

Study on Consumption Demand of Aquatic Prepared Dishes Based on SEM and IPA Models

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Abstract: The aquatic prepared dishes industry is developing rapidly, and it is an urgent research problem to find out the problems from the consumption side so as to provide the improvement direction for production and sales. In this paper, from the perspective of consumers' purchase intention and consumption satisfaction, we constructed the evaluation index system and evaluation model of aquatic prepared dishes' consumption demand, took Guangxi (China) as a case study to do empirical research, fitted the evaluation model of aquatic prepared dishes' purchase intention with SEM model, and used IPA analysis to measure the importance of each index and satisfaction. The study found that: the SEM model empirical analysis verified that consumers' cognition, economy, edibility and appearance of aquatic prepared dishes have significant positive effects on purchase intention; IPA analysis empirically found that there is a large difference between the importance of each index and satisfaction.

Keywords: Aquatic Prepared Dishes, Purchase Intention and Satisfaction, SEM, IPA Analysis.

1. Introduction

In recent years, with China's aquaculture and consumption of aquatic products, the total amount of rise, the pace of life of residents to speed up the transformation and upgrading of the consumption structure, aquatic prepared dishes with its convenient and fast advantage has become the new wind direction of the food industry. 2022 China's aquatic prepared dishes market size reached 104.7 billion yuan, an increase of 16.8% year-on-year. However, in the process of aquatic prepared dishes enterprise development, but also faced with product development and marketing and other aspects of the difficulties. In the face of the increasing consumption trend of aquatic food prepared dishes, how to find out from the consumer side of the problem so as to provide the direction of improvement for the production side and the sales side of the problem is urgently need to study.

Chinese scholars have mainly discussed the prepared food industry from four perspectives: Firstly, prepared food is "pre-made dishes", which can be divided into ready-to-eat, ready-to-heat, ready-to-cook, and ready-to-mix food [1]. Secondly, China's aquatic products prepared dishes industry is still in the early stage of development, the consumer market potential, and the catering industry's industrial demand and retail consumers' demand for convenience and speed to promote the development of the prepared dishes industry [2-3]. Thirdly, China's prepared dishes industry in the early stage of development is also faced with a number of dilemmas such as the concept of ambiguity, the lack of industry standards, backward technology and equipment, safety hazards, and the dispersion of the dishes. The situation and enterprise scale operation is not suitable [4]; Fourthly, for the above problems, some scholars believe that we should increase the research and development of science and technology of prepared vegetables, tap the technical talents, and provide production science and technology support for the aquatic products prepared vegetable industry chain with the conversion of scientific and technological achievements [5], and improve the quality of the products through the standardisation of the dishes, intensive operation, and the sustainability of the taste of the prepared vegetable products [6].

Existing studies mostly focus on definition, classification, current situation, problems and strategies, etc., while there are not many studies exploring consumers' willingness to buy aquatic prepared dishes and their actual satisfaction from their perspective. Based on the perspective of consumers' willingness to buy and satisfaction, this paper conducts an empirical study with Guangxi consumer market as a case study, using SEM model to explore consumers' willingness to buy aquatic prepared dishes and its influencing factors and influence intensity, and empirically analysing the differences between the importance of each evaluation index of the consumer demand for aquatic prepared dishes and the satisfaction using IPA analysis, in order to scientifically respond to the response relationship between the supply of aquatic prepared dishes and the demand, with a view to providing a better solution for the supply and demand of aquatic prepared dishes. In order to scientifically respond to the response relationship between supply and demand of aquatic prepared dishes, it is hoped to provide reference for the development of the prepared vegetable industry and enterprises to formulate suitable marketing strategies.

2. Materials and Research Methods

2.1. Overview of the Evidence Case Area

Guangxi is a large agricultural province and region in China, with high quantity and quality of raw materials, and good foundation and conditions in aquatic products industrial base, regional brand, and large regional market facing ASEAN, etc. In recent years, Guangxi has also introduced several policies and measures to support the development of the prepared vegetable industry, and the development of the prepared vegetable industry has obvious advantages. Therefore, it is of outstanding practical significance to empirically study whether the evaluation index system and evaluation model of aquatic prepared dishes consumption demand are scientific, taking the consumer market of Guangxi as a case study.

2.2. Selection of Observed Variables

This paper constructs four perceptual dimensions of

consumers' perception of aquatic pre-prepared dishes products, namely *cognition*, *economy*, *edibility* and *appearance*, and enters into the study from the perspectives of consumers' willingness to buy and satisfaction, thus constructing the evaluation index system of aquatic pre-prepared dishes consumption demand (among which 17 indicators of the four perceptual dimensions of *cognition*, *economy*, *edibility* and *appearance* are the independent variables in the SEM and IPA models, and the three indicators of the *repurchase intention*, *satisfaction* and *recommend intention* in the *purchase intention* are the dependent variables of the SEM model):

Table 1. Indicator system for evaluating consumption demand for aquatic prepared dishes

Latent Variable	Name	Observed Variable
Exogenous Latent Variable	B5 Cognition	B5-1 Celebrity endorsement
		B5-2 Brand
		B5-3 Purchased/recommended by friends
	C5 Economy	C5-1 Price
		C5-2 Promotions
	D4 Edibility	D4-1 Tasty
		D4-2 Diverse flavours
		D4-3 Portion
		D4-4 Nutrition
		D4-5 With or without ingredients
		D4-6 Healthy raw materials
		D4-7 Fewer additives
	E3 Appearance	E3-1 Attractive packaging
		E3-2 Freshness with ice/vacuum
		E3-3 Ingredients individually wrapped
		E3-4 Complete labelling information
		E3-5 Convenient for transport and storage
Endogenous Latent Variable	F1 Purchase Intention	F1-1 Repurchase intention
		F1-2 Satisfaction
		F1-3 Recommend intention

Firstly, consumers' awareness of aquatic prepared dishes products is a prerequisite to draw their attention to the product, and celebrity endorsement, brand effect and recommendations from friends around can promote people's understanding of aquatic prepared dishes. Secondly, according to economics, price is usually the primary factor influencing consumer demand, while food flavour and food safety are its determining factors. More over, whether the packaging of the product can be favoured by consumers and whether the food can be preserved intact are also important factors affecting consumption. As for consumers' willingness to purchase aquatic prepared dishes, repurchase willingness, satisfaction and recommendation willingness are good indicators.

2.3. Acquisition and Pre-processing of Data

Data source: This paper takes consumers in 14 cities in Guangxi as the main survey object for empirical analysis. The research team conducted online and offline research and data collection in 14 cities in Guangxi during December 2022 to February 2023, and distributed 685 questionnaires, with 651 questionnaires returned and 583 valid questionnaires.

Reliability and validity test (Table 2): The results of the reliability test show that the alpha value of the overall index reaches 0.967, and the alpha value of the basic dimensions of the Cronbach is above 0.7, indicating that the scale has high reliability. The validity test results show (Table 2) that the KMO value of the overall index reaches 0.956, and the KMO value of each basic dimension is between 0.698-0.870, and the Bartlett's spherical test values are all significantly correlated at 1% significance level, indicating that the scale has a high degree of validity.

Table 2. Results of the reliability analysis

Dundamental Dimension	Cronbach Alpha	KMO	Bartlett's Sphericity Test Significance Level
B5	0.751	0.861	.000
C5	0.813	0.756	.000
D4	0.945	0.870	.000
E3	0.896	0.698	.000
F1	0.911	0.793	.000
Overall Indicator	0.967	0.956	.000

2.4. Research Methodology

Structural Equation Modelling: Structural Equation Modelling (SEM) is a statistical method based on the covariance matrix of variables to analyse the relationship between variables, and it is an important tool for multivariate data analysis, mainly used to deal with the relationship between multiple causes and multiple effects, as well as problems containing latent variables. The final latent variable to be analysed in this study is the endogenous latent variable *purchase intention*, with the respondents' *repurchase intention*, *satisfaction* and *recommend intention* of aquatic prepared dishes as the observed variables. There are four exogenous latent variables, namely, *cognition*, *economy*, *edibility*, and *appearance*.

IPA analysis: Consumer satisfaction can be regarded as the subjective psychological evaluation made by consumers based on the comparison between the expectations of the product or service and the actual experience of using the product or service [7]: when the actual performance is higher than the expected performance, the consumers are satisfied; when the actual performance is lower than the expected performance, the consumers are dissatisfied [8]. The IPA analysis method is well suited to this kind of idea, which lists the mean value of importance of the overall indicators as the y-axis and the mean value of satisfaction as the x-axis, divided into four quadrants, and the measurement indicators according to their consumer-perceived importance and satisfaction evaluation measurements correspond to the distribution of the four quadrants, in order to analyse and explain the meaning and importance of the indicators.

3. Results and Analyses

3.1. SEM model Empirical Results and Analysis

Different attribute dimensions have different degrees of influence on the final variable. When comparing similar food and beverage products, their promotion, price, appearance and taste can positively contribute to the consumer's purchase intention. Therefore, this paper hypothesises that the perceived, economy, palatability and appearance of prepared dishes of aquatic products all have a positive effect on purchase intention.

Based on the recovered survey data, the SEM model was used to fit and adjust the consumption demand evaluation model of aquatic prepared dishes, and the convergent validity (AVE) obtained was a minimum of 0.513 and a maximum of 0.711, and the combined reliability (CR) was a minimum of 0.744 and a maximum of 0.945, which indicates that the model has a high degree of overall fit. The overall fitness indicators of the model all meet the standard, the model fits the sample data well, and the structural relationship is relatively reasonable.

The fitting results of the model show (Fig. 1) that *cognition*, *economy*, *edibility* and *appearance* all have positive effects on *purchase intention*, with path coefficients of 0.452, 0.283, 0.256 and 0.367 respectively, and that *cognition*, *appearance*, *economy* and *edibility* have decreasing degrees of influence on purchase intention in that order. In addition, *purchase intention* has a positive effect on *repurchase intention*, *satisfaction* and *recommend intention*, with the greatest effect on *repurchase intention*, with a path coefficient of 0.81.

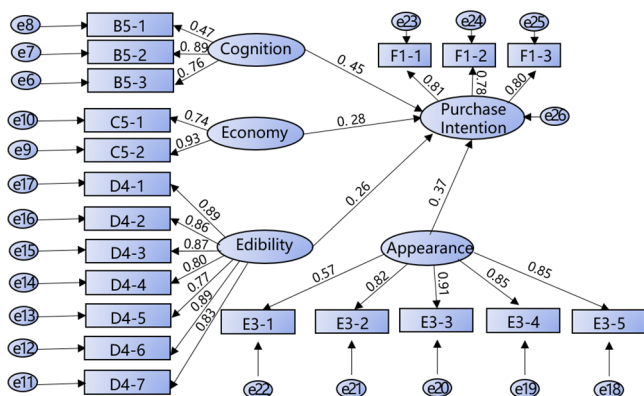


Figure 1. Influence pathway diagrams for variables at each level

The specific analyses are as follows:

The path coefficient of *celebrity endorsement* is 0.47, the path coefficient of *brand* is 0.89, and the path coefficient of *friends' purchase/recommendation* is 0.75. This indicates that the branding and friends' purchase/recommendation dimensions have a more obvious influence on cognition, with the branding dimension contributing more path influence, while the path coefficient of celebrity endorsement is not obvious. This indicates that whether or not the horizontal product prepared vegetable products have celebrity endorsers does not have a big effect on the promotion of the product, and aquatic products prepared vegetable manufacturers should put more energy into branding and the construction of private domain traffic in order to improve the degree of consumer awareness and acceptance of the product.

In *economy*, the path coefficient of *price* is 0.74, and the

path coefficient of *promotions* is 0.93, which indicates that both factors have a significant impact on economy, and *promotions* are the most important factor. This indicates that the sensitivity of consumers to the promotional efforts of aquatic prepared dishes and their own cost-effectiveness are both high, and that the adjustment of appropriate pricing strategies and the implementation of promotional activities are the main points for manufacturers to increase the willingness of consumers to buy.

The path coefficients of *tasty*, *diverse flavours*, *portion*, *nutrition*, *with or without ingredients*, *healthy raw materials* and *fewer additives* were 0.89, 0.86, 0.87, 0.80, 0.77, 0.89, and 0.83, respectively, with high coefficients. This indicates that the taste, variety, food nutrition and safety of aquatic prepared dishes largely determine the consumer's evaluation of the edibility of aquatic prepared dish products, and manufacturers should continue to maintain their efforts in these areas.

In *appearance*, the path coefficients of *attractive packaging*, *freshness with ice/vacuum*, *ingredients individually wrapped*, *complete labelling information* and *convenient for transport and storage* are 0.57, 0.82, 0.91, 0.85, and 0.85, respectively, suggesting that whether the packaging design is beautiful or not is not yet able to determine the consumer's evaluation of the product's appearance to a large extent, and that manufacturers can reduce the investment in this part, turning to pay more attention to other influencing factors. Meanwhile, the influence of preservation of freshness, complete labelling information, and convenience of transport and storage is close to the path coefficient of appearance on consumer willingness, which suggests that consumers may classify the above factors as the basic conditions to be met by aquatic products prepared dishes.

3.2. IPA Empirical Results and Analyses

Based on the research data of aquatic prepared dishes, this paper uses IPA analysis to measure the difference between the importance and satisfaction of each evaluation index of aquatic prepared dishes consumer satisfaction. The Cronbachs Alpha coefficient of satisfaction of the sample data for the 17 measurement indexes is 0.959, and the Cronbachs Alpha coefficient of importance is 0.967, which indicates that the sample data has high reliability. The KMO value of satisfaction of the sample data is 0.891, and the KMO value of importance is 0.956, which indicates that the sample data has good validity. The paired-sample t-test also shows that the mean value of the importance of the sample data for the 17 measurement indicators is greater than the mean value of satisfaction, indicating that there is a significant difference between the importance of the indicators within the consumer satisfaction system of Guangxi aquatic prepared dishes and satisfaction, and that the degree of research and development and marketing design of the indicators has not reached the level of tourists' expectations. The overall mean values of satisfaction and importance of the sample data were calculated to be 3.39 and 3.99, respectively. According to the theoretical method of the model, the 17 indicators were assigned to the corresponding quadrants, and the final IPA analysis diagram of the consumer satisfaction system of Guangxi aquatic prepared dishes was constructed:

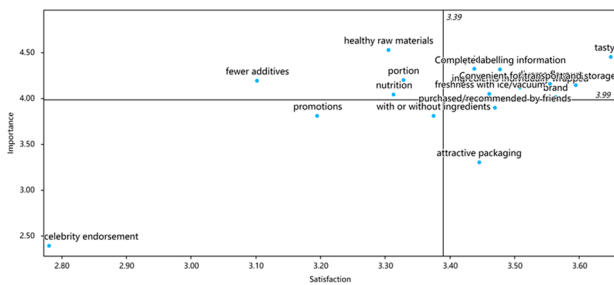


Figure 2. IPA model analysis diagram

The first quadrant is the Dominant Zone, the mean value of the measurement indicators in this quadrant is more than 3.99, and the mean value of satisfaction is more than 3.39. The main measurement indicators include *tasty*, *singredients individually wrapped*, *cost-effectiveness*, *diverse flavours*, *complete labelling information*, *convenient for transport and storage*, *brand*, *freshness with ice/vacuum*, etc., which are focused on product flavour, packaging and branding. It indicates that the above indicators of aquatic prepared dishes are generally more important to consumers, and consumers are more satisfied with the above indicators in the actual consumption process. So enterprises should pay more attention to these aspects in the R&D and marketing of aquatic prepared dishes, and continue to give full play to the advantages of these aspects.

The second quadrant is the Improvement Zone, in which the mean value of the measurement indicators is more than 3.99 and the mean value of satisfaction is less than 3.39. The main measurement indicators include *healthy raw materials*, *portion*, *nutrition*, and *fewer additives*, and the focus is on the edibility aspect of the product. This indicates that the above aspects of aquatic prepared food products are more important to consumers, but in the actual consumption process, they fail to obtain a product supply that matches their expectations, especially in terms of the "additive content" of the product, which is a finished/semi-finished food product that has always attracted the attention of consumers in terms of additives, and they hope that the aquatic prepared food products consumed have less additive content and meet the health standards. As finished/semi-finished food products have always been concerned about additives, consumers would prefer to consume aquatic prepared dishes with less additives and in line with health standards. Therefore, enterprises should place emphasis on the safety of products for consumption, and consider increasing the portion sizes of the products appropriately, and focus on balanced nutritional matching.

The third quadrant is the Opportunity Zone, where the mean value of the measurement indicators is less than 3.99 and the mean value of satisfaction is less than 3.39. The main measurement indicators include *with or without ingredients*, *promotions*, and *celebrity endorsement*, which are focused on product marketing methods. This indicates that consumers' perception of the importance and satisfaction of the above aspects of aquatic prepared dishes is low, especially the weak promotional effect of "celebrity endorsement" on aquatic prepared dishes, and that there is no need to invest high costs in this aspect of marketing, but activities and promotions should be taken as the direction of marketing improvement, and attention should be paid to matching ingredients with the corresponding aquatic prepared dishes in product development to meet the needs of consumers. However, event promotion should be considered as a direction for marketing

improvement, and focus should be placed on product development with good ingredients for the corresponding aquatic prepared dishes to meet consumers' convenience needs.

The fourth quadrant is the Maintenance Zone, the mean value of the measurement indicators in this quadrant is less than 3.99, and the mean value of satisfaction is more than 3.39. The main measurement indicators are *purchased/recommended by friends*, and *attractive packaging*. It means that for aquatic prepared dishes, although the expectation value of the private traffic in the circle of friends is close to the mean value and the satisfaction level is high, it is not a key consideration for consumers, and the exquisite packaging (such as exquisite gift boxes, exquisite patterns, etc.) is not the focus of consumers' consideration. But the current market products give consumers a better perception of satisfaction in this regard, so it is possible to appropriately reduce the attention paid to these indicators, and to maintain the existing level is sufficient, and more resources can be invested in improving the indicators of the district.

4. Conclusion

The empirical results of SEM model found that the consumption demand evaluation model of aquatic prepared dishes constructed in the article is more rigorous and scientific. The factors affecting the consumption demand of aquatic prepared dishes are mainly composed of four major dimensions, and the degree of their relationship is as follows: *cognition > appearance > economy > edibility*, all of which have a significant positive effect. The *purchase intention* of aquatic prepared dishes has a significant positive effect on *repurchase intention*, *satisfaction* and *recommendation intention*.

The empirical results of IPA analysis found that there is a discrepancy between the importance of indicators and satisfaction within the evaluation system of Guangxi aquatic prepared dishes' consumption demand, and the actual effect of each indicator does not reach the level of consumers' expectations. The indicators in the Advantage Zone are mainly focused on product packaging, delicious taste and brand; the indicators in the Improvement Zone are related to the food safety of the product; the indicators in the Opportunity Zone are mainly promotional activities and celebrity endorsement, which are focused on product marketing means; and the indicators in the Maintenance Zone are mainly the beautifully designed packaging.

In general, taste, quality, price, brand, convenience, packaging and logistics are the focus of consumer attention. Consumers' perception of prepared aquatic products to a large extent positively affects their willingness to consume, and the brand is the most important factor in the cognition evaluation, so enterprises should highlight the brand strategy and broaden marketing channels. In addition, consumers are more sensitive to the economy nature of the product, cost-effective and promotional activities are more concerned about consumers, and sound pricing strategy and diversified promotional activities are good choices. Besides, edibility positively affects the willingness to buy, consumers pay great attention to the taste of aquatic prepared dishes and food health and safety, so the relevant enterprises and departments should innovate product development and processing technology, and enhance food supervision and control. Finally, the quality of product packaging is still the focus of consumer attention, food preservation is still the most concerned about

the quality of consumer elements, packaging freshness design and cold chain logistics system needs to be improved.

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