according to the understanding of the China sample group. The questionnaire used in this survey consists of 33 items.

The data analysis and hypothesis testing in this study are carried out by computer software. The analysis includes two main parts: descriptive statistics and inferential statistics. The details of these components are as follows:

1) Descriptive statistics: Descriptive statistics are used to analyze the general data of sample groups. The introduction includes a frequency, percentage, mean, and standard deviation to provide basic information about the sample group.

2) Inferential Statistics: Inferential statistics are used for hypothesis testing. In this study, inferential statistics uses a complex statistical method called the structural equation model

(SEM) and maximum likelihood estimation. Specifically, this study only focuses on the measurement model, which is used to analyze the confirmatory factors of business model innovation based on the measurement model developed by Clauss (2017). The researchers ensure that this measurement model is suitable for the environment of the green food industry in China.

RESEARCH RESULTS
Respondents' Profiles and Studied Variables
Most of the respondents were women (294, or 69.67%) compared with men (128, or 30.33%). There are 180 people (42.65%) under or equal to 30 years old. There are 167 undergraduates (39.57%). Moreover, 122 people (28.91%) earned between 4,001 and 5,000 CNY.
Hypothetical Test Results
Table 1 Skewness and kurtosis of variables in conceptual framework

| Business model innovation	Skewness	Kurtosis
Value creation innovation		
1) New capabilities	-0.429	-0.013
2) New technology/equipment	-0.396	0.018
3) New partnerships	-0.482	0.036
4) New processes	-0.590	0.182
Value proposition innovation		
5) New offerings	-0.446	0.353
6) New customers and markets	-0.491	0.178
7) New channels	-0.487	0.322
8) New customer relationships	-0.430	0.122
Value capture innovation		
9) New revenue models	-0.512	-0.065
10) New cost structures	-0.387	-0.124

According to Table 1, it is found that the variables of skewness value range from -0.387 to -0.590, its value is not greater than -2 to 2, kurtosis is 0.124 to -0.353, and its value is not greater than -5 to 5, indicating that all observed variables are normally distributed.

Table 2 Exploratory factor analysis results

Business model innovation	Factor loading		
	Factor1	Factor2	Factor3
1) New capabilities	0.769		
2) New technology/equipment	0.806		
3) New partnerships	0.827		
4) New processes	0.827		
5) New offerings		0.810	
6) New customers and markets		0.837	
7) New channels		0.838	
8) New customer relationships		0.802	
9) New revenue models			0.777
10) New cost structures			0.854
Cumulative explanation of total variance	66.43	72.22	76.91
KMO	0.960		
Bartlett's Test	3028.126		
p-value	.000***		

*** Statistical significance level of .001

According to Table 2, the results of exploratory factor analysis (EFA) can classify all three components, and the factor load of each component is between 0.769 and 0.854, and its KMO value is 0.960. The cumulative explanation of total variance is 76.91, which exceeds 50%, so it is considered to be suitable for an excellent level of component analysis. In addition, the test statistic of the Bartlett test is equal to 3028.126, and the p-value is equal to .000, indicating that the variables have a relationship that is statistically significant at levels of .000.
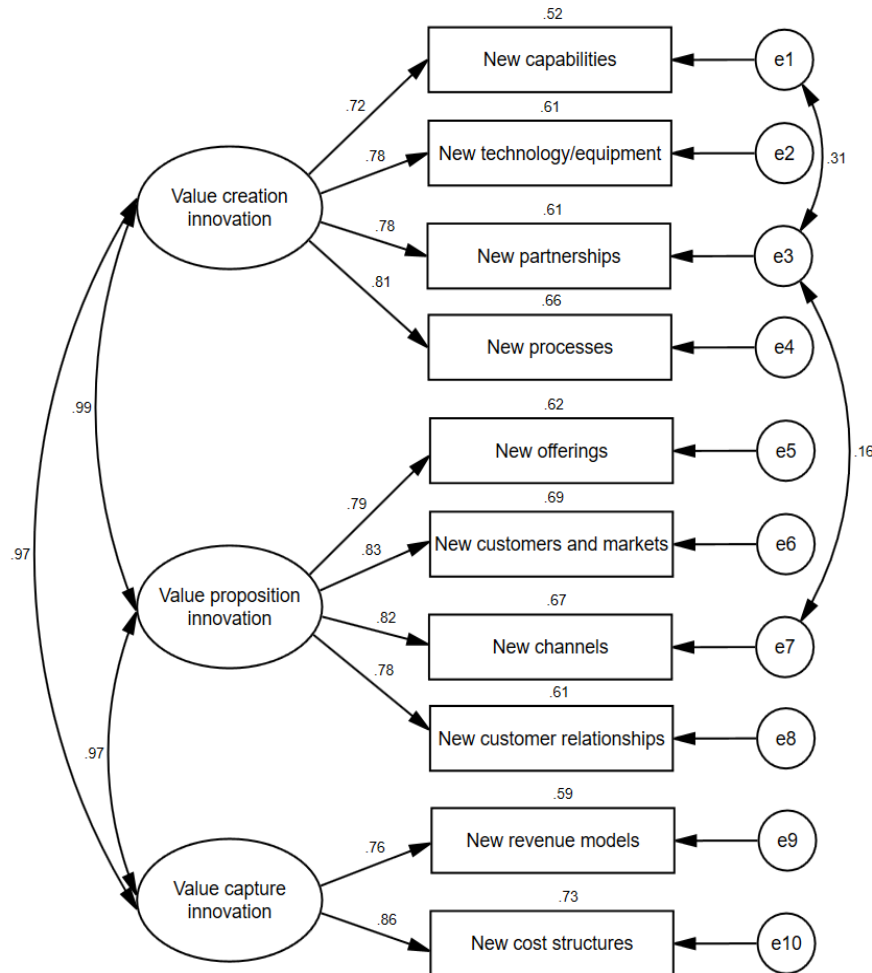
$\chi^2 = 43.200$, df = 30, p-value = .056, χ^2/df = 1.440, GFI = 0.980, AGFI = 0.963, CFI = 0.996, NFI = 0.986, RMR = 0.006, RMSEA = 0.032

Figure 2 Results of the first-order confirmatory factor analysis of the business model innovation after model adjustment

From Figure 2, it can be concluded that the first-order confirmatory factor analysis of capability factors is consistent with the empirical data. All three components are related to each potential variable 0.97-0.99.
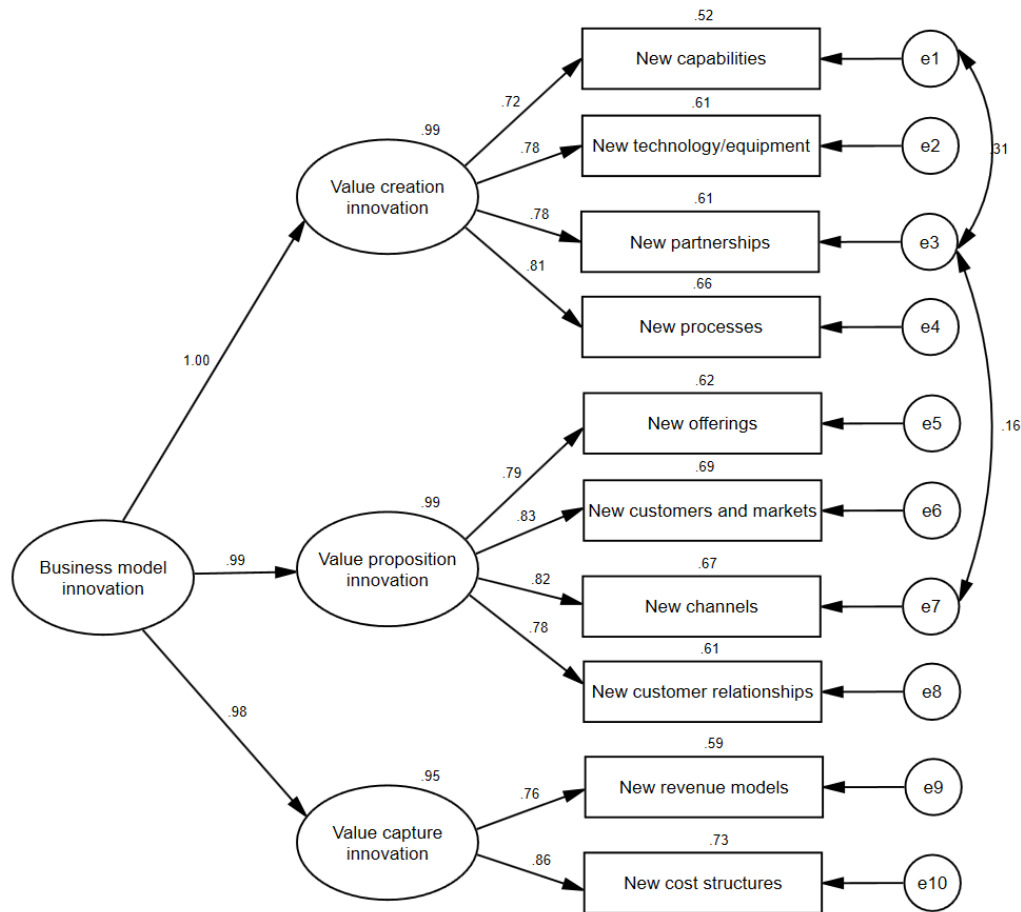
$\chi^2 = 43.200$, df = 30, p-value = .056, χ^2/df = 1.440, GFI = 0.980, AGFI = 0.963, CFI = 0.996, NFI = 0.986, RMR = 0.006, RMSEA = 0.032

Figure 3 Results of the second-order confirmatory factor analysis of the business model innovation

From Figure 3, it can be concluded that the second-order confirmatory factor analysis of ability factors is consistent with the empirical data.

The figure shows that the most critical component of business model innovation is value creation innovation, with a factor load factor of 0.997 and four sub-index variables consisting of new capabilities, new technologies, new equipment, new partnerships, and new processes.

Secondly, the new advocate innovation has a factor load coefficient of 0.994, and the four sub-index variables include new products, new customers and markets, new channels, and new customer relationships.

The last one is value capture innovation, with a factor load coefficient of 0.976, and the two sub-index variables are composed of a new income model and a new cost structure.

Table 3 Factor loading, average variance extracted, and reliability of the business model innovation

Business model innovation	Factor loading	R^2	AVE	CR
Value creation innovation	0.997	0.994	0.602	0.858
1) New capabilities	0.723	0.523		
2) New technology/equipment	0.783	0.613		
3) New partnerships	0.783	0.613		
4) New processes	0.813	0.661		
Value proposition innovation	0.994	0.988	0.648	0.964
5) New offerings	0.790	0.624		
6) New customers and markets	0.828	0.686		
7) New channels	0.817	0.667		
8) New customer relationships	0.783	0.613		
Value capture innovation	0.976	0.953	0.660	0.795
9) New revenue models	0.765	0.585		
10) New cost structures	0.857	0.734		

From Table 3, it can be seen that the composite reliability (CR) of business model innovation is 0.795-0.964, which is more valuable than 0.7 and has an average variance extracted (AVE) equal to 0.602-0.660, while the standard is set to 0.5.

Since the factor load ranges from 0.723 to 0.997, which is greater than 0.5, and the ability to explain variance ranges from 0.523 to 0.994, which is also greater than 0.5, it can be concluded that every index in the model is reliable (Henseler, Hubona, & Ray, 2016).

DISCUSSION & CONCLUSION

Through the analysis of value creation innovation, it is concluded that most respondents' views on the overall concept are at the agreeable level. When considering the average unilaterally, it is found that most respondents have the most views on new capabilities, followed by new processes, and new partnerships.

Research results show that value proposition innovation includes new products, new customers and markets, new channels, and new customer relationships. The development of new offerings is a key component of green food industry innovation in China. As consumers' health awareness has improved, food producers feel pressure to develop innovative green foods to meet their unique dietary requirements and tastes. For example, enterprises began to provide gluten-free, organic, and non-GMO food choices to meet the various needs of health-conscious consumers (Zhang & Cheng, 2018). This is a response to more and more people who care about their health.

Research results show that value capture innovation includes a new revenue model and a new cost structure. There are several reasons to support these findings. At first, the demand of Chinese consumers for safe and nutritious food led to the large-scale expansion of the green food industry in China. The fear of food safety, such as the use of pesticides, fertilizers, and genetically modified organisms, is the driving force behind this desire. According to a poll conducted by Nielsen (2019), food safety is considered the number one concern of 56% of consumers in China when purchasing food. Therefore, enterprises in the green food industry are implementing a new income model to meet customer needs by providing traceable and certified goods, thus taking advantage of this value.

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Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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