Research on Seafood Sales E-commerce Model Based on Principal Component Analysis

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Abstract: Offshore fishing plays an important role in the supply of seafood. However, due to the long supply chain of traditional seafood and many intermediate links, fishermen earn low profits and customers buy that in high prices. At present, there are many studies on wholesalers and retailers, and few studies on fishermen. In order to study the factors that affect fishermen's online sales of seafood, this paper studies the e-commerce model of seafood sales and uses the method of principal component analysis to analyze the survey data. The results show that there are six factors affecting fishermen's online sales of seafood. Based on the analysis results and the actual situation, the paper puts forward corresponding suggestions and countermeasures.

Keywords: influencing factors; e-commerce model; principal component; analysis

1. Introduction

In recent years, seafood has become an important part of people's daily consumption because they are rich in protein and other substances needed by the human body. However, the existing circulation mode restricts the development of seafood industry. In order to meet the needs of customers, we began to explore the new development model of online sales. The existing e-commerce of seafood mostly relies on traditional e-commerce platforms. At present, there are three main modes of e-commerce of seafood in China. One is to publish supply information about third-party e-commerce platforms such as Jingdong Mall and Tianmao, mostly in the form of B2C or C2C; the other is to publish information through professional seafood websites, mostly in the form of B2B; the third is to publish supply information through self-built enterprise websites, 2C mode. It can be seen that the mode of fishermen's online sales is not yet mature. In order to find out the main factors affecting fishermen's online sales of seafood, this paper uses principal component analysis to start relevant research. Ye Chao et al. fully demonstrated the necessity and inevitability of the transformation of China's aquatic wholesale market from traditional circulation mode to electronic commerce, and put forward the management strategy of the aquatic wholesale market based on electronic commerce and its comparative advantages over the traditional aquatic wholesale market [1]. Yang Derong and Ma Shangping analyzed several typical e-commerce modes, and analyzed the advantages, disadvantages and environment of the application of e-commerce modes in seafood, and proposed the future development path of seafood [2]. Chen Mingzhu and Ma Shangping pointed out that there are some problems in the development of seafood e-commerce in China, such as market disorder, imperfect supply chain, and lack of professionals [3]. Li Yifang and Han Xiao conducted SWOT analysis on the fresh seafood e-commerce industry in China [4]. The following problems exist on the fresh seafood e-commerce industry: imperfect supporting laws and regulations, difficult to control the upstream industry chain, difficult to determine the profit model, low consumer acceptance and high cost of cold chain logistics. Zhang Bang et al. will take the concept and introduction of seafood logistics as the main entry point, analyze the current development status of China's seafood logistics model, and explore the establishment of seafood logistics system in the new era based on the excellent experience of foreign countries [5].

Many scholars have studied the problems existing on the development of seafood e-commerce industry and seafood logistics. However, few studies have been conducted on the factors affecting fishermen's online sales of seafood. In order to find out the influencing factors, this paper carries out a questionnaire survey on fishermen in Lianjiang County, Fuzhou City, and makes principal component analysis on the collected data, and finds that the factors affecting fishermen's online sales. There are six factors: government policy, product fresh-keeping, logistics system, win-win cooperation, fishermen themselves, social environment. Suggestions and policies are put forward according to the existing factors.

2. Materials and Methods

2.1. Data

The object of this study is the offshore fishermen in Lianjiang County, Fuzhou City. The purpose of this study

is to explore the factors affecting the online sale of seafood from the perspective of offshore fishermen. Firstly, this study collects the factors affecting the online sale of seafood by consulting relevant literature, field visits, interviews and other methods, and classifies and collates them, then combines the actual situation. The initial questionnaire was made. Then, the relevant statistical analysis methods are used to further to refine the influencing factors and test the reliability and validity of the scale. Finally, the questionnaire is revised to obtain the final data and questionnaire.

2.2. Principal Component Analysis

According to the definition, principal component analysis (PCA) aims to use the idea of dimension reduction to transform multiple indicators into a few comprehensive indicators, in which each principal component can reflect most of the information about the original variables, and the information contained is not repetitive. This method can simplify the problem and get more scientific and effective data information by introducing multiple variables and reducing complex factors to several principal components. This is a method of mathematical transformation, which transforms a given set of related variables into another set of unrelated variables by linear transformation. These new variables are arranged in descending order of variance. In the mathematical transformation, keeping the total variance of variables unchanged, so that the first variable has the largest variance, called the first principal component, the second variable has the largest variance, and is not related to the first variable, called the second principal component. By analogy, I is the principal component of a variable.

2.3. Actor Rotation

In the analysis of social survey data, in addition to synthesizing the relevant problems and retaining large factors, researchers often need to examine the relationship between factors and measurement items to ensure that each major factor (principal component) corresponds to a set of meaningful measurement items. In order to show the relationship between factors and measurement items more clearly, researchers need to rotate factors. The common method of rotation is VARIMAX rotation. After rotation, it is considered acceptable if a measure item has a high correlation between the corresponding factor (>0.5). It is unacceptable that a measure item has too high correlation between a non-corresponding factor (>0.4). Such a measure item may need to be modified or eliminated.

In this study, data will be entered into SPSS 20.0 for principal component correlation analysis.

3. Results and Discussions

After pretreatment of initial data such as reliability and validity, the eigenvalues and contribution rates of correlation coefficient matrix R obtained by SPSS software are shown in Table 1.

Table 1. Total variance of interpretation.

Component	Initial Eigenvalues			Rotating Square Sum Loading		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
	7.292	34.723	34.723	3.258	15.512	15.512
2	3.119	14.854	49.577	3.114	14.829	30.341
3	2.127	10.127	59.704	2.708	12.894	43.235
4	1.538	7.322	67.027	2.633	12.539	55.774
5	1.353	6.442	73.469	2.521	12.003	67.777
6	1.055	5.023	78.491	2.25	10.714	78.491

The results showed that the eigenvalues of principal components were 7.292, 3.119, 2.127, 1.538, 1.353 and 1.055, respectively. The cumulative variance contribution rate is 78.491%. These six principal components can explain the variables in the questionnaire. Because the initial factor load matrix is not simple enough, the main representative variables of each factor are not very prominent. In order to better to explain the factors, the maximum variance orthogonal rotation method is adopted. In order to make it easy to see the variables under each principal component, only the values of load greater than 0.5 are taken, and the factor load matrix after rotation is obtained as shown in Table 2.

Table 2. Rotating component matrix a.

Influence factor	Component					
	1	2	3	4	5	6
Documents of government guiding the development of online sales of seafood	0.865					
Government's advocacy and publicity on online sales of seafood	0.828					
Government's policy of supporting the development of online sales of seafood	0.812					
Support and implementation of government policies	0.775					
Fishermen's individual ambition and actions		0.843				
Fishermen's habitual degree to traditional aquatic product sale model		0.819				
Fishermen's understanding of online seafood sales		0.803				
Fishermen's operational ability in online platform		0.659				
Current status of facilities and equipment for preservation			0.825			

Development of fresh-keeping technology for seafood		0.797			
Technical level of cold chain in seafood		0.743			
Logistics cost of logistics company			0.842		
Response degree of logistics company			0.761		
The soundness of logistics company's distribution system			0.733		
Distribution speed level of logistics company			0.658		
Linkages and cooperation among fishermen				0.913	
Linkages and cooperation between fishermen and third party logistics enterprises				0.868	
Contact and cooperation between fishermen and wholesalers				0.861	
Social inclusion and recognition of online sales of seafood					0.945
Number and scale of fishermen selling seafood online					0.905
Media's attention and publicity to online sales of seafood					0.665

From Table 2, we can see that the documents of the government guiding the development of seafood online sales, the government's advocacy and propaganda for the development of seafood online sales, the government's policy of supporting the development of seafood online sales, the government's policy support and implementation efforts in the first principal component have a greater load, which means that the first principal component has a higher correlation coefficient; fishermen's personal aspirations and actions, fishermen's biography. The second principal component is heavily loaded by the habitual degree of traditional aquatic product sales mode, fishermen's understanding of online aquatic product sales, and fishermen's operational ability in online platform, which means that the second principal component has a high correlation coefficient.

Similarly, combined with the chart, we can get the factors that affect the online sales of fishermen's seafood, such as government policy, fishermen themselves, product preservation, logistics system, win-win cooperation and social environment.

4. Conclusion

This paper investigates the coastal fishermen in Lianjiang County, Fuzhou City, and makes statistical analysis of the collected data by principal component analysis. The results show that in order to solve the problem of fishermen developing online sales of seafood, comprehensive consideration should be given to government policies, fishermen themselves, product preservation, logistics system, win-win cooperation and social environment.

It has become normal for fishermen to send information about seafood to Weixin "Friends Circle" for sale. "Seafood one-dollar shoot" APP for fishermen to sell online has been on line of half a year, but only a small part of registered users. It can be seen that strengthening the propaganda of seafood e-commerce, enhancing fishermen's entrepreneurial awareness and

customer awareness can speed up the development of fishermen's online sales of seafood.

"Online + offline" mode will become the main development mode of e-commerce in the future. It is a business mode that combines offline experience activities with the Internet. It enables online customers to enjoy the current resources and makes the Internet a front desk for offline transactions. This mode has brought opportunities for seafood e-commerce, enabling fishermen and consumers to achieve "face-to-face" transactions, reducing intermediaries, optimizing seafood supply chain, and speeding up the development of fishermen's online sales of seafood.

Acknowledgement

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