Customers' intention towards O2O food delivery service under the different characteristic of customer group – A case study of Suzhou industrial park

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Abstract

Two research questions are identified and discussed. Relevant factors that influence the customer preferences were selected as research objects, data collection was based on 348 valid questionnaires, SPSS software was used for data analysis by the means of the multivariate logistic research model. Customer intentions include delivery payment, delivery time, food quality and brand trust. Customer reviews are related to customer preferences. The delivery payment is the most important factor when customers use food delivery service, but different groups of people have different tendency compared with their counterparts. All variables are designed based on baseline categories; the outcome of the model is only significant while comparing two groups of variables. Multivariate logistic research model is used to find customer preferences under the different characteristic of customer groups based on questionnaires and tries to forecast the possibility of the tendency of one targeting customer group in Suzhou Industrial Park. This research conduct a questionnaire on the Suzhou industry park, the respondents are mainly students and white collars customers, the characteristics of respondents are typical in this area.

Keywords – customer preference; the multivariate logistic research model; targeting customer group

Biographical notes:

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1. Introduction

1.1 Background

Food delivery service is a form of service originated from Korea. This service can be dated from World War II. Large amounts of homes and kitchen utensils were war-battered so people had no place to cook. At the same time, women started to undertake the role as volunteer service to cover food to servicemen. In some areas such as Hemel Hempstead, food was transported by prams rather than vans. However, the idea of meal service became mature after spreading to more areas. This idea was adopted by Philadelphia after entering into the United States. Under the support of the government, every home had the quota to receive food via delivery. Gradually, other areas in the United States even the rest the world started to put this idea into practice. For instance, food delivery services began in 1952 in Australia.

Food delivery has been concerned widely in the food industry since the 1950s. In modern society, modern food delivery services have changed a lot and became more appeal to customers due to the growth of internet and E-commerce, offline distribution support online selling has developed in recent years (Jones, 2013). Therefore, a new e-commerce form: O2O (online-to-offline) commerce came next as the result of this trend. In this way, people can not only order food conveniently but also get the food they need with lower transaction costs. As the growth of e-commerce technical, more food markers settled in the food delivery platform. In this situation, a limited market is doomed to be partitioned by online food ordering service providers and an increasingly saturated market increases the completion among providers. Customers can choose different food delivery services, since they are often attracted by the quality of the food and delivery services. It has become apparent for food delivery platform to retain a growing number of loyal customers. However, exploring the multi-dimensional needs of existing users, increasing user engagement and maintaining the user group is very challenging to the current food delivery market.

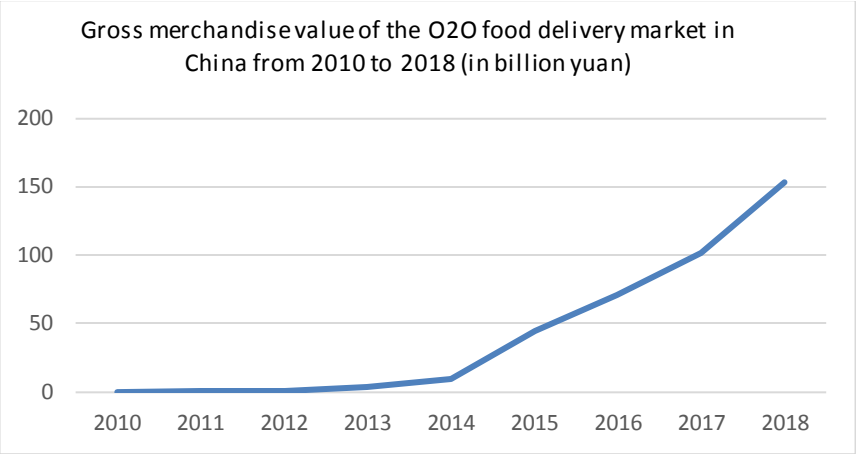
A good example of a food delivery food service in Malaysia. The total market value of food delivery service lived up to RM253 million in 2014 is forecasted to continue to rise at 11% annually. The major customers are people who have busy life with little time to cook, so home delivery can help them to save time, especially in the fast food industry. The fast-food segment contributed mostly to the delivery food. In 2012,

KFC began to provide takeaway service in Malaysia to further improve the service quality, and Domino's Pizza seeks to expand market share and attract new customers in Sabah and Sarawak (Euromonitor, 2015).

In addition to Malaysia, market penetration is also high in the US. 23% of large food chains offer delivery service to customers and 44% of adults in the US have an online food order booking experience (Kimes, 2011). Retailers themselves such as Pizza Hut, Kentucky Fried Chicken could provide delivery service dependently, some restaurant intermediaries also provide delivery services include Seamless, Yelp Platform, Delivery.com and more. Whether Retailers or restaurant intermediaries, they all make an effort to meet the needs of customers to update services.

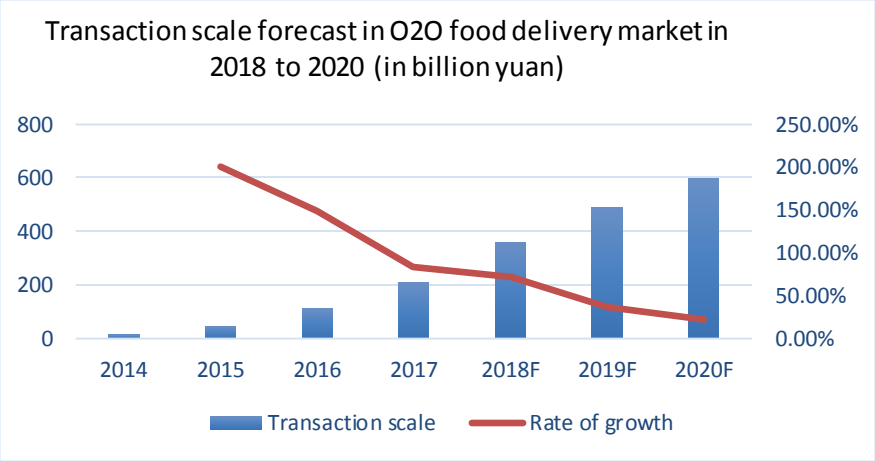
The rapid development of the food industry in China leads to the boom of food delivery service. Compared with that of other countries, the food delivery market in China has gone through three phases. In the first stage, customers call the restaurant for ordering food then took it away. Technically, it's a form of takeaway rather than food delivery service, but this form of communication has laid the foundation for food delivery service. Then as the web grew up, online food order service had been accepted by more people. Finally, ordering food on a mobile platform is popular in recent years, the mobile platform could feature a wide selection and promise quick delivery. According to Statista (2018), China O2O food delivery gross value exceeded 153.33 billion yuan in 2018. It can be seen from Figure 1 that the gross revenue of the O2O food delivery market is rising consistently from 2010 to 2018. Gross merchandise value measures the growth of O2O food delivery commerce business, but it includes unpaid orders. It seems that the transaction scale could reflect successful transactions more specifically. Figure 2 (Analysis International, 2018) indicates that the transaction scale is expected to increase, but the year-on-year growth rate will continue to decline, which means that user scale tends to be stable, the online food delivery industry will mainly improve service to existing customers, such as improving the service quality, exploring the multi-dimensional needs of existing users, increasing user engagement and maintaining the user group. It is an undeniable fact that customer experience has been a lead indicator in the online food delivery industry.

Figure 1:



Source: Statista, 2018

Figure 2:



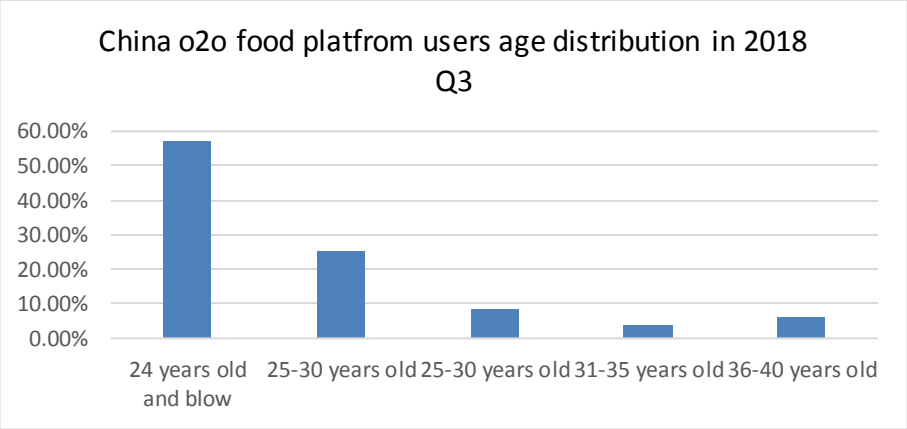
Source: Analysis International, 2018

O2O food delivery platforms achieve real-time, high-efficiency food delivery will gain a competitive advantage in the market to achieve real-time efficiency, e-commerce applications have to make effective decisions. Previous studies investigated main problems in online food delivery management such as food storage, handling, package, transport, and distribution because most of the chains are from food providers. Indeed, customers as main plays in food delivery should be taken into consideration, their experience can be a key driver to motivate food delivery service because they are the end of the whole food delivery chain. However, their experiences are too usual to be ignored. Although their assessments would involve problems from providers, their concerns are not the same as providers. Analyzing the costumers'

preferences according to their characteristic is key to maintain existing customer groups and explore potential customers.

Figure 3 (iimedia, 2018) shows that Chinese online food platforms users are under 30 years old, 57.0% are under 24 years old, and 25.2% are under 25 years old. So young adults are the main customer group for the O2O food delivery industry. Among them, 31.3% of Chinese online delivery platform users have a monthly income less than 3000 RMB, and 53% of them hold a bachelor or higher degree, which means that students and white collars with medium income are main customers.

Figure 3



Source: iimedia, 2018

1.2 Research questions and objectives

It is noticed that white collars and students are the main customer group to the O2O online food delivery market in China. Among online food delivery app users, 63% of them are white collars and 30.5% are students (Daxue Consulting, 2105). Especially in first and second-tier cities, people with high incomes and educational backgrounds are more concentrated in O2O food delivery service, it is meaningful for food delivery companies to know the demanding of the biggest customer group for ChinaO2O food delivery service industry.

Previous studies have investigated some customer groups' attitudes, experience, behaviour or acceptance level to online food delivery (OFD) services. Yeo et al. (2017) explored the structural relationship between consumer experiences, intention toward online food delivery (OFD) services in Malaysia. It was found that the relationship between consumer experiences, attitude and behavioral intention is supported . Lin and Lu (2011) also claimed that network externalities also influence users' perceptions of trust in the intermediary platform and purchase intentions in O2O commerce but lack of comparison in different users. Nonetheless, Dachyar and Banjarnahor (2017) realized the shortcoming of previous studies and compared consumer's purchase intentions of e-commerce on three e-commerce company websites and found different factors influencing customer purchase intention from perspectives of companies, which was suggestive for e-commerce companies to know their customer purchase intentions.

Although customer attitudes, intentions, and behaviors toward e-commerce service were discussed by several kinds of literature, few studies tried to focus on comparing preferences of targeting groups on O2O food delivery service. As the important part of O2O commerce, O2O food delivery has distinctive customer group characteristics, it is worthy for present studies to fill the gap that explores the different preferences of targeting groups toward O2O delivery food service.

Thus, this study aims to discuss different preferences for the main customer group users in O2O food delivery service by solving the following questions:

1. What are the main factors influencing customers' intention towards online food delivery service for the O2O commerce business?
2. How different characteristics of targeting customer groups influence customers' intention towards online delivery service?

2. Literature review

2.1 O2O food delivery and customer service

With the advancement of the market-orientated food system and internet technology, various food system came into existence to meet mass tastes, so the traditional grocery stores have been abandoned by customers after the Second World War (Bhuyan, 2001). Instead, consumers are willing to have more choices and switches between alternatives, so it is emergent for the food

industry to revaluated its traditional service. Director of the Food Industry Center offered new chances to increase the efficiency of entire food distribution by using internet data. In addition, although the development of trust posed a threat to online food delivery, Yoon (2002) found that online to the office could help to eliminate this risk. The ideal e-commerce could combine the real operation with the virtual operation and this model is highly accepted by customers.

However, this model also encountered many obstacles in its development history. In the 2000s, online grocery shopping was still in early stages, only 10% of customers reflected that they bought grocery products online in their first shopping experience, which was resulted from short of practicality (Food Marketing Institute, 2000a). Merely 9% of US customers claimed that online ordering service was provided to them in their primary food shopping experience (Food Marketing Institute, 2000b), while nearly 30% of department stores supplied home delivery service. Vincent Cheow Sern et al. (2017) stated that convince, technology and competition motivated retail model was more accessible. In recent years, enterprises were actively seeking to effectively combine physical channels and virtual channels to form a "click-to-entity" model. In the food delivery industry, this model developed as o2o food delivery (Chen et al. 2018).

In the China market, with the expansion of o2o food delivery service scenarios, the further dynamics of user demand, continuous optimization of food delivery logistics, and further improvement of residents' consumption, it is expected that the o2o food delivery market will maintain a growth trend in next three years. However, due to the decline of demographic dividend, the year-on-year growth rate will continue to decline. To be specific, the structure of the food delivery service industry is stable. The food delivery platform Ele.me, which is owned by China's internet giant: Alibaba, acquisition Baidu Waimai supported by Baidu company in 2017, after that only ele.me and Meituan remain on the comprehensive platform of catering takeout, it is obvious that the total market shares of two o2o food delivery platforms account for more than 90% of the market share (iimedia, 2018). The competition among main o2o food delivery platforms in first-tier and second-tier cities have become fierce, and platforms are seizing the opportunity to gradually to extend the service population and service scenarios and actively seeking to meet the needs of more market users. In the context of increasingly rich service scenarios, platforms are also trying to optimize the user experience and retain users through high-quality services.

2.2 Theoretical background

2.2.1 Partial least square (PLS) Path Model

Partial Least Square (PLS) is defined as a structural equation modeling (SEM) method to maximize the dependent variable of endogenous constructs through an iterative approach. PLS-SEM is most useful to abnormal data, little sample and formally measured constructs research (Hair et al., 2014). PLS has been used in various fields including customer behavior. For instance, Cheow Sern Yeo et al. (2017) inferred hypotheses of the structural relationship between consumer experiences, intention, and behavioral tendency. The partial least square (PLS) path modeling approach was used to prove based on 224 questionnaires to test the coefficient between these factors. The result indicated that all hypotheses apart from the relationship between prior online purchase experience and post-usage usefulness are supported. Although this research exposed external factors guided by post-usage usefulness and convenience motivation towards online food delivery service, the samples collected are Chinese ethnicity students within the age range of 18–22 years in Malaysia, which are very limited to confirm its validity in applying to other countries. Additionally, PLS was also be applied in the service sector. For instance, Bontis et al. (2007) examined the effect of an organizational reputation as intermediaries between service recommendation and customer loyalty. The results revealed that company reputation has an influence on customer loyalty and identified brand trust plays an important role in improving the satisfaction level of customers. PLS does not depend on normality assumptions, so it could work well in examining mediation effects. However, the PLS model cannot be used to investigate the average change of independent variables as the unit change of the dependent variable.

2.2.2 Trust transfer theory

Trust transfer theory examines that trust can be taken from the selling platform to the sellers and has been widely applied in e-commerce environments. Scientifically, the trust should be transferred using institutional mechanisms. Relationships between trust-in-platform, seller, and purchase intention in consumer to consumer online shopping are influenced by two key moderators: perceived effectiveness of e-commerce institutional mechanisms (PEEIM) and perceived website quality of the seller (PWQS), they affected relationships positively and negatively respectively (Xiayu et al. 2017). Research by Xiao et al. (2018) applies the trust transfer theory to analyze different types of trust that affect customer purchase intentions process in this process. This research identifies the verification of the transfer process from the online channel to the offline while the prior study only focuses on transfer from intermediary websites to sellers. Other studies also discussed externalities influence users' perceptions of trust in the intermediary platform and purchase intentions in O2O commerce (Lin and Lu, 2011). However, these studies

didn’t explain the effect magnitude of brand trust from the aspect of customer who plays a vital rule in o2o commerce.

2.2.3 Technology acceptance model (TAM)

The technology acceptance model is a model to study the user's acceptance of the information system by analyzing rational behavior. TAM proposes two decisive factors: perceived usefulness and perceived ease of use (Davis, 1986). Perceived usefulness is defined as the degree of trust that online transactions can improve shopping efficiency from the individual perspective (Shih, 2004). According to the empirical results of TAM's previous research, users’ behavioral intention to use specific technologies will be affected by the perceived usefulness and perceived ease of information systems (Hongyao, 2013). Although TAM was only used in the work environment initially, it has been applied to more situations. Analyzing the purchase intentions of Internet users offers a possibility of applying TAM in other technological introduction situations (Cheng & Bao, 2003). For instance, Dachyar and Banjarnahor (2017) investigated factors affecting consumer's purchase intention of e-commerce on three e-commerce C2C company websites by using TAM, they found trust, risk factors, perceived usefulness, and benefits are significant factors influencing customer purchase intention. Additionally, the usability and navigation of a website will increase consumers' trust in this website. A positive relationship between perceived ease of use and customer’s trust in C2C e-commerce is supported. However, purchase intention is limited in TAM variables. TAM concentrates mostly on **the** acceptation of technology rather than purchase intention, purchase intention has a wider range compared with purchase intention, thus it is not very convincing to use TAM to explain customer intention.

2.2.4 Agent-based model

Autonomy, social ability, reactivity, and positivity could be viewed as the main features of the agent-based ordering model. A complex adaptive system (CAS) is formed by multiple agents (Wooldridge and Jennings, 1995). CAS theory can be used to study various complicated systems based on an agent-based model. Different from the traditional agent-based model in which agent locations are fixed, He et al. (2018) adopted an agent-based O2O food ordering model (AOFOM) consisting of customers, restaurants and online ordering platforms agents to investigate food quality and location behavior of restaurants. All restaurants are divided into two groups and the differences in their decisions are compared to decide what strategies are more likely to help restaurants to success in competition. The result shows that the restaurant's food quality decisions are impacted significantly by customer behavior and how different delivery policies influenced restaurant food quality and location decisions. However, increasing online takeout

orders will become increasingly challengeable as more competitors enter into the market from the respective of the restaurant, the cost of relocation and food quality improvement decisions is very high. It is only beneficial for a restaurant to adopt the O2O food ordering model to advance its location or food quality on food delivery platforms but not suggestive for the o2o food delivery service industry in the long term. Therefore, more researches should be taken to fill the gaps in the roles of customers, and online ordering platforms.

2.2.5 Logistic regression model

A logistic regression model was mainly used in epidemiology. Exploring the risk factors of the disease and predicting the probability of the occurrence of a disease according to the risk factors are the most common situations. Although a binary dependent variable is the basic form of logistic regression, in fact, some researches involve more than two independent variables, so multivariate logistic are introduced to predict the probabilities of the different possible results (Greene,2012). It uses the observed characteristics and some linear combinations of problem specific parameters to estimate the probability of each specific value of the dependent variable to solve a classification problem. To be specific, the dependent variables used in multivariate logistic regression should be nominal, which means that any one of the categories could not be ordered by its meaning. For example, logistic regression can be used to predict the probability of choice of pharmacy based on variables related to service. This research acquired the significant variables that lead to predicting the customer's pharmacy choice using a multinomial logistic regression model. The finding of this research indicates that the probability of choice of pharmacy can be predicted according to variables related to service. Moreover, it could help the pharmaceutical market to improve specific sectors (Valencia, 2018). Similarly, this model has been applied to data analysis in many other fields, such as health, society, behavior, and education. Another example of education is that student satisfaction is influenced by the quality of services offered by higher learning institutions, and the result demonstrated some variables are significantly related to students' satisfaction level. After improving these variables, the enrollment would also increase. It means that multivariate logistic regression could be effective to evaluate the quality of service, so multivariate logistic regression could be used in more service sector. It is very useful to estimate the specific possibility of customer preference to one service industry. This paper serves as a benchmark to estimate the quality of customer preferences to food delivery service.

2.2.6 The expected cost model

We adopt Yang (2019)'s expected cost model to evaluate and compare food delivery with other factors that influence customer intentions. The core idea of the expected cost model is that an optimal food delivery should yield the smallest expected cost. The expected cost of food delivery help customer

reduce expenses and further increase their satisfaction towards o2o food delivery service, thereby providing a useful tool to evaluate and compare those factors that influence customers food delivery preferences.

3. Methodology and results

3.1 Methodology Design

The research method combines quantitative and qualitative methodology. main data was collected from the result of questionnaires, these questions were designed to collect data about main customer characteristics in Suzhou industrial park and customer intention toward o2o food delivery platforms. Questions in the questionnaire were designed into closed questions and open questions. Firstly, the researcher confirmed the basic characteristics of samples such as gender, age, income and frequency of ordering food on online delivery platforms. Secondly, respondents are required to answer questions related to their intentions. In addition, open ended interviews are conducted to unusual answer respondents. Other data from O2O commerce company official websites in China such as Ele.me.com Meituan.waimai.com as well as data collection websites such as iiMedia Research Group to further exam the result.

3.2 About questionnaire

This questionnaire was conducted with multiple choices with two sections. Firstly, the respondents are required to answer the basic personal characteristics including gender (male and female), income per month (<2000 RMB to >5000 RMB per month), education (High school and below, College Degree, Bachelor Degree, Master/Doctorate and above) and frequency of ordering food per week (< 1 times to > 14 times per week).

Secondly, the respondents would be asked questions about research variables that were adopted in later research. The questions were set as “I believe spending on mobile online food delivery is worth it” ” I believe it is better to deliver food as quickly as possible" "Food health and safety are crucial", " I choose my familiar food brands", "I care about customer scores and comments about service", and the answers were measured by a five-point Likert scale (1=completely agree, 5=completely disagree). According to Dawes (2007), slightly higher mean scores are produced easier than a 5 or 7 points Likert scale compared with a 10 point scale. After collecting answers, the answers with greater tendency were reserved. They were divided into six categories: delivery payment, delivery time, the quality of food, brand trust and customer reviews, which factors that customers feel the most important when they order food. Although some customers tended to choose more than one answer. For these customers, we conducted an open-

ended interview with them personally and identified their best choice after finishing questionnaires online. Finally, we collected about 360 questionnaires, 12 of them are missing due to invalidating answers.

There are various advantages of questionnaires such as high efficiency, cost saving and provides anonymity. Firstly, questionnaires could help researchers to access the target demographic more easily. For example, the main customers of the online food delivery market are white-collar workers and students, thus researchers could design the questionnaires based on the target group quickly. Secondly, to test the accuracy of questions set in questionnaires, the researcher needs to test a minority of questionnaires primarily then choose the reasonable sample size around 30 (Burmeister and Aitken, 2012). Thirdly, the anonymous questionnaires will not put psychological pressure on respondents, so the results would more objective than interviews. Finally, the validity of questionnaires can be checked in data analysis and some variables could be ruled out due to unavailability.

3.3 Influential factors

The follow researches attempt to describe factors related to customers' intention toward online food delivery from different aspects.

3.3.1 Delivery time

Length of delivery time is one of the most important measurements in online food delivery services. As mentioned in Vincent Cheow Sern et al. (2017), many people cannot endure traffic congestion in the way to go out for food or long waits for the restaurant. Instead, they prefer to receive food delivered to the home, which could save their time due to opportunity cost. Furthermore, as a result of increased sales of fast food, the takeaway industry has a flourishing development in the 1980s. OFD (online food delivery) services are widely accepted because of its speed and convenience. In addition, household order constitutes 70% of food delivers orders, which means that households are the main market of food delivery. Consumers pay more attention to the delivery time when ordering takeaway at home compared with eating out. Gentry and Calantone (2002) proposed that the time saved by the high efficiency of food delivery is the rising utility that consumers earn. It seems that efficient technology could reduce time, and saving time has a direct impact on post-usage usefulness and attitudes. Similarly, the easier the process of ordering food online is, the more time it could save.

3.3.2 Delivery payment

In addition to delivery time, consumers are also concerned about payment. Consumers are willing to buy products for extra discounts in the store because the discount could reflect the perceived value of products (Thaler, 2008). The lower price could boost sales and a higher price discount could add the value of the

product (Madan and Suri, 2001). Online shopping platform provides consumers the stronger ability to compare prices so the websites could offer lower prices are more attractive (Gentry and Calantone, 2002). Smaller companies have lower capital and margins, so further price cuts could force them out of business. However, for existing delivery services, they cannot guarantee that lower prices will lead to higher sales, as customers always expect " supplementary benefits" when placing orders, thus the delivery price is also considered seriously by customers under the same price of foods. In the food segment, different types of consumers choose to afford different levels of the delivery price. Because of the flexible expectation of customers, it is challenging for food delivery e-commerce to adopt a pricing model that is free from volatility and continues to encourage sales. Consumers incline to make rational decisions based on the maximum benefits derived from finding the lowest reasonable payment (Ollila, 2011). Consequently, the delivery payment is taken into consideration when customers decided to order food online.

3.3.3 Food quality

Food quality is a vital factor in the whole online food supply which could determine the life of the food industry. Some food problems may lead to commercial failures such as product recall, reputation damage and huge compensation (Hobbs, 2006). For instance, the USA recalled more than 2100 peanut butter products because of the existence of salmonella (Terreri, 2009). This safety crisis also involved over 200 food manufacturers in a steam of the whole food distribution. Especially in online food distribution, the rising online food retailing causes various distribution channels, providing a direct channel from producers to customers. In this process, the actors involved, the distance and wide of products would increase in the distribution network, these factors have a substantial influence on food safety. Akkerman et al. (2010) concluded the food distribution strategy and operation related to food quality, safety, and sustainability.

In some cases, food quality is wider than food safety, including package, flavors, and ingredients quality of takeaway food. Food distribution requires higher efficient food quality control than other product distribution because food quality changes continuously from products to final assumption. Thus, food quality should be considered centrally. However, food with limited shelf life requires strict environmental standards, so it becomes challenging for the O2O commerce business to manage the transformational operation process. It is evident that the food is not as fresh as the food served directly from the kitchen, so the quality of food is inconsistent no matter how the food is packaged. For example, the soup may sprinkle out or the pizza will cold in the delivery way. Food quality becomes more decisive as the importance of environment falls, so it should be emphasized in the food industry. However, He et al. (2018) pointed out food quality should be one of the most vital factors when customers choose restaurants, it is

still controversial to be considered as a measurement in food delivery service. In this study, it is regarded as a control group.

3.3.4 Brand trust

Brand trust represents a kind of reliability, which means that a brand should have enough strength to influence the choices of consumers. When making purchase behavior, apart from some objective factors based on fact, customer choice mainly related to subjective emotion such as familiarity. Customers often make choices base on their prior shopping experience, so they often become confident about some products, brands or stores especially. When it applied to the o2o delivery service, it could help the o2o food delivery platform to know their reliability from the perspective of customers and promote business. Consumers' brand effect is significant to the relationship between company and consumer, brand effect lays a solid foundation to a relationship (Berry & Parasuraman, 1991). If platforms perform better on building brand trust than their competitors, they can take the initiative in the competition and maintain a close or even intimate relationship. Moreover, trust is the source of customer loyalty which could help consumers when facing formidable perceptions of risk and insecurity in e-commerce. Brand loyalty was initially considered as consumers' willingness to repurchase (Morgan & Hunt, 1994).

3.3.5 Customer reviews

Customer reviews are comments of a product or service made by customers who have purchased the product or service. On E- commerce, they can also be regarded as customer feedback to product or service. Company or third party websites post online customer reviews and offer consumers the chance to post product reviews with the form of numerical star ratings. When consumers search for product information online and compare product alternatives, they often get dozens or hundreds of service reviews from other consumers, which could be added value for them and feedback mechanisms can have a positive effect on buyer trust (Ba and Pavlou and Gefen, 2004). Prior research also found that sales can be positively influenced by customer reviews (Chen et al., 2008). Thus customer reviews are very vital to know about customers' intention in food delivery service.

3.4 Variables Design

For independent variables, we set "delivery payment=1, food payment=2, food quality=3, brand trust=4, customer reviews=5" and "food quality=3" as a baseline category in independent variables, its coefficient was set as 0.

Since dependent variables were larger than 2, these variables should be set as dummy variables in multivariate logistic regression，the researcher set "male=1, female=2". "Frequency less than 1 times=1, frequency between two to three times=2, frequency between four to six times =3, frequency between

seven to thirteen times =4, frequency more than fourteen times =5". As for education, "high school and below =1, college degree=2, bachelor degree=3, master/doctorate and above=4". "Female=2, frequency more than fourteen times =5 and master/doctorate and above=4" as baseline categories in dependent variables, thus their coefficients were set as 0.

3.5. Construction of model

If the dependent variable y has J values (i.e., y has J classes), use one of the categories as a baseline category, other categories were produced as j-1 non-redundant logit transformation model.

$$\mathrm{G} = \log\frac{P(y=i)}{P(y=j)} = Bjo + Bj1X1 + Bj2X2 + Bj3X3 + \cdots . + BjpX_P$$

In this research, we set "food quality" as a baseline category (y=j) and discuss the relationship between different characteristics (gender=x1, eduation= x2, frequency=x3) of groups and different factors influencing customer intention (y=i). In this research, these variables can be analyzed by multinomial logistic regression.

Appendix 1 presents the Kendall correlation coefficient among independent variables, dependent variables were observed that at the significance level of 0.05, there was a strong correlation between income and other variables: gender, and frequency of weekly take-out orders. Although from Appendix 2 these four dependent variables: gender, frequency, education, and income all passed the significant test, Appendix 3 shows that Likelihood Ratio Tests of the whole model, only gender, education, and frequency these three variables are significant, income is not significant, thus variable "income" was ruled out and construct new model which only including gender, education and frequency.

4 Data and Statistical analysis

Table 1

Case Processing Summary

		N	Marginal Percentage
Factor	Payment	73	21.0%
	Delivery time	26	7.5%
	The quality of food	171	49.1%
	Brand trust	70	20.1%
	Customer reviews	6	1.7%
	Others	2	0.6%
Gender	male	162	46.6%

	female	186	53.4%
Education	high school and below	7	2.0%
	college degree	23	6.6%
	bachelor degree	291	83.6%
	master/doctorate and above	27	7.8%
Frequency	1 time and below	127	36.5%
	2-3 times	106	30.5%
	4-6 times	71	20.4%
	7-13 times	30	8.6%
	14 times and above	14	4.0%
Valid		348	100.0%
Missing		0	
Total		348	
Subpopulation		31[a]	

a. The dependent variable has only one value observed in 13 (41.9%) subpopulations.

This study data was collected in Jiangsu industrial park; 348 valid questionnaires are collected in the end. Table 1 shows the sample's demographic information. In this sample, 46.6% are male and 53.4% are female. Over 80% of respondents are students or white collar with a college degree or bachelor degree, and the majority of them earn less than 3000 RMB per month. More than 85% of respondents reported they order food on food delivery platforms 1-6 times per week.

Table 2

Correlations

			Gender	Education	Frequency
Kendall's tau_b	Gender	Correlation Coefficient	1.000	-.021	.058
		Sig. (2-tailed)	.	.694	.242
		N	348	348	348
	Education	Correlation Coefficient	-.021	1.000	.010
		Sig. (2-tailed)	.694	.	.841
		N	348	348	348
	Frequency	Correlation Coefficient	.058	.010	1.000
		Sig. (2-tailed)	.242	.841	.
		N	348	348	348

It can be seen from table 2 that all p values are less than 0.1, there is no significant correlation among the three independent variables in the sample, none of the independent variables is constant and there are no exact linear relationships among the independent variables.

Table 3

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	265.606			
Final	180.858	84.748	40	.000

Table 3 gives information about model fitting information. The p values of all variables were less than 0.1, indicating that all variables passed the significance test. The three independent variables made significant contributions to the explanation of the variation of dependent variables, and it is meaningful to study them.

Table 4

Pseudo R-Square

Cox and Snell	.296
Nagelkerke	.354
McFadden	.194

Table 4 reveals the maximum of the three pseudo-r squared values is 0.354, indicating that the interpretation degree of the model is general, and there is still a part of the variation of the dependent variable that cannot be explained by the model. (0.3 to 0.5 is ideal).

Table 5

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	180.858[a]	.000	0	.
Gender	209.838	28.980	5	.000
Education	210.736	29.879	15	.012
Frequency	216.126	35.268	20	.019

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Table 5 reveals the effect of dependent variables. p values of all variables were less than 0.05, indicating that all variables passed the significance test. The three dependent variables made significant contributions to the explanation of the variation of dependent variables, and it is meaningful to study them.

5. Results and Findings:

5.1. Model outcomes explanation:

Table 3 list the level of different classifications of dependent variables affecting customer intention when order food online.

The value of B indicates the coefficient of different dependent variables in the model, the symbol of B could reflect the positive or negative relationship between dependent variables and independent variables. Ward is used to inspecting significant value, this value corresponding is less than 0.05 0.1 shows that corresponding coefficients of the dependent variables have statistical significance and dependent variables have significant effects on independent variables.

Exp (B) indicates that the class within an independent variable is a multiple of its corresponding reference category with a certain tendency. Exp (B)>1, the possibility of occurrence of the independent variable is larger than that of reference category; Exp (B)<1, the possibility of occurrence of independent variable is less than that of reference category

5.2 model outcomes and discussion

Table 6

Table 6.1 payment

Factor[a]		B	Std. Error	Wald	df	Sig.	Exp(B)
Payment	Intercept	-0.724	0.923	0.616	1	0.433	
	[Gender=1]	0.752	0.293	6.593	1	0.01	2.122
	[Gender=2]	0[b]	.	.	0	.	.
	[Education=1]	0.624	1.076	0.336	1	0.062	1.866
	[Education=2]	0.457	0.818	0.311	1	0.577	1.579
	[Education=3]	0.368	0.612	0.361	1	0.548	1.444
	[Education=4]	0[b]	.	.	0	.	.
	[Frequency=1]	-0.984	0.784	1.573	1	0.21	0.374
	[Frequency=2]	-1.426	0.776	3.374	1	0.066	0.24
	[Frequency=3]	-0.441	0.747	0.348	1	0.055	0.644
	[Frequency=4]	-1.679	0.956	3.082	1	0.179	0.187
	[Frequency=5]	0[b]	.	.	0	.	.

Discussion: For table 6.1, gender1, education 1, frequency 2 and frequency 3 were significant to payment compared with baseline categories. (p=0.1)

Men tended to choice payment as their most concern more likely than that of women. Compared with that of people with a master's degree or above, people with a high school degree or less were more likely to care about the payment.

Table 6.2 Delivery time

Factor[a]		B	Std. Error	Wald	df	Sig.	Exp(B)
Delivery time	Intercept	-1.661	1.363	1.484	1	0.223	
	[Gender=1]	1.448	0.49	8.721	1	0.003	4.253
	[Gender=2]	0[b]	.	.	0	.	.
	[Education=1]	0.067	1.323	0.003	1	0.96	1.069
	[Education=2]	0.688	0.816	0.711	1	0.399	1.99
	[Education=3]	1.216	0.666	3.335	1	0.068	0.296
	[Education=4]	0[b]	.	.	0	.	.
	[Frequency=1]	-0.09	1.294	0.005	1	0.945	0.914
	[Frequency=2]	-0.38	1.275	0.089	1	0.765	0.684
	[Frequency=3]	-0.193	1.249	0.024	1	0.077	0.824
	[Frequency=4]	-1.116	1.599	0.487	1	0.485	0.328
	[Frequency=5]	0[b]	.	.	0	.	.

Discussion: For table 6.2, gender1, education 3, frequency 3 were significant to delivery payment compared with baseline categories. (p=0.1)

The possibility of that men chooses delivery time is higher than that of women when ordering food. People with a bachelor's degree cared more about delivery time than those with a master's or PhD. The possibility

of people who ordered food more than 14 times a week place emphasized on delivery time was higher than that of those who ordered food 2-3 times a week or more.

Table 6.3

Factor[a]		B	Std. Error	Wald	df	Sig.	Exp(B)
Brand trust	Intercept	0.081	0.888	0.008	1	0.927	
	[Gender=1]	-0.457	0.301	2.317	1	0.098	0.633
	[Gender=2]	0[b]	.	.	0	.	.
	[Education=1]	-15.76	62.676	0	1	0.994	1.43E-07
	[Education=2]	-1.375	1.179	1.36	1	0.244	0.253
	[Education=3]	0.123	0.555	0.049	1	0.025	1.131
	[Education=4]	0[b]	.	.	0	.	.
	[Frequency=1]	-0.844	0.777	1.179	1	0.278	0.43
	[Frequency=2]	0.78	0.752	1.078	1	0.075	0.458
	[Frequency=3]	-1.111	0.766	2.107	1	0.147	0.329
	[Frequency=4]	-0.627	0.837	0.56	1	0.454	0.534
	[Frequency=5]	0[b]	.	.	0	.	.

Discussion: For table 8.3, gender1, education 3, frequency 2 were significant to brand trust compared with baseline categories. (p=0.1)

Women were more likely than men tend to choice brand trust; compared with those with a master's degree or above, those with a bachelor's degree were more likely to order food with brand trust reason; people who ordered takeout more than 14 times a week were more influenced by brand trust than those who ordered food online 1-2 times a week.

Table 6.4

Factor[a]		B	Std. Error	Wald	df	Sig.	Exp(B)
Customer reviews	Intercept	-35.669	350.08	0	1	0.992	
	[Gender=1]	0.426	0.893	0.227	1	0.034	0.653
	[Gender=2]	0[b]	.	.	0	.	.
	[Education=1]	-0.415	83.567	0	1	1	0.66
	[Education=2]	16.63	50.08	0	1	0.996	165.875
	[Education=3]	15.796	50.08	0	1	0.996	72.895
	[Education=4]	0[b]	.	.	0	.	.
	[Frequency=1]	1.098	20.663	0	1	1	2.999
	[Frequency=2]	2.029	1.448	12.596	1	0	27.12
	[Frequency=3]	3.418	1.166	23.071	1	0	92.407
	[Frequency=4]	17.308	0	.	1	.	32.024
	[Frequency=5]	0[b]	.	.	0	.	.

Discussion: For table 6.4, gender1, frequency 2, frequency 3 were significant to customer reviews compared with baseline categories. (p=0.1)

Women valued customer review more than men; people who order takeout 2-3 times a week and 4-6 times a week placed more importance on customer reviews than those who order takeout 14 times or more a week.

5.3 Case Study Finding:

Based on the coefficients in the model, the probability of a customer group's intention can be estimated. (gen=gender, educ=education, fre=frequency)

$$G1 = log\frac{P(delivery\ payment)}{p(food\ quality)} = 0.752 * gen1 + 0.624 * educ1 + 1.425 * fre2 - 0.441 * fre3$$
$$\begin{cases} gen1 = 1 \\ others = 0 \end{cases} \begin{cases} educ1 = 1 \\ others = 0 \end{cases} \begin{cases} fre\ 2 = 2 \\ others = 0 \end{cases} \quad fre\ 3 = 3 \ others = 0$$

$$G2 = log\frac{P(\ delivery\ time)}{p(food\ quality)} == 1.448 * gen1 + 1.216 * educ3 - 0.193 * fre3$$
$$\begin{cases} gen1 = 1 \\ others = 0 \end{cases} \begin{cases} educ3 = 3 \\ others = 0 \end{cases} \begin{cases} fre3 = 3 \\ others = 0 \end{cases}$$

$$G4 = log\frac{P(\ brand\ trust)}{p(food\ quality)} == -0.457 * gen1 + 0.123 * educ3 + 0.78 * fre2$$
$$\begin{cases} gen1 = 1 \\ others = 0 \end{cases} \begin{cases} educ3 = 3 \\ others = 0 \end{cases} \begin{cases} fre2 = 2 \\ others = 0 \end{cases}$$

$$G5 = log\frac{P(\ customer\ reviews)}{p(food\ quality)} = 0.426 * gen1 + 2.029 * fre2 + 3.418 * fre3$$
$$\begin{cases} gen1 = 1 \\ others = 0 \end{cases} \begin{cases} fre2 = 2 \\ others = 0 \end{cases} \begin{cases} fre3 = 3 \\ others = 0 \end{cases}$$

$G3 = 0$ ， because food quality is the reference group in the dependent variable, all its coefficients are 0

For a male undergraduate student who orders food 2-3 times a week, gender =1, education background =3, frequency =2, according to the model: $G1 = 0.752*1 + 0.624*0 - 1.426*2 = -2.1$

According to {EMBED Equation DSMT4}， probabilities that this undergraduate male student who orders food online 2-3 times a week tend to different aspects when using online food delivery service could be calculated as follows:

{EMBED Equation DSMT4}

6. Presentation and Evaluation:

Figure 4

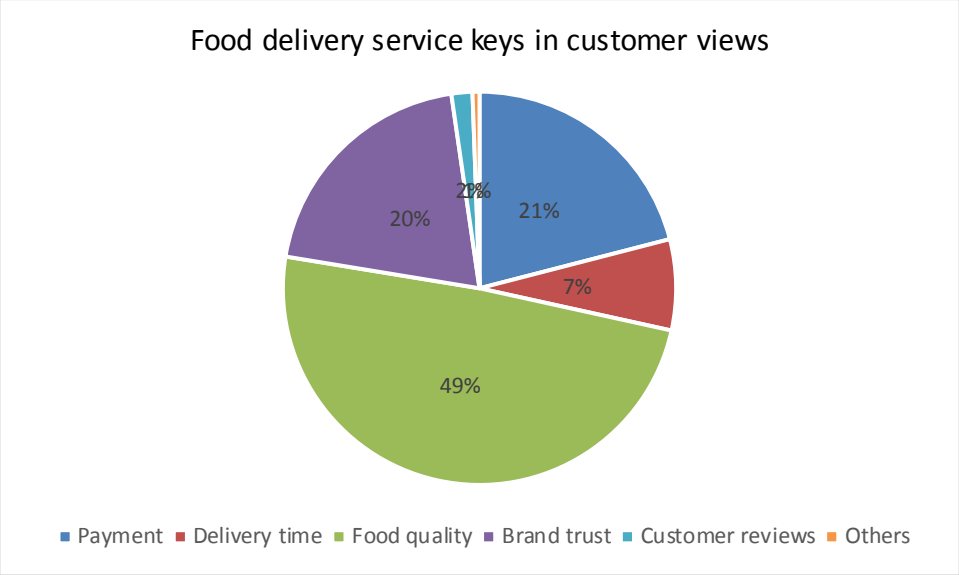


Figure 4 shows that customer intention when ordering food online. 49% of customers thought the food quality is the most important factor when they order food. Although food safety couldn't be guaranteed by food delivery service, the process involving package, distribution and convey is related to it. For instance, the process of delivery may cause loss and waste, which would affect the quality of food directly. Some respondents reflected that they care about the freshness and competence of food, which would influence their attitudes at giving customer reviews and brand trust. Thus, in this research we didn't regard food quality as our main measurement of customer intention, it could be specifically reflected in other aspects.

20% of customers and 21% of customers regarded payment and customer reviews as their basis when choosing food delivery service. We interviewed respondents who choice customer review was their deciding factor when using food delivery service, they reported that comments from other customers would help them to learn better about the prior user experience. In addition, some extreme reviews could guide them to avoid unpopular food merchants directly, which also save their shopping time. As for payment, most of the costumers cared about discount and promotion campaigns, they would be more willing to choose the food delivery platforms which could provide a higher discount or attractive discount coupons used on the next payment.

7% of customers care about the delivery time, the figure of results varied from present studies. The time-saving motivation was put in an important place in present studies investigating customer behaviors. However, the number of respondents who choice payment consisted of the third largest proportion of the whole population in the sample. In-depth analysis of the characteristic of customers, main customer

groups are students in this research, they have relative enough time to wait for delivering food. Additionally, most food delivery platforms could offer a time booking service, which is convenient for customers to choose delivery time flexibly, Just-in-time service is not very crucial to customers. Delivery time is still a vital factor for people with fixed work or study time, these respondents reported that they tended to wait for a shorter time and receive food on booking time.

Apart from the whole sample situation, intentions are different for different characteristics of customer groups. Tables 6.1-6.4 reveal preference differences in different groups of customers. The finding could be concluded as follows:

As for gender. Compare with women, men tend to choose delivery payment, delivery time rather than food quality, women tend to concern more about brand trust and customer reviews rather than food quality. It means that male customers are controlled by male consumers feel more encouraged by a products' functional features such as delivery payment or delivery time which could be controlled or set in website, while female customer rely more on emotional and social attachments so they to have higher brand trustworthiness and prior shopping experience will influence their choices (Zhang et al. 2009).

Compared with people with a high education degree, people with a low education degree are more likely to care about the payment than those with a high education degree. People with higher education often not held a positive attitude towards online payment ways because of their higher credit rating payment and higher confidence to afford expenses (Wu et al,2018). Although the ability to pay is strongly related income level, most of the respondents are undergraduate without a real source of income and white collars with fix income, thus it is not reasonable to discuss income level directly, education is related closely with the economic ability.

As for the frequency of ordering food, customers with a low frequency of ordering food online were concerned more about customer reviews while customers with a high frequency of ordering food online emphasized more on brand trust. High-frequency use of service could build customer loyalty because frequent interactions between consumers and marketers could increase the effect of the brand. However, customers with low frequency have less interaction with food delivery platforms, the stickiness of users is also low, they needed to acquire shopping experience from others to choose online food delivery service.

To further study targeting customer group's intention words online food delivery service, one group of targeting customers (an undergraduate male student who order food online 2-3 times a week) would be selected to estimate their tendency, the main results of intention possibilities for one customer groups could be seen as Table 10.

Figure 5

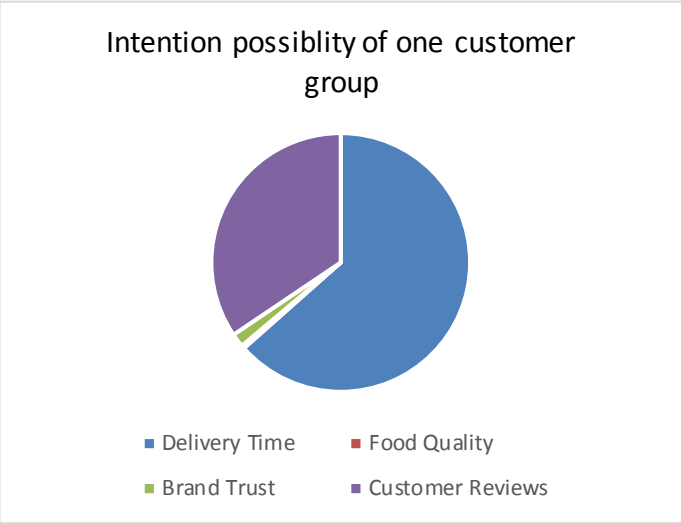


Figure 5 reveals the information about the intention of customer group (undergraduate male students who order take-out 2-3 times a week), they will pay attention to the delivery time and customer reviews when choosing take-out, the possibility is 0.632 and 0.343 respectively.

Results of the study partially different characteristics of customers' intention when order food online. Specifically, one representative customer groups (male undergraduates who order food online 2-3 times week) were selected to identify their main choice possibilities.

Although Male undergraduates who order food online 2-3 times week cannot represent the whole population, they are one of the most important target customer groups for o2o food delivery service provider. From their preferences, brand trust and customer reviews become the most possible reasons when they choose food delivery service. We conducted interviews about the result to the group of customers.

7. Limitations and recommendations.

7.1 Limitations:

The limited empirical evidences on the O2O food delivery are discussed. Firstly, in questionnaires, although the size of a sample is large, it is still far away from the whole population of college students, this study was based on responses from a very limited group of 348 people, questionnaires respondents mostly are students and white collars, these customers' intentions are contained by their characteristics, a larger sample is a better representation of the population. In addition, some respondents would not answer the questionnaires with deep thinking, the fix question setting would affect the judgment they made in answering the questions and their open answers.

Secondly, the samples are collected mostly in Jiangsu industrial park due to limit time and source, sample bias would produce when it applies the local situation to other areas. In the future, the sample should be selected more specifically according to study subjects and investigations in more cities are ought to be covered. Our future research will consider another one or two countries if additional time and resources are available.

Thirdly, the effect estimates in the model are based on prior studies, the good-fit of regression is not very high, and the accuracy of the classification of independent variables is not very scientific. Reference categories of variables were selected on a relatively large amount of number, the evidence that the choice of basic category should be more convincing on fact. In the data analysis process, some dependent variables are collected according to prior studies, their significance as independent variables should be based more on the present situation.

Finally, the cost model applied in this paper maybe not very effective to assess and predict food delivery payment, we will develop a more suitable cost model in our future research.

7.2 Recommendations:

Firstly, from the outcomes of model, the results show that different gender, education, and frequency of ordering food would influence customers' choices toward online food delivery service. In the future, o2o food delivery platform is encouraged to provide special service to targeting customer groups to meet their various demanding. Leading O2O food delivery platforms such as "ele.me" not only provide consumers with rich, healthy and safe consumption choices but also use intelligent and efficient real-time distribution system to earn faster and more multi-dimensional distribution capability. More products could be linked to consumers according to their preferences. In addition, some promotion campaigns are designed for targeting groups will occupy the market more quickly. For instance, Meituan's food delivery service was combined with other activities such as cinema ticket business, students could have the chance to get a free ticket when ordering food on the platform in back-to-school season (iimedia,2018), it would be used as a reference for other food delivery platforms to occupy college market.

Secondly, food delivery platforms are recommitted to organize a team such as a customer service center to manage customer reviews to enhance service quality. For instance, the customer service center of ele.me was prepared and the department of rights and interests arbitration was established in 2018. In the early stage, the center was committed to improving users' experience of returning orders and refunds and ensuring the after-sales performance of the platform. In addition, it also improved the customer service arbitration intervention rate within 24 hours. Compared with the first half of the year, the 24-hour intervention rate had been increased from 30% to nearly 90%, solving users' demands for customer service

arbitration intervention (Ele.me.com, 2017). The customer service center continues to promote the use of technology to meet customer service requests, and promotes the optimization of a series of self-service products, including self-service reminder on the client side, voice prompt for customer service request on the merchant side, so platforms are advised to constantly donated to promoting more convenient customer service in the future.

Thirdly, the delivery time of O2O food delivery platform could be managed effectively. Consumers are now ordering smaller quantities of food more often. Handling such a large number of customer orders puts pressure on the logistics activities of the supply chain. At the same time, consumers have high expectations for the delivery of online purchases. To meet these demands with low cost, food delivery platforms need to optimize their logistics strategy (Ramaekers, 2018). Delivery of time management, track tracking time could be solved by the technical means. At the level of technological development, food delivery platforms are concerned about unmanned distribution, optimizing distribution services with technological innovation, and each platform has released an intelligent voice assistant to solve the problem of delivery management.

Besides that, all services can be provided in real-time on an integrated Industry 5.0 platform. All service requests, payment and delivery can happen within seconds for order completion and within 20 minutes to receive food on hands. The future-proof Industry 5.0 platform and service for the next-generation of consumer services in mainland China and other advanced and emerging economies.

Finally, this paper studies the hottest topic of food delivery in China, whose food delivery service development is the fastest in the world, compared with other countries. Therefore, it is worthwhile to discuss the main factors influence customers' intention towards online food delivery service. This paper adopts a new method to analyze the question, which is multivariate logistic research model, and get some vital conclusions, such as customer reviews are related to customer preferences, the delivery payment is the most important factor when customers use food delivery service and so on. Those important findings not only will point out the direction for the development of food enterprises, but also improve the service quality for customers.

8. Conclusion and Future Work

To sum up, customer intentions including delivery payment, delivery time, food quality, brand trust, and customer reviews are related to customer preferences. This research is aim to estimate the relationship between the different characteristic of customers and their intentions when choosing O2O food delivery platforms. 348 valid questionnaires were collected to interpret customer intentions; SPSS software was chosen to analyze the relationship between data by the means of the multivariate logistic research model.

The model results give information about three new findings. Firstly, men rely on facts of delivery payment or time while women concern more about brand trust and customer reviews. Secondly, people with low education degrees are more likely to care about the payment compared with those with a high education degree. Thirdly, customers with a low frequency of ordering food online focused more on customer reviews while customers with a high frequency of ordering food online emphasized more on brand trust.

The case study shows the possibility of one target customer group's preferences to online food delivery service in Suzhou industrial park. For O2O food delivery platforms in Suzhou industrial park, they could estimate the possibility of different preferences of targeted customer groups, know better about targeting customers and their preferences, and emphasis more on building customer reviews and brand trust.

Our future work will have two streams of activities. The first stream is to understand the needs and business performances of different food-delivery service providers in different parts of mainland China, and in other countries such as Singapore, South Korea and Japan for similar services. The second stream will include the development of the advanced platform for Industry 5.0 services that food delivery and other tertiary services can be done with more convenient, less time, less costs and wider coverage for different regions to take part in the near future.

Appendix 1:

Correlations

			Gender	Education	Income	Frequency	App
Kendall's tau_b	Gender	Correlation Coefficient	1.000	-.021	.124*	.058	.007
		Sig. (2-tailed)	.	.694	.013	.242	.896
		N	348	348	348	348	348
	Education	Correlation Coefficient	-.021	1.000	-.022	.010	.001
		Sig. (2-tailed)	.694	.	.651	.841	.979
		N	348	348	348	348	348
	Income	Correlation Coefficient	.124*	-.022	1.000	.054	.122*
		Sig. (2-tailed)	.013	.651	.	.243	.013
		N	348	348	348	348	348
	Frequency	Correlation Coefficient	.058	.010	.054	1.000	-.154**
		Sig. (2-tailed)	.242	.841	.243	.	.001
		N	348	348	348	348	348

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix 2:

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	522.823			
Final	405.889	116.934	70	.000

Appendix 3:

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	405.889[a]	.000	0	.
Gender	424.922	19.033	5	.002
Education	432.759	26.870	15	.030
Frequency	433.836	27.947	20	.091
Income	428.073	22.184	20	.331
App	416.406	10.517	10	.396

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

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