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Consumers' Attitudes toward Online Food Purchases in China: Segmentation Analysis of Online Food Market

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Food purchase channels in urban China are diversifying. We examine post-pandemic consumer attitudes in the online food market and identify the following: first, consumers' attitudes are categorized using an index that combines online and offline purchase attitudes; and second, the promising segment is highly aware of prices on the offline market and the freshness on the online market, whereas the potential segment cares about checking the actual foods at the offline market and online reputation. These results suggest that the online market can further expand through the development of channels that allow consumers to gain both online and offline benefits.

Key words: COVID-19 pandemic, online food purchase, market segmentation

1. Introduction

The E-commerce (EC) market is emerging in China. With the rapid increase in income and food safety awareness in urban areas, the potential demand for high-quality Japanese foods is crucial. Thus, the Japanese government is promoting Japanese food export to China through the internet. Japanese imported foods, such as health foods, confectionery, and seasonings, are mainly purchased by the high-income class in urban China (Ito *et al*., 2021).

From early 2020, control measures to curb the spread of COVID-19, such as curfews in housing complex areas, were implemented in some Chinese cities. These strict controls made it difficult for people to purchase daily foods at physical shops, thereby promoting online food shopping. Moreover, lifestyle changes, such as an increase in working at home and a decrease in dining out, have made the Chinese online food market reach new growth stages, indicating that they are taking advantage of this social shock opportunity.

This study conducts a market segmentation analysis using data collected in October 2020, when social regulations in urban China were relaxed. We intend to identify the internal factors of consumers' online shopping. As a result of social regulations, the unavailability of offline markets (i.e., the external factor) temporarily encouraged online shopping. It has also been reported that even with the easing of restrictions on going out, people have continued to shop online on their own, stemming from the desire to avoid contact with others (OECD, 2020). It means that the post-pandemic habits and mindsets that underlie their behavior have not fully returned to their pre-pandemic state. A consideration of Chinese consumers' attitudes (i.e., internal factors) of online use, after experiencing the pandemic, will provide useful information to those who want to enter the online food market in China in the long term.

2. Previous Studies and Questionnaire Survey

1) Market segmentation analysis

Food purchase channels in urban China are increasingly diversifying into online, offline, and intermediate forms, such as O2O (online to offline) systems.[1)] Thus, the boundary between online and offline channels is closing. Recent research on how Chinese use these channels shows that the main channels they use differ depending on their food choice motives, socio-demographic characteristics, and the type of product they are buying (Wang and Somogyi, 2019). The differences in the characteristics of online and offline markets are also examined. In the online market for edible oils, the price is higher when a certified label is given, whereas that is

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1) In this study, the "online" channel includes EC and O2O. EC refers to online shopping platforms and other food companies' EC websites. O2O refers to the systems that enable consumers to use both online and offline channels. The "offline" channel refers to retail shops, such as supermarkets, departments, convenience stores, and traditional markets.

not the case in the offline market (Jiang *et al*., 2019).

Existing research on market segmentation focusing on consumer attitudes in the Japanese online food markets has conducted a factor analysis using items such as situations and benefits of online channels (Ito, 2013). Common factors such as exploring good foods were used in a cluster analysis to classify consumer types, such as the proactive type, who buys a variety of things online. Okamoto and Im (2011) conducted a factor analysis using perceptions of product status, communication with sellers, and store conditions in online and offline markets to compare consumer attitudes toward online and offline markets of the Japanese Co-op.

Much of the segmentation analysis of online users have examined the common factors behind their awareness toward online use or completely separated consumers' attitudes in the online market from those in the offline market and have identified the characteristics of each. Compared to the existing studies, this study reveals the common factors behind online users' attitudes towards both online and offline channels. It allows us to understand the diversity of users' attitudes after the deregulation. As we mentioned, some consumers switched from offline to online during the regulation and continued to use online (OECD, 2020). We can assume that there are both categories of consumers: those who use the online channel because they perceive the benefits of the online channel itself, and those who perceive the benefits of the offline channel but use the online channel instead. Taking into account their awareness of offline channels, we can capture the latter category. Research on post-pandemic consumer attitudes in the online market has been increasing but still limited, so the accumulation of empirical findings is particularly needed.

2) Questionnaire survey

An online survey involving 1,250 people living in urban areas was conducted in October 2020 through Baidu Inc. To obtain a complete picture of the Chinese online market, we selected research sites from all over China.[2] The survey population was defined as those who have purchased food via the internet in these two years and eat rice regularly.[3] After data collection, we find a comprehensive, unobservable common factor behind awareness of both online and offline channels by performing a factor analysis using items about awareness of both online and offline channels as variables. Then, using the common factors, we categorize consumer attitudes into several groups. Lastly, we provide marketing strategies tailored to the characteristics of each segment, especially measures to increase the use of online markets by each segment of consumers.

This study may contribute to understanding the overall awareness of online users in the urban Chinese situation where various channels, including online and offline, are available. Moreover, using data when the regulations were relaxed, we examine future market strategies based on the long-term impact of the pandemic on the use of online channels and the internal factors (attitudes) of consumers.

3. Results

1) Factor and cluster analysis

The overall characteristics of the respondents are shown in Table 1. The proportion of those who are up to 20 as well as those who are 40 and over, live with other members, company employee, and has a household expenditure level of 4,000 to 6,000 yuan and less than 4,000 yuan are relatively high. The "online purchase rate" during the survey month was 40% or 60% for most respondents. 60% of the respondents state that they increased their online purchase rate after the pandemic.[4] Most respondents purchase food

Table 1. Overall characteristics of the respondents

		Number			Number
Gender	Male	625 (50%)	Online purchase rate	0%	24 (2%)
	Female	625 (50%)		20%	256 (21%)
Age	Up to 20s	500 (40%)		40%	375 (30%)
	30s	222 (18%)		60%	379 (30%)
	40s and over	528 (42%)		80%	188 (15%)
Area	Beijing	250 (20%)		100%	21 (2%)
	Shanghai	250 (20%)	Change of online purchase rate	Significant decreased	7 (1%)
	Guangdong	250 (20%)		Decreased	52 (4%)
	Sichuan	250 (20%)		Stable	274 (23%)
	Wuhan	250 (20%)		Increased	704 (60%)
Number of Families	Single	49 (4%)		Significant increased	140 (12%)
	2 to 4	919 (74%)			
	4 and over	282 (23%)			
Occupation	Company employee	588 (47%)	Frequency of online food purchasing	Less than once a month	41 (3%)
	Civil servant	119 (10%)		Once a month	205 (17%)
	Student	203 (16%)		Once a week	465 (38%)
	Other	340 (27%)		Two or three times per week	481 (39%)
Household monthly expenditure (yuan)	Less than 4,000	276 (22%)		Almost everyday	37 (3%)
	4,000 to 6,000	411 (33%)			
	6,000 to 8,000	268 (21%)			
	8,000 to 10,000	164 (13%)			
	10,000 or more	131 (10%)			

Source: Authors' calculation.

2) We chose Beijing in North China and Shanghai in East China as the cities directly under the government which have the most developed online markets. Since there are no cities in West and South China with as developed an online market as these cities, we chose the provinces of Guangdong and Sichuan respectively. We also added Wuhan (a sub-provincial city) to our research sites to understand consumers' attitudes after experiencing the strict regulations.

3) We will analyze their rice purchase behavior in the other paper.

4) "Online purchase rate" presents the share of online food purchase value in the total food purchase value in the survey month (October 2020). "Change of online purchase rate" is the differences in their "online purchase rate" during October 2020 and before the pandemic (November 2019).

through the online channel more than once a week. These results indicate that the online channel has become established as their indispensable food purchase channel.

The questionnaire examines the degree of agreement using 17 items related to the usual style of food purchase behavior and perceived online and offline benefits (Table 2). It is indicated that the survey respondents who buy food online are strongly aware of the advantages of offline shopping, especially the immediate availability and access to products.

The results of the factor analysis are presented in Table 3, which should be interpreted carefully because they include question items with low communality estimates.[5] We use the maximum likelihood method and promax rotation. To consider the appropriate number of factors, we tried the three methods; Kaise-Guttman rule (the eigenvalue-one criterion), minimum average partial (MAP) criteria and parallel analysis. Each method, in turn, suggested a number of factors: five, two and six. These results indicated that the number of factors needs to be between two (MAP) and six (parallel analysis). After examining these three numbers, we decided to use five factors (the eigenvalue-one criterion), considering the interpretability of the factors and the purpose of the analysis, which is to look for the common factors behind awareness of both online and offline channels.[6]

Factor 1 has high factor loadings for touching and confirming the real items at physical shops immediately after purchasing. Factor 2 is related to the freshness of food at the online market. Factor 3 has high factor loadings for the safety of food. Factor 4 is related to the food price mainly at the physical shops. Factor 5 is closely related to the reputation of the diverse items on the internet, such as SNS and reviews. Regarding the difference in purchase channels, Factors 2 and 5 are strongly related to awareness toward online shopping, whereas Factors 1 and 4 are the factors with high factor loadings for the awareness toward the use of offline channels.

Next, with these five factor scores, we conduct a cluster analysis using the K-means method (Table 4). The number of clusters is set to four to explore the possibility of representing them in a two-dimensional plane (Ito, 2013).

Table 2. Respondents' perceptions of food purchasing and benefits of using online/offline channels

	Questionnaire	Mean value
Usual style of food purchasing behavior (No distinction between online and offline channels)	I am concerned about food labeling such as organic foods.	4.0648
	I am interested in information about food safety on TV and in magazines.	4.0296
	I am concerned about the use of pesticides and additives.	3.9704
	I often buy cheaper foods.	3.4768
Benefits of buying food through **online** channels	**Online** channels make it easy to compare prices.	4.1216
	Online channels allow me to see others' evaluation through SNS and reviews.	4.0800
	Online channels offer a wide variety of products.	4.0552
	Delivery systems for **online** channels are well developed.	3.7472
	Product information on the website of the **online** channel is reliable.	3.5856
	With the **online** channel, I can buy fresh food.	3.5840
Benefits of buying food through **offline** channels	**Offline** channels provide immediate access to products.	4.2112
	Using **offline** channels, I can touch the real thing to check the quality.	4.1656
	Offline channels can be used to buy fresh food.	3.9960
	Offline channels make it fun to look around the store.	3.8808
	I'm used to using **offline** channels.	3.7176
	Delivery systems for **offline** channels are well developed.	3.6040
	I can buy cheaper products in **offline** channels.	3.6000

Source: Authors' calculation.

Note: Respondents were asked to select the degree of agreement with each item from five levels using a Likert scale. The higher the mean value of the item in the table, the higher the mean value of the respondents' degree of agreement with the item.

5) Usually, factor analysis is conducted after excluding the question items with low communality estimates. However, the two question items ("I am concerned about the use of pesticides and additives" and "I'm used to using offline channels") with low communality estimates (0.168 and 0.144) are analyzed without excluding them at this time. It is because previous studies have focused on issues related to consumers' concerns about pesticides and their shopping habits (Ito, 2013; OECD, 2020). Based on these studies, these issues need to be considered to capture the characteristics of the Chinese consumers after the deregulation. However, the results show that the communality estimates of these items are low. It indicates that complex matters such as the perceptions toward life in general, lifestyle, and online usage environment, which have not been considered in this study would be related to these matters. To increase the overall communality estimates and better understand consumer characteristics, tasks such as conducting a survey that includes more comprehensive questions remain to be addressed.

6) If we adopt the two factors indicated by MAP, both online and offline awareness will be included in one common factor. Since MAP is the criterion for proposing a thrifty factor structure, it is difficult for us to interpret each factor. When we adopt the six factors indicated by the parallel analysis, the fourth to sixth factors contain only one item each with a large factor loading, thus cannot fulfill the analytical purpose of extracting the common factors. In contrast, when five factors with eigenvalues greater than one are employed, the main items included in each factor are either online awareness only, offline awareness only, or general awareness only (Table 3), making it easier to interpret in light of the research objective. The cumulative contribution rate is low and the accuracy of the factor analysis is not high. Since it is thought that there have not been many awareness surveys that consider both online and offline channels, it is necessary to deepen the research on what questions should be set and how they should be combined to better explain the common factors behind the comprehensive awareness that combines both.

2) Relationships between consumers' consciousness and food purchase channels

After comparing the cluster center scores, the relationships among the segments are represented in a two-dimensional plane (Figure 1). Cluster 1 can be named the "real oriented" segment, with higher attitudes toward Factors 1 and 5. Cluster 2 can be named the "cost performance oriented" segment, with relatively higher attitudes toward factors 2, 3, and 4 overall. Cluster 3 is a "proactive" segment, with positive cluster center values for all factors. Cluster 4 is an "indifferent" segment, with negative cluster center values of all factors. It seems that "online awareness" and "offline awareness" are harmonious rather than opposed. In other words, each of the criteria for classification, "evaluation by consumers" and "market information," includes a combination of online and offline awareness.

3) Characteristics of each segment and appropriate market strategy

Table 5 shows the respondents' attributes and their online use features in each cluster. The results of the Chi-square test for independence show that there is an association between the clusters to which they belong and the following variables: age, number of families, occupation, household monthly expenditure, online purchase rate, change of online purchase rate, and frequency of online food purchasing.[7] The features of each segment and the appropriate market strategy are derived from Tables 4 and 5 and Figure 1.

Cluster 1 (real oriented segment) is strongly aware of the evaluation of products by consumers. As for online awareness, the value of Factor 5 is high, but that of Factor 2 is negative. Regarding offline awareness, the value of Factor 1 is high. It includes a high percentage of young people in their 20s (41%) and high spenders with household expenditures of 10,000 yuan or more (14%). Compared with the proactive and cost performance segments, the online purchase rate and frequency of online food purchase are relatively less, but the online purchase rate increased rapidly after the pandemic. Therefore, this segment is a potential segment. It prefers to buy perishable goods at a store but may be forced to go online under social regulations. To create more positive attitudes toward the evaluation by online consumers (Factor 5), it is essential to make sure that online reputation is easy to check. To reduce negative attitudes toward online use (Factor 2), EC sites should enhance sales of processed foods rather than fresh foods. In addition, the quality of perishable products should be able to be checked in physical stores through O2O so that consumers can feel the benefits of offline (Factor 1).

Cluster 2 (cost performance oriented segment) has a high awareness of market information, such as price and freshness. Regarding online awareness, Factor 5 has a negative value, whereas Factor 2 has a positive value. In terms of offline awareness, Factor 4 has a high value. With a high percentage of the older generation in their 40s and above (48%) and the

Table 3. Results of factor analysis (Factor loadings)

Questionnaire	Channels that consumers find beneficial	Factor 1: Touching real items	Factor 2: Freshness	Factor 3: Safety	Factor 4: Price	Factor 5: Evaluation	Communality
		Offline	**Online**	No distinction between channels	**Offline**	**Online**	
Offline channels provide immediate access to products.	**Offline**	**0.735**	0.114	0.000	-0.108	-0.023	0.540
Using **offline** channels, I can touch the real thing to check the quality.	**Offline**	**0.716**	-0.036	0.028	0.072	-0.078	0.465
Online channels make it easy to compare prices.	**Online**	0.338	0.082	0.001	0.112	0.159	0.251
With the **online** channel, I can buy fresh food.	**Online**	0.037	**0.692**	0.001	0.024	-0.083	0.464
Product information on the website of the **online** channel is reliable.	**Online**	-0.018	**0.467**	0.008	0.052	0.237	0.377
Delivery systems for **online** channels are well developed.	**Online**	0.019	0.360	0.122	0.110	0.023	0.255
I am concerned about food labeling such as organic foods.	-	0.029	0.068	**0.693**	-0.111	-0.056	0.437
I am interested in information about food safety on TV and in magazines.	-	-0.055	0.045	**0.479**	-0.114	0.138	0.274
I am concerned about the use of pesticides and additives.	-	0.217	-0.034	0.325	0.026	-0.045	0.168
I can buy cheaper products in **offline** channels.	**Offline**	-0.130	0.075	-0.045	**0.581**	-0.032	0.375
I often buy cheaper foods.	-	0.158	0.054	-0.168	**0.455**	-0.051	0.183
Delivery systems for **offline** channels are well developed.	**Offline**	-0.097	0.049	0.286	0.327	-0.070	0.269
I'm used to using **offline** channels.	**Offline**	0.018	-0.016	-0.016	0.261	0.228	0.144
Offline channels make it fun to look around the store.	**Offline**	0.110	-0.135	0.248	0.259	0.086	0.215
Online channels allow me to see others' evaluation through SNS and reviews.	**Online**	0.044	0.097	-0.039	-0.077	**0.564**	0.346
Online channels offer a wide variety of products.	**Online**	-0.035	-0.008	0.052	-0.021	**0.451**	0.205
Offline channels can be used to buy fresh food.	**Offline**	0.311	-0.176	0.040	0.026	0.331	0.337
Sum of squares of factor loadings		1.923	1.536	1.884	1.381	2.007	-
Cumulative contribution rate		15.844	24.129	26.915	29.512	31.197	-

Source: Authors' calculation.

Note: Locations with factor loadings of 0.4 or higher are shown in bold and colored.

7) The results of the Chi-square test for independence do not indicate that there is an association between the clusters to which the respondents belong and their place of residence. Although the age structure of each city was considered in the sample, it was not possible to fully account for differences in the development of channels and the degree of social regulation on shopping in regions. The details of the differences in consumer types by region will be the subject of future study.

Table 4. Results of cluster analysis (Cluster center values)

Name of cluster (Number)	**Cluster 1**: Real oriented (390)	**Cluster 2**: Cost Performance oriented (312)	**Cluster 3**: Proactive (432)	**Cluster 4**: Indifferent (116)
Factor 1: Touching real items (Offline)	**0.650**	-0.730	**0.310**	-1.390
Factor 2:Freshness (Online)	-0.560	**0.050**	**0.740**	-1.000
Factor 3: Safety	-0.170	-0.250	**0.710**	-1.390
Factor 4: Price (Offline)	-0.560	**0.120**	**0.650**	-0.850
Factor 5: Evaluation (Online)	**0.200**	-0.530	**0.620**	-1.540

Source: Authors' calculation.

Note: Locations with positive cluster center values are shown in bold and colored.

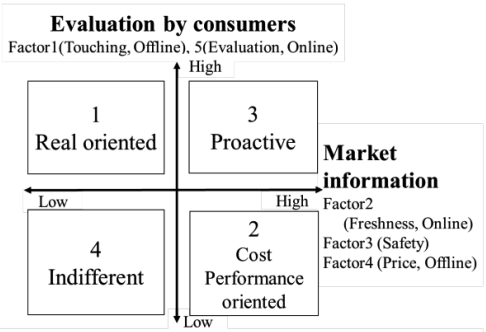

Figure 1. Types of consumers in online food market

Source: Prepared by authors.

Note: The vertical axis consists of factors 1 and 5.
The horizontal axis consists of factors 2, 3, and 4.

Table 5. Differences in consumer attitudes by cluster

Name of cluster		Cluster 1: Real oriented	Cluster 2: Cost Performance oriented	Cluster 3: Proactive	Cluster 4: Indifferent	Chi-square value (p-value)
Gender	Male	**51%**	49%	**52%**	41%	4.413 (0.220)
	Female	49%	**51%**	48%	**59%**	
Age	Up to 20s	**41%**	38%	39%	**46%**	13.072** (0.042)
	30s	21%	14%	19%	12%	
	40s and over	38%	**48%**	**42%**	42%	
Area	Beijing	20%	20%	21%	18%	15.115 (0.235)
	Shanghai	**23%**	18%	18%	21%	
	Guangdong	19%	**23%**	17%	**22%**	
	Sichuan	**21%**	18%	**22%**	15%	
	Wuhan	17%	**21%**	**21%**	**24%**	
Number of Families	Single	4%	4%	3%	8%	18.197*** (0.006)
	2 to 4	**75%**	**68%**	**78%**	**65%**	
	4 and over	21%	28%	19%	28%	
Occupation	Company employee	**53%**	**41%**	**46%**	**47%**	21.478** (0.011)
	Civil servant	7%	11%	12%	8%	
	Student	15%	16%	15%	**24%**	
	Other	**25%**	**32%**	**28%**	21%	
Household monthly expenditure (yuan)	Less than 4,000	19%	**25%**	18%	**36%**	64.04*** (0.000)
	4,000 to 6,000	**33%**	**42%**	**27%**	**30%**	
	6,000 to 8,000	**22%**	17%	**24%**	20%	
	8,000 to 10,000	11%	10%	18%	10%	
	10,000 or more	14%	5%	13%	3%	
Online purchase rate	0%	3%	2%	1%	2%	52.766*** (0.000)
	20%	26%	20%	14%	**31%**	
	40%	**30%**	**29%**	**30%**	**37%**	
	60%	**29%**	**28%**	**35%**	23%	
	80%	12%	19%	18%	6%	
	100%	1%	2%	3%	1%	
Change of online purchase rate	Significant decreased	1%	0%	1%	1%	29.656*** (0.003)
	Decreased	5%	7%	2%	6%	
	Stable	**24%**	**27%**	**19%**	**28%**	
	Increased	**58%**	**57%**	**63%**	**62%**	
	Significant increased	13%	9%	15%	3%	
Frequency of online food purchasing	Less than once a mon	3%	5%	1%	8%	58.345*** (0.000)
	Once a month	20%	17%	10%	**30%**	
	Once a week	**41%**	**35%**	**40%**	29%	
	Two or three times per week	**34%**	**40%**	**45%**	**32%**	
	Almost everyday	2%	3%	4%	2%	

Source: Authors' calculation.

Note: Locations with relatively high percentage in the respective cluster are shown in bold and colored.
*** and ** indicate that the results of the chi-square test are significant at 1% and 5%, respectively.

lower spending group with monthly expenditures of less than 4,000 yuan (25%), Cluster 2's online purchase rate frequency of online food purchase are relatively higher than those in the real oriented segment. A relatively high percentage (27%) of respondents said that their online purchase rate is "stable," indicating that they have always been highly dependent on online channels, even before the pandemic. This segment is the main target of the online market. As it has a positive sense to purchase perishable goods online (Factor 2), selling more perishables online is important. Since it is less conscious of considering other consumers' ratings online (Factor 5), more reliable information from sellers is of more interest to it. Moreover, it is highly interested in prices at physical stores (Factor 4), thus providing appropriate price information will encourage this segment to continue to buy online.

Cluster 3 (proactive segment) is highly aware of both evaluations by consumers and market information. Like the cost performance oriented segment, since the online purchase rate and frequency of use by this segment are high, it is a key target. Respondents who "increased" their online purchase rate after the pandemic represent 63% of this segment. It includes a high percentage of seniors in their 40s or older (42%) and high spenders with household expenditures of 10,000 yuan or more (13%).

Cluster 4 (indifferent segment) has a high percentage of people in their 20s or younger (46%), students (24%), and low spenders with household expenditures of less than 4,000 yuan (36%). Their reliance on and frequency of online use were low and did not change much after the pandemic. This segment would be better left out of the food market target.

Concerning the strategy of expanding exports from Japan to China using EC, since processed products are the main products, it is important to promote sales of inexpensive products with appropriate market information to the proactive and cost performance oriented segment. Moreover, it is necessary to take measures to enhance the reputation of products on the internet for the real oriented segment.

4. Conclusion

The COVID-19 pandemic control measures in China have promoted online food purchases. The conclusion of this study, which categorizes post-pandemic consumer attitudes and discusses appropriate market strategies, is twofold.

First, consumer attitudes are categorized using an index that combines online and offline attitudes. Moreover, using two axes (consumer evaluation and market information), four types of typologies are presented.

Second, market strategies should be tailored to the characteristics of each segment. Consumers in proactive and cost performance oriented segments are highly aware of market information. Providing more market information and keeping prices low are essential for this promising group. Moreover, consumers in real oriented segment care about checking the actual foods at the offline market and online reputation. Therefore, it should be possible to check the quality of perishable products in physical stores for this potential segment through O2O development.

Based on the results, it is suggested that the online market can further expand through the development of channels that allow consumers to gain both online and offline benefits.

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