Advances in Economics, Business and Management Research, volume 203
Proceedings of the 2021 3rd International Conference on Economic Management and Cultural Industry (ICEMCI 2021)

Survey on Consumption Demand of Quick-frozen Steamed Dumplings in Hefei City——Research Based on Consumer Decision-making Perspective

Wenhui Zhu[1,a]*，Houqing Wang[1]

[1]*School of Economics and Management, Anhui Agricultural University, Hefei, Anhui, 230036, China*
[a]（*zhuwenhui0901@163.com*）

ABSTRACT
The survey is based on the decision makers of the purchase of steamed dumplings in Hefei，the main content is the basic image of consumers, the cognition of steamed dumplings, purchase needs, consumption habits, and purchase considerations. Use descriptive statistics to analyze basic consumer information; Contingency analysis shows that consumers with different job characteristics have significant differences in the frequency of using steamed dumplings; Using principal component analysis, it is found that the comprehensive evaluation scores of purchase intention are basically in line with the normal distribution, indicating that the purchase intention of consumers in Hefei is not strong enough; Through k-means cluster analysis, the consumers in this survey are divided into four major categories of consumer population portraits according to working status, purchasing conditions and eating frequency. At the same time, Matlab is used to obtain the consumer's purchase decision tree, which mainly considers the consumer's busy situation, the supermarket promotion situation and the holiday factors. Finally summarize the relevant conclusions.

Keywords: *Quick-frozen steamed dumplings, Consumer decision, Questionnaire*

1. INTRODUCTION

Dumplings are not only a traditional delicacy with a long history of the Chinese nation, but also food that people often come into contact with in their daily life. With the increase of social pressure and the acceleration of the pace of life, many young people are no longer willing to go into the kitchen[1], but to choose more convenient and fast convenient food instead. Quick-frozen Steamed Dumplings, whether as the re-innovation of the traditional culture carrier, or as an important member of the frozen food industry, has been widely concerned by people in the industry. For example, CP Group launched the Steamed Dumplings project in 2015 and introduced the most advanced unmanned production chain[2], which really caught fire in Steamed Dumplings industry. At present, the steamed dumplings market is mainly based on brand steamed dumplings such as Zhengda, Sanquan, Si Nian, and Bibigo. However, there is a situation of "multiple feet" among the brand steamed dumplings, not only in terms of popularity, but also between products. Similarities have appeared, and it is difficult to meet the diversified needs of the market.

Hefei, Anhui Province has a registered population of 7.5796 million, and it is located in East China, which has the habit of eating dumplings and Steamed Dumplings consumption ranked first by region. This paper in order to explore Steamed Dumplings market and Steamed Dumplings consumer demand in Hefei, and to facilitate CP to become a leading enterprise in the industry[4].

2. INVESTIGATION PLANNING AND IMPLEMENTATION

2.1 Survey object and sampling method

This survey is intended to the decision makers of the purchase of steamed dumplings in Hefei, using a simple random sampling survey method to determine the corresponding confidence probability and sampling limit error. Using the repeated sampling formula, 600 permanent residents were selected as a simple random sample from the population of more than 8 million in Hefei, as shown in formula (1). Where z is the probability, p is the overall proportion, and Δ is the limit error. This paper directly select the maximum value of p(1-p) 0.25, and the limit error is controlled within 4%. And using the

Copyright © 2021 The Authors. Published by Atlantis Press International B.V.
This is an open access article distributed under the CC BY-NC 4.0 license -http://creativecommons.org/licenses/by-nc/4.0/.

network survey method, mainly to study the consumption demand and consumption drive of Hefei consumers for steamed dumplings, and explore the opportunities of Zhengda steamed dumplings in Hefei.

$$n_0 = \frac{z^2 p\times(1-p)}{\Delta^2} = \frac{1.96^2\times0.5\times0.5}{0.04^2} \approx 600 \qquad (1)$$

2.2 Questionnaire inspection and confirmation

In this preliminary survey, the Cronbach' a coefficient was used as the basis for measuring the reliability of the questionnaire, and the questions were scored quantitatively through a certain scoring mechanism. Using SPSS software, the overall Cronbach' a coefficient of the pre-survey questionnaire was 0.73. After excluding 5 questions, Cronbach's a coefficient increased to 0.75, and the overall reliability of the questionnaire increased.

And use the Bartlett sphericity test Kaiser-Meyer-Olkin sample measurement two methods to test the validity of the questionnaire. The KMO value is greater than 0.5 but less than 0.6, indicating that factor analysis can be performed. The significance of the Bartlett sphere test is less than 0.05, indicating that there is a significant correlation between the items. In general, the results of the questionnaire can achieve the purpose of the survey to a certain extent.

Tab.1 KMO and Bartlett test

Kaiser-Meyer-OlkinValue		0.505
Bartlett Spherical test	Chi square	269.296
	df	120
	Significance	.000

3. CONSUMER DEMAND ANALYSIS

3.1 Basic Consumer Information

Among the residents of Hefei surveyed, the proportion of women is relatively high, reaching 65%. Considering that women are the main purchasers of household food, this sample result is still used. The main age distribution in the population is 19-30-year-old young people, followed by 31-40-year-old middle-aged people. Their consumption concepts can have similarities and differences, and can well represent the consumption concepts of the main consumer groups. There are about 30% of office workers, who occasionally work overtime may also have a high demand for convenience food. And low-and middle-income groups accounted for about 50%.

3.2 Consumers' eating habits of steamed dumplings

Through the analysis of the survey results, we can conclude that people pay more attention to the taste and texture of food, and then associate it with the emotions behind it.Alleviating hunger and hunger and eating convenience are the most important functions for consumers to eat steamed dumplings, but the nutritional and healthy function of steamed dumplings is relatively neglected, as shown in Figure 1.

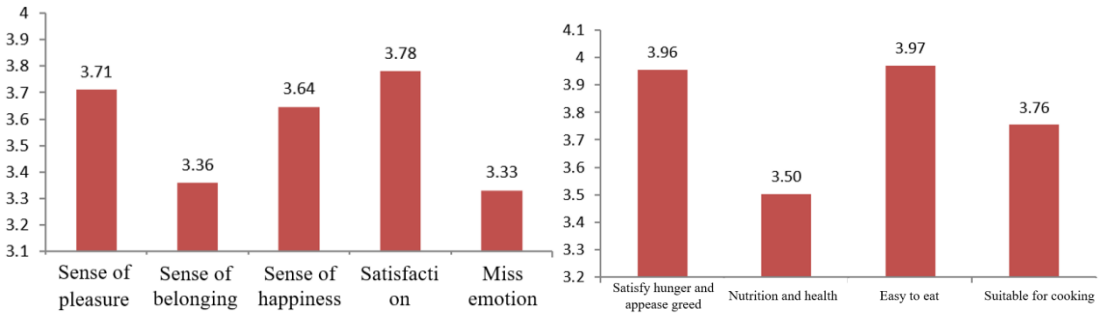

Fig.1 Emotional needs histogram and Functional requirements histogram

In addition, the survey found that the proportion of people eating steamed dumplings at home and fast-food restaurants is as high as 68.12%, indicating that people basically recognize steamed dumplings as one of their daily meals. Condiments are considered the "best partner" for steamed dumplings. Merchants can consider bagged steamed dumplings with special seasoning packages to further implement the concept of convenience food. Individual consumption is about 1-10 pieces at a time, and the consumption frequency is relatively scattered. Merchants can produce steamed dumplings in bags of appropriate weight, so that one bag

is not enough and two bags are not enough to eat.

3.3 Consumer edible characteristics based on contingency analysis

Through SPSS contingency analysis, a contingency cross-tabulation of consumer job characteristics, consumer monthly income, and frequency of eating steamed dumplings was made. The chi-square test results show that the sign number of occupational characteristics and eating frequency is 0.028, and the sign value of monthly income and eating frequency is 0.03 less than 0.05. It shows that there are significant differences between occupational characteristics, monthly income and consumption frequency.

Tab.2 Contingency Crosstab

		Frequency of steamed dumplings（Percentage）						
		≤a week	≤a month	≤3 month	≤6 month	≤a year	≥a year	total
Occupational characteristics	Normal commute	28.30%	32.92%	20.04%	10.10%	5.36%	3.28%	100%
	Work overtime occasionally	30.08%	28.88%	28.25%	12.35%	6.89%	3.55%	100%
	Often work overtime	32.86%	26.56%	15.36%	12.64%	5.85%	6.73%	100%
	Free working hours	26.68%	25.80%	18.65%	14.95%	8.64%	5.28%	100%
	No job	25.98%	22.47%	19.57%	12.56%	10.66%	8.76%	100%
	other	20.84%	23.68%	19.94%	18.58%	8.79%	8.17%	100%
monthly income	No income	25.98%	22.47%	19.57%	12.56%	10.66%	8.76%	100%
	≤ 3000 yuan	14.32%	22.33%	18.84%	16.49%	17.48%	10.54%	100%
	3000-4999 yuan	18.72%	25.47%	19.94%	14.68%	11.66%	9.53%	100%
	5000-6999 yuan	25.44%	23.47%	12.91%	17.48%	14.69%	6.01%	100%
	7000-8999 yuan	23.69%	21.57%	17.84%	16.55%	11.02%	9.33%	100%
	9000-10999 yuan	18.64%	21.08%	19.64%	22.48%	17.63%	0.53%	100%
	≥ 11000 yuan	12.35%	14.68%	22.65%	24.79%	16.99%	8.54%	100%

Further analysis shows that people who often need to work overtime for a long time eat steamed dumplings at shorter intervals and more frequently, that is, people who work long hours and work harder will prefer steamed dumplings as their staple food. For people whose monthly salary is lower than the average and whose monthly salary is far above the average, they eat steamed dumplings relatively few times.

3.4 Consumer population portrait based on cluster analysis

In order to further understand the consumer's steamed dumpling usage habits and purchase considerations, we performed K-means cluster analysis on the samples, selected eating characteristics, basic information, purchase status, and eating frequency as clustering indicators, and assigned weights to them, and finally Divide into groups of different characteristics, and combine the clustering results to name different types of consumers to form a consumer group portrait.

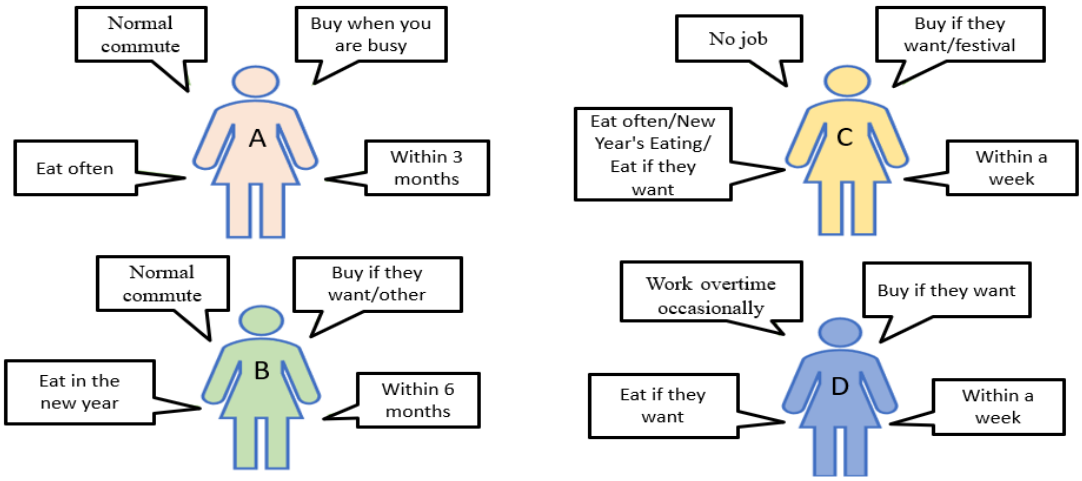

Fig.2 Consumer crowd portrait

Category A consumers think steamed dumplings are healthy and delicious. They often eat steamed dumplings, but the corresponding frequency of eating steamed dumplings is not high. They commute to and from get off work normally and only buy steamed dumplings when they are busy. This type of consumer has a moderate pace of work and life, but when they are busy, they will take steamed dumplings as one of their main choices.

Category B consumers will occasionally work overtime and occasionally eat steamed dumplings. They want to eat and buy what they want. The frequency of eating steamed dumplings is within a week. This category of consumers is more active and more casual than the new category A consumers. Steamed dumplings are not unfamiliar to them and have become part of their lives.

C-type consumers do not have a job, and they often eat steamed dumplings, whether it is during the holidays or on ordinary days. They eat what they want and buy what they want. Their purchase frequency is within a week, and they are loyal lovers of steamed dumplings. Such consumers are likely to be mainly student groups, and homes, canteens, restaurants, etc. provide convenient places for them to eat steamed dumplings.

Category D consumers go to and from get off work normally. They eat steamed dumplings during the Chinese New Year. They usually buy them if they want, but their willingness to eat is not very high, so the consumption frequency is within half a year. Such consumers retain the traditional custom of eating dumplings on holidays and may be used to eating staple foods.

Among them, category B consumers account for the largest proportion, followed by category D consumers. It shows that consumers are not too optimistic about the consumption situation of steamed dumplings. In the Hefei market, the loyal fans of steamed dumplings, namely category C consumers, account for the least. From the perspective of consumers of categories A, B, and C, steamed dumplings have been accepted by about 2/3 in the Hefei market.

4. ANALYSIS OF CONSUMERS' WILLINGNESS TO BUY PRODUCTS OF ZHENGDA

4.1 Construction of Consumers' Purchase Intention Evaluation Index

The paper has extracted the following core elements of consumers' purchase intentions: cognitive status quo, willingness to try, holiday customs, economic factors, basic conditions, purchase obstacles and media factors. The seven dimensions constitute the consumer's evaluation of the purchase intentions of CP products. Index system. On this basis, it is subdivided into 10 measurement dimensions, namely: steamed dumplings, willingness to try new things, buying inertia, customs, income level, price expectations, basic factors, purchase barriers, barriers to online shopping, and communication media.

4.2 Comprehensive Evaluation of Consumers' Purchase Intention

First, KMO and Bartlett test are used to obtain a KMO result of 0.865, and the data meets the use conditions of principal component factor analysis. Based on the 10 quantified evaluation indicators mentioned above, SPSS principal component factor analysis is used to set the eigenvalue to be greater than 1 to obtain the contribution rate of each principal component, the rotated component matrix and the eigenvector matrix.

Tab.3 The eigenvalues, variance and cumulative contribution rate of the main components

Element	Initial eigenvalue			Extract the sum of squares of the load		
	Total	Variance%	Accumulative%	Total	Variance%	Accumulative%
1	2.005	40.054	40.054	2.005	40.054	40.054
2	1.688	16.876	56.93	1.688	16.876	56.93
3	1.236	12.361	69.291	1.236	12.361	69.291

From Table 3, the principal component analysis selects 3 principal components, the contribution rates of which are the first principal component 40.054%, the second principal component 16.876%, the third principal component 12.361%, and the cumulative contribution rate is 69.291%, which is 3 The main component covers more than 69.291% of the 10 steamed dumpling purchase intention evaluation indicators.

Tab.4 Eigenvector matrix

project	Element			project	Element		
	1	2	3		1	2	3
Income level	0.097	0.227	0.791	Price expectations	-0.079	-0.231	0.700
Basic factors	0.576	-0.461	0.035	Barriers to online shopping	0.101	-0.622	0.113
Steamed Dumplings Cognition	-0.076	-0.588	0.188	Buying inertia	0.685	0.021	0.121
Buying barriers	-0.004	0.725	0.071	Media factor	0.380	-0.440	0.245
Customs	0.673	0.065	-0.153	Willingness to try new	0.661	0.139	0.007

The eigenvector matrix can reflect the load of each index on each principal component. This shows that the main positive factor affecting consumers' willingness to buy is the willingness to try new products, that is, consumers who have eaten Zhengda steamed dumplings are willing to continue to try new products. If Zhengda launches new products, most other consumers are also willing to try new products. The main negative factor that affects consumers' purchasing intention is purchase barriers. In addition to purchase considerations such as price and quality, even today with the rapid development of e-commerce, consumers' concerns about online shopping of steamed dumplings still become an obstacle to the sale of steamed dumplings. The main objective factor that affects consumers' purchase intention is economic factors. Income affects their expectations of the price of steamed dumplings and also affects their freedom of consumption.

Suppose the data of 10 variables are standardized as $x_1 \sim x_{10}$. After calculating the above three principal components using the quantified variable values, the rotated variance contribution rate of each principal component is used as the weight, and after normalization, the factor score is used as the variable value to construct consumer purchase steam Comprehensive evaluation index of dumpling willingness.

$$F = 0.2881y_1 + 0.2508y_2 + 0.1909y_3 \quad (2)$$

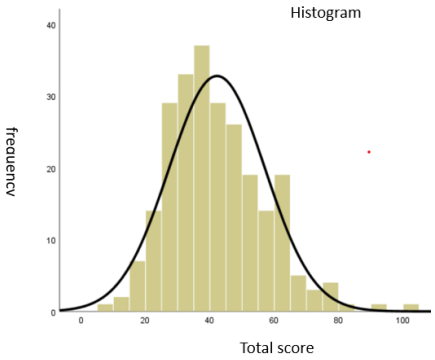

Fig.3 Histogram of consumer purchase intention evaluation scores

The comprehensive scores of consumers' purchase intention for steamed dumplings shows a normal distribution. There are more people with a total purchase intention score of about 40, while consumers with a score of about 80 and college students with a score of 10. Less, which means that consumers with too low or too high willingness to buy are relatively small, which once again shows that consumers in Hefei are not strong enough to buy steamed dumplings and are at an average level.

4.3 Consumer purchase decision tree model

In order to understand the external factors of consumers in purchasing decisions, we consider three aspects: holiday factors, work factors and promotional factors. According to the results of the questionnaire, about half of the people are casual buyers when they buy steamed dumplings, and the other half are hesitant buyers.

For hesitant consumers, ID3 decision tree algorithm is used, and MATLAB is used to build a decision tree model. Categorize the data in the questionnaire and get the result as shown in the figure 4.

The above results show that this type of "hesitating" consumers are mainly affected by three external factors:

busy work, supermarket promotions and holiday factors. Among the two types of people whose work characteristics are busy or not, there are two types of extreme consumers in China as a result of this survey. One is promotion-sensitive and the other is holiday-sensitive. In addition to the influence of other categories of consumers on sales promotion and holidays, there are other factors, mainly the influence of product attributes on their buying behavior, which is a multi-factor decision consumer.

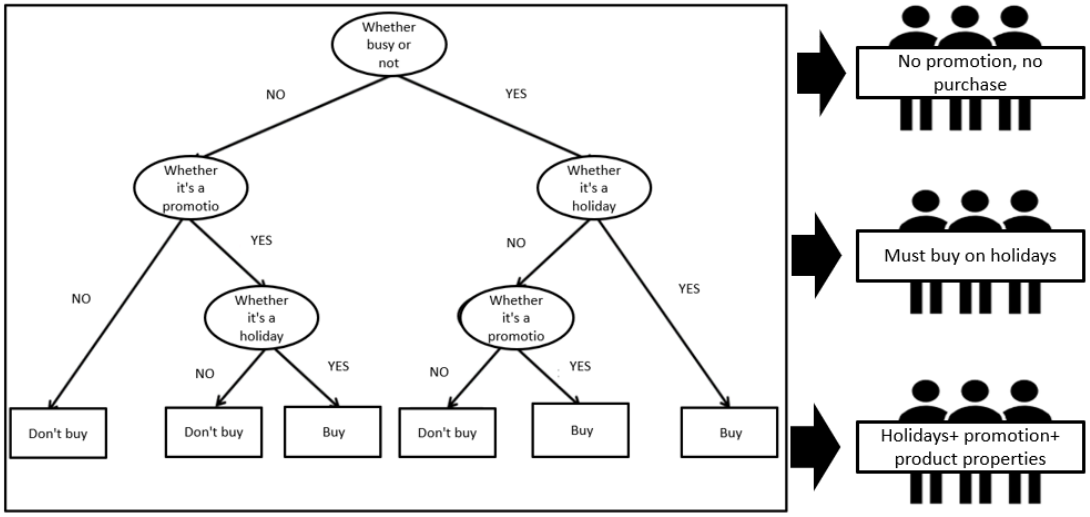

Fig.4 Consumer purchase decision tree

5. CONCLUSION

Through the market investigation and research on Steamed Dumplings in HeFei, it is found that consumers' recognition of the quality of Zhengda's steamed dumplings is asymmetry with their desire to buy. When shopping for steamed dumplings online, consumers are picky. They often compare the taste and quality of steamed dumplings of various brands, but they generally reflect that there are certain problems in logistics for quick-frozen steamed dumplings. The traditional attributes of steamed dumplings are weakened, and the modern flavor is strengthened, consumers pay more attention to the satisfaction of taste. Different occupations and income groups have significant differences in the frequency of eating steamed dumplings, the occupational groups with a higher frequency of overtime work and groups with a middle income level tend to have a higher demand for steamed dumplings.

REFERENCES

[1] New first-tier city research institute. 2020 ranking of commercial charm of cities: Hefei and Foshan. Released on June 1st, 2020

[2] Li can, Xin Ling. Study on the evaluation method of the reliability and validity of the questionnaire [J]. China Health Statistics, 2008 (05): 541,544.

[3] Wang Xiujun, Wang Junchao. Research on the Market situation and consumption of Steamed Dumplings in Nanjing Zhengda-- based on 4p Model [J]. China Market, 2020 (01): 129130.

[4] Wang Xiujun, Wu Lin, Chen Zhikang, Sun Changyi. Investigation and Research on Steamed Dumplings's consumption preference after 2000-- based on Howard Sheth Model [J]. Modern Commerce, 2019 (33): 17-19.

[5] Anhui Bureau of Statistics. Anhui Statistical Yearbook 2019 [R]. Beijing: China Statistics Publishing House, 2019.

[6] National Industrial Competition Network, ranking of the top ten dumpling brands in 2019, released on September 6, https://chyxx.com/ top/201909/ 780257. html,2019.