

# Online Meal delivery services: Perception of service quality and delivery speed among Chinese consumers

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## Abstract

In China, the online purchases of meals grow rapidly. The online ordering and meal delivery services allow a busy urban consumer for a specific selection at a convenient time. This paper examines the satisfaction of consumers with the overall quality of service provided by the meal delivering companies and the speed of delivery. The level of satisfaction with the overall meal delivery service provides insights that permit improvement of service quality and its essential attribute, the delivery speed.

The study uses the sample of 554 respondents from all but two China's provinces collected between June 3 and July 30, 2017. A pilot test was administered among students of a major urban university. Data were collected through an online survey administered by the reputable commercial company. The structured questionnaire contained questions probing for views on several aspects of meal delivery services and requested a respondent to share the information about socio-demographic characteristics. The scale applied in the posed questions allowed the ordered logit to estimate the relationships. Results show, among others, that the average meal price and expectations of food safety were important to consumer perception of service quality, while the type of meal type of meal mattered with regard to speed delivers.

Keywords: Online meal order, survey data, ordered logit, meal variety

## 1. Introduction

Modern gadgets, such as cell phones, permit use of services through available free-of-charge applications. In China, there is a rapid growth of on-line meal purchases by consumers. Many, including students at Chinese colleges, order meals from restaurants located outside the campus or working place. The advantage of such services is the opportunity to eat a meal that is selected from a posted menu by placing an order rather than, for example, limiting choices to the university or company cafeteria's menus, and delivered promptly to the customer location.

Therefore, for the ordering consumers both the quality of meal and speed of delivery are important. This paper examines the satisfaction of online meal ordering service customers with the overall quality of service provided by the meal delivering companies and the speed of delivery using survey data collected in China in 2018. In this investigation, the term "the last mile" service commonly used in China, refers to the logistics of short distance distribution and door-to-door delivery services. "The last mile" service begins after a customer places an order and completes the payment online, and ends when a meal is delivered. The level of satisfaction with the overall meal delivery service provides insights that permit improvement of service quality, while the perception of essential attribute of service, namely speed, allows gauging the current performance and possible variations in its importance given customer characteristics.

## **2. Development of online meal delivery industry**

Meal delivery is an important part of the fast food (FF) industry. The FF industry has expanded rapidly during the past two decades in China driven by the country's economic growth (Xue *et al.*, 2017). The FF industry expansion was highly correlated with GDP, and per capita disposable income growth of urban residents but moderately correlated with urban population growth (Xue *et al.*, 2017). More recently, a new consumer-driven sub-sector has emerged, called the online meal ordering industry and characterized by a systematic use of online services (Yang, 2007). The phenomenon of purchase and delivery of meals online mostly occurs in cities.

According to Wu (2012), online meal ordering is accompanied by the rapid development of the internet based economy and e-commerce and produced a new food catering marketing concept. The service attracts customers because of its convenience to complete food and

beverage orders to the satisfaction of customers and providers. (Wu, 2012).

Among those ordering meals online are university students (Cairns, 1996, He *et al.*, 2016, Wang *et al.*, 2013, Chen and Li, 2017). Compared to the dining hall, the online ordered meals tastes better, is more convenient and cheaper (Li *et al.*, 2016). He *et al.* (2016) also researched on online ordering among and found that college students focus on meal's price, quality, and purchase ability. Growth in online shopping has led to an increase in the numbers of small delivery vehicles in urban areas. Consumers generate a significant volume of home deliveries and, when clustered, for example in university residence halls, delivery vehicles can generate considerable traffic near a single location. Cherrett *et al.* (2017) estimate that residence halls with accommodations for 8000 students could generate 13,000 meal delivery trips annually. Cherrett *et al.* (2017) explored the potential to consolidate deliveries using a consolidation center in the United Kingdom, but the feasibility of the approach has not been considered in China.

There is a number of online meal ordering platforms available in China. Two types of online ordering platforms are: the catering firm or individual self-operation platform, and the third-party online ordering platform. The third party online reservation platform collaborates with a large number of small restaurants. Such platform offers a large variety of food and beverage choices and expands fast. Examples include "E le me", "Meituan Take-away", "Baidu Take-away", and "No 1 sales", among others.

## **2.1 Earlier studies and modeling approach**

Since final stage of distribution plays a crucial role in the e-commerce logistics chains, it has drawn many stakeholders' attention and different solutions have been proposed to enhance

the “last-mile” logistics (Xiao *et al.*, 2017). Overall, service quality and the speed of delivering an ordered meal are important attributes in this new food service sector. Sumaedi and Yarmen (2015) thought service quality is a critical success factor of fast food restaurant. Fast food restaurant managers need to measure and improve the service quality of their restaurant continuously. Hau-siu Chow *et al.* (2007), reported an empirical assessment of service quality in restaurant operations, by proposing and testing a conceptual model of service quality using structural equation modeling. The results supported the link between service quality and customer satisfaction, and service quality and repeat patronage.

Considering the satisfaction level among all levels of cities, the satisfaction of first-tier cities with the online meal order and delivery has been higher than the satisfaction across all size cities. The delivery services have been better developed in the first-tier cities as compared to cities of other levels (Iresearch, 2016).

Meal delivery to an ordering customer represents a high cost for food businesses. Ran *et al.* (2016) examined the catering industry of Jiangnan University as an example and proposed a closed-loop delivery for online meal ordering, with the centralized order management, and centralized distribution of the fixed time logistics distribution mode. The approach reduces the time it takes to deliver a meal from an average of 45 minutes to less than 30 minutes, and it also saves costs of hiring food delivery workers.

Yeo *et al.* (2017) studied consumer experiences, attitude and behavioral intention toward online food delivery (OFD) services. This study is to examine the structural relationship between convenience motivation, post-usage usefulness, hedonic motivation, price saving orientation, time saving orientation, prior online purchase experience, consumer attitude and

behavioral intention towards OFD services.

Perceptions or attitudes of customers towards the online meal ordering service can be measured using tools developed for studying psychological behavior. Marketing studies routinely apply Likert-type scales to solicit response pertaining to the importance of various attributes of a product or service. A five-step scale was applied in this study to solicit responses regarding the importance of meal delivery service quality and the speed of meal delivery. Two steps measure a certain level of unimportance, while to top steps accounted for the relative importance, with the middle step reflecting a neutral stand with regard to the studied issue. Data obtained using a scale due to their ordinal nature suggest an ordered logit (or probit) technique in estimating the empirical relationships. This general approach was to be used also in this study unless the distribution of responses called for a modified approach.

### **3. Data**

#### **3.1. Survey design**

The structured questionnaire contained two main parts. One part involved questions probing for respondent views and opinions on specific aspects of meal delivery services, while another requested that a respondent share socio-demographic information.

The major socio-demographic characteristics included gender, age, in college, year of study, and job type/ position for respondents other than students. The other part of the questionnaire probed respondents for details about various aspects of the process of ordering a meal, order features, and meal attributes. Respondents indicated the number of online meal orders, average price per order, own willingness to cook, and own ability to cook. Information was obtained about meal delivery service, meal variety, taste, nutrition, and safety, as well as

price and payment convenience. Multiple choice options were presented to survey participants regarding meal type, such as traditional Chinese breakfast, gai jiao fan (rice served with meat and vegetables on top), noodles or dumplings, different local snacks, barbecue, American fast food (KFC, McDonalds, etc.), Japanese or Korean cuisine, dessert, drink, fruit, and others. The phrasing of questions about the overall service quality and the meal delivery speed offered a respondent a range of choices by applying a scale. The scale ranged from 1 (not important) to 5 (very important). The use of a scale suggests the ordered logit technique as the estimation technique.

### **3.2. Data collection**

The survey instrument was subject to a pilot test prior to wide distribution. The pilot test was held at a major university in Shanghai from June 5, 2017 to July 3, 2017, and yielded 267 completed questionnaires. The online survey website was commissioned to a well-known online survey portal operated by a private company. The data collection techniques used by the company ensured efficient data collection by providing strict quality control, which included sample quality control, selection of respondents, and tracking the completion process. The online survey was administered between June 5, 2017 and July 30, 2017. The study uses the sample of 554 respondents from cities scattered across 29 provinces of China (Figure 1).

### **3.3. Sample description**

The respondents (554) participating in the survey were located in cities in most provinces in China. The widespread location of respondents provides evidence of the popularity of online meal ordering, although the majority was located in coastal provinces. Many of these provinces enjoy solid economic growth and are relatively developed supporting the observation

that online meal ordering coincides with the level of economic development. Nearly a third of respondents, 31.2%, were from first-tier cities, 20.6% from second-tier cities, and 48.2% from third-tier cities. The division into three levels is based on the number of residents and economic development level. The first-tier cities include Beijing, Shanghai, Tianjin, Chongqing, Guangzhou, and Shenzhen. The second-tier cities refer to provincial capital cities, and the third-tier refers to cities of regional importance in a province.

The majority of respondents were not older than 35 years. The largest number was between 26 and 35 years old (57%), followed by respondents whose age ranged from 36 years to 45 years (18.6%). Another 7.6% of respondents were 46 years old or older suggesting that there is a clear preference for meal order services among younger consumers. In terms of occupation, white collar workers dominated among respondents (30.1%). Professionals and government employees represented the next largest group (24.7%). Blue collar workers (19.0%), and the self-employed or others (7.4%) accounted for about a quarter of respondents. Of the 18.8% of college students, juniors (8.3%) and seniors (4.7%) represented the largest shares.

When asked about their willingness to cook, 48.7% of respondents claimed a neutral opinion, choosing “neither dislike, nor like” cooking. But there were more respondents, 29.2%, who liked to cook than those who disliked it, 17.7%. Additionally, respondents self-evaluated their cooking ability. Among them, 28.2% thought their cooking skills were good, while 20.6% viewed them as poor. The correlation between the willingness to cook and cooking abilities was 0.588, at  $p=0.000$ .

The frequency of online meal ordering indicated that 43.5% of respondents ordered meals online 3-4 times per week. Another 29.8% of respondents ordered twice a week and

12.6% of respondents did so only once a week. The category reflecting the most frequent ordering meals online, over 5 times, was posted by 11.0% of respondents. The average price paid per order shows that the largest number of respondents (45.5%) paid 20-25 yuan per meal. The highest price per ordered meal listed among options presented to respondents was over 25 yuan, and was selected by 16.1%. As many as 8.5% of respondents selected the price range 10-15 yuan per meal, and 1.6% admitted to paying less than 10 yuan, on average. Overall, those ordering more than twice a week accounted for 84.3% of respondents, while 89.9% paid 15 yuan or more per order, further indicating that online meal ordering is quite popular.

Furthermore, with the increase of meal ordering frequency, the price of each order showed a tendency to increase. For example, when ordering twice a week, those spending 10-15 yuan per order accounted for 6.7%, while respondents paying 15-20 yuan and 20-25 yuan per meal represented 39.4% and 35.8% of respondents, respectively. When the weekly ordering frequency reached 3-4 times, the proportion of those spending 20-25 yuan per order increased sharply to 60.2%, while the share of those spending 10-15 yuan decreased substantially to 6.7%, and the share of respondents spending 15-20 yuan decreased to 23.2%. A person frequently ordering a meal online is commonly a very busy employee, who may choose to work during the lunch break. Such workers, regardless of their position, may have high quality expectations of meals and delivery service, and they may be less sensitive to the order price.

The questionnaire probed respondents about the kind of meal they usually ordered. Nine options were presented and included Chinese traditional breakfast, Gai jiao fan (rice served with meat and vegetables on the top), noodles or dumplings, different local snacks, barbecue, American fast food menu (KFC, McDonalds, etc), Japanese or Korean cuisine, dessert-

drink-fruit, and “other”. Gai jiao fan was most popular (72.4%), which shows that a complete main dish was commonly selected online for delivery. There were 54.3% of respondents purchasing American fast food proving that was an important and popular option. The reason maybe due to the nature of online ordering, which seems to favor a fast-paced lifestyle characterizing younger people, who are likely to accept western, especially American, fast food. Different local snacks were also commonly ordered (50.2%), which shows much interest in some regional delicacies. Noodles or dumplings are a convenient and traditional meal in China and ordered by 49.3% of respondents. Chinese breakfast accounted for 38.3% of online orders, and usually includes a stuffed bun, porridge, fried dough sticks, or steamed roll. Recently, Chinese breakfast has not been only eaten in the morning, but ordered for lunch or dinner. Dessert, drink, or fruit proportion was ordered by 27.3% of respondents and usually would be ordered in combination with another meal. Barbecue is popular worldwide including China. Chinese consumers prefer barbecue late at night, and 26.4% of respondents indicated ordering it online. Japanese or Korean cuisine was enjoyed by 16.4% respondents. Overall, results show traditional Chinese food was the main type of meal ordered online, but some foods from other countries (United States, Japan, and Korea) also are accepted by Chinese consumers.

A respondent could indicate all types of meals he ordered online. Given a total of eight meal categories, 33.8% of respondents purchased three kinds of meals, 24.0% selected four categories, and as many as 12.6% of respondents ordered five different meal types online. The mean number of online ordered meal types was 3.35.

Respondents were asked what major factor influenced their ordering behavior, and were presented with eight options. The most often chosen options included concerns about the meal

taste (85.6%), followed by meal delivery service (73.7%), and food safety (70.0%). Meal variety (69.5%), price (55.8%), payment convenience (43.1%), and nutrition (36.1%) were the other four selected factors influencing ordering behavior.

#### *Perception of delivery service quality and speed importance*

The main purpose of this paper is to analyze Chinese consumer perception of meal service delivery quality and speed of delivery. The question about the importance of delivery service quality and speed offered a respondent a choice along a 5-point scale, and "5" implied "very important" where "1" meant "not important at all." The largest share of respondents (56.9%) selected option 4 (important), followed by 5 (very important). Very few selected option 3 (6.0%), or 2 (1.4%), and none of the respondents perceived quality of service or speed as "not important at all".

The importance of meal delivery speed was expected to be important. There were 46.4% of respondents who indicated the speed to be very important, while 42.8% perceived it important. Only three respondents indicated that delivery speed was not important. The mean scores of two online meal ordering service attributes were respectively, 4.27 and 4.34.

Meal quality and speed of meal delivery perceptions were examined in terms of possible association. The correlation coefficient of importance of delivery service and speed is 0.201, at  $p=0.000$ . It appears that the correlation, although positive, is relatively small suggesting the respondents were not likely to link those two attributes when completing the questionnaire.

#### **4. Results**

The responses regarding the importance of service quality and delivery speed associated with the use of online ordering systems suggested that answers were often concentrated in the

two categories indicating the item was “important” or “very important”. This distribution of responses led to the specification of the empirical relationship distinguishing between only those two response categories. The selected approach suggested the use of the logit technique in estimation.

#### **4.1. Importance of delivery service**

Table 3 shows the results of the estimated equation modeling the importance of service quality to online meal order customers. Older customers attached more importance to the service quality than younger respondents. This result is not surprising as older customers have longer life experiences shaping their expectations. However, students also attached importance to service quality suggesting that it is not only life experience that may shape expectations of quality service, but also the level of educational attainment.

Other variables that significantly affect the importance of service quality include the average price per ordered meal. The higher the meal price, the more importance attached to service quality. Such results are not surprising as it is common among consumers to expect high quality service when paying a high price. In the case of this study, another feature influencing the perceived importance of service quality is payment convenience; high convenience seems to increase the importance of service quality.

Two variables associated with ordered meals also result in increasing the importance of service quality to customers. Namely, those who like to see meal varieties offered when ordering a meal online also believe that service quality matters. A variety of meals like variety for food in general are associated with consumers whose preferences have been shaped by a combination of factors, including culture, informal knowledge, and experience. Additionally,

customers who expressed satisfaction with the most recently delivered meal attach importance to service quality suggesting that a positive experience led to a repeated order and strengthens that feature with regard to service quality.

Among features directly related to the person delivering a meal, it appears that customers who would like the company logo displayed on the uniform are also likely to assign importance to service quality. Indeed, the external appearance of the delivery man signals the reputation of the service to customers and bystanders alike.

#### **4.2. Importance of meal delivery speed**

Factors influencing the perceived importance of the delivery speed of a meal ordered online differ from those associated with perception of service quality importance (Table 4). Among two meal types ordered online, gao jiao fan and barbecue significantly influence the importance of speed delivery. Gao jiao fan is a typical dish combining rice with vegetables and meat placed on top and is a full meal, commonly the main meal of the day. It can be ordered and delivered at any time of the day, however. Ordering such a meal increases the importance of speed delivery, likely because it is a large meal that is typically eaten at mid-day. Customers ordering online expect speedy delivery because if the order is placed mid-day, they likely take only a short break from their daily work. Any delay in the delivery could compromise job performance. In contrast, customers ordering barbecue attached less importance to speed delivery because barbecue is commonly eaten late in the day, probably for special occasions during leisure time. Customers most likely add barbecue to other foods they may already be enjoying while waiting for delivery.

Among other variables that suggest a customer attaches less importance to speed

delivery is ability to cook; if a respondent liked to cook, the delivery speed was less important. It is possible that liking to cook implies also knowing how to cook, and such customers realize what it takes to prepare and deliver a meal. Another variable implicitly suggests that speed delivery is important. Having a logo on the uniform worn by the delivery service courier facilitates identifying him and accelerates receiving a meal. The logo on a uniform may be particularly important when the delivery point may be crowded with other couriers during, for example, the lunch break at a factory. Customers who wanted a health certificate badge on the uniform or on the delivery vehicle viewed delivery speed as less important.

## **5. Conclusions**

Results show that online meal ordering services are popular among relatively young people (aged below 35). Many of them are well educated and have good jobs. However, many students, who are not likely to earn income from having even part-time jobs, also frequently order meals online. Additionally, almost 90% of respondents indicated the average price per ordered meal was in excess of 15 yuan and 84.3% of respondents ordered online meals at least twice a week. The average meal price and ordering frequency suggest that the meal delivery sector is likely to grow with an increase in the urban population educational attainment level and discretionary income.

The most commonly ordered meal was traditional gai jiao fan (72.4%) and online ordering was most convenient to deliver this (likely), main meal of the day. However, there is a substantial number of customers who desire variety, and one in three respondents purchased 3 kinds of dishes listed in the questionnaire. The meal's delivery service quality (73.7%) was among the top three factors viewed as important by survey participants.

The average score of meal delivery service and speed was, respectively, 4.27 and 4.34, and the perception of importance of those attributes were modeled. The importance of each attribute was differently influenced by the explanatory variables. Older customers and students emphasized the importance of meal service quality as did those who paid a relatively high price on average and valued payment convenience (e.g., paying for the meal using a cell phone when the order is placed). High standard of courier appearance was also an important signal of service quality, while satisfaction with the most recent delivery also strengthened the importance attached to perception of meal service quality.

Despite the rapid development of e-business, Chinese catering and logistics companies still have room to improve in online meal ordering services. Restaurants having a delivery service or hiring such a service can insist on clearly visible logos on the courier uniform, for example. The importance of satisfaction with the latest delivered meal suggests soliciting customer feedback regarding this issue immediately after the delivery. An instant feedback allows for a quick correction of any possible lapses. Delivery speed needs to be considered with regard to the type of ordered meal, and it seems to matter particularly to customers ordering *gai jiao fan*, a typical main meal of the day in China. Since it is likely such meals are ordered mid-day, improving delivery speed may require monitoring traffic patterns to reduce waiting time on the part of a customer.

## **6. Limitations of the study**

Future studies may involve larger samples where the number of respondents from each province more closely reflects the estimated number of urban residents. Additionally, by focusing on the general public, there may be opportunity to collect information about income,

household characteristics, and job types, which are relevant to ordering meals online. Also, more information about reasons for ordering a meal will help discern motives behind the use of the service, while more details about the delivery service will allow examining the performance of such services across cities.

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Table 1. Sample socio-demographic characteristics.

Characteristic		Count	%
City level	First-tier city	173	31.2%
	Second-tier city	114	20.6%
	Third-tier city	267	48.2%
Gender	Male	249	44.9%
	Female	305	55.1%
Age	<=25 years old	94	17.0%
	26~35 years old	316	57.0%
	36~45 years old	103	18.6%
	>= 46 years old	41	7.4%
Occupation	College student	104	18.8%
	White collar	167	30.1%
	Blue collar	105	19.0%
	Professional or government employee	137	24.7%
	Self-employed or other	41	7.4%
Grade, if a college student		450	81.2%
	freshman	3	0.5%
	sophomore	20	3.6%
	junior	46	8.3%
	senior	26	4.7%
	graduate student	9	1.6%

Table 2. Descriptive statistics of variables included in the empirical model (N=554).

Variable name	Variable description / units of measurement	Mean	Std. deviation	Min.	Max.
<i>Dependent variable</i>					
Service importance	1= not important at all, 2= not important, 3= general, 4= important, 5= very important	4.268953	.6349182	2	5
Speed importance	1= not important at all, 2= not important, 3= general, 4= important, 5= very important	4.33574	.7211007	2	5
<i>Independent variables</i>					
Demographic factors					
City level	1=first-tier city, 0 otherwise	.3122744	.4638399	0	1
Gender	1=male, 0=female	.4494585	.4978886	0	1
Age	= 1 if 18-25 or 26-35; 0 otherwise	.7382671	.4399752	0	1
Student	1=yes; 0 otherwise	.1877256	.3908458	0	1
Cook willingness	1=if be very fond of or like; 0 otherwise	.3158845	.4652873	0	1

Cook ability	1=if very good or good; 0 otherwise	.299639	.4585139	0	1
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Socio-economic factors

Ordering frequency	=1 if 3-4 times or over 5 times per week; 0 otherwise	.5451264	.4984095	0	1
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Price of each	1 = below 10 yuan; 2= 10-15yuan; 3=15-20yuan; 4=20-25yuan; 5=over 25yuan	3.658845	.9025999	1	5
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Categories	1=if Categories $\geq$ 5, 0 otherwise	.1805054	.3849555	0	1
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Table 3. Result of the estimated equation modeling perceptions of the service quality importance.

Parameter	Estimate	Standard Error	Wald Chi-Square	Pr>ChiSq
Intercept	1.2201	0.2082	5.86	<.00
Gender	-0.0119	0.0605	-0.20	0.84
Student	0.1727	0.0977	1.77	0.08
Manager	0.0761	0.0806	0.94	0.35
Age	0.0809	0.0391	2.07	0.04
Average price paid	0.1042	0.0494	2.11	0.03
Payment convenience	0.3071	0.0475	6.47	<.00
Satisfaction with last delivery	0.0850	0.0463	1.84	0.67
Meals categories	0.1001	0.0512	1.96	0.05
High standards of appearance	0.0971	0.0312	3.04	0.00
Dressing printing LOGO	0.0143	0.0369	0.39	0.70
Health certificate	0.0208	0.0413	0.50	0.61
Sigma	0.5473	0.0164	33.29	<.00

Table 4. Result of the estimated equation modeling perceptions of the delivery speed importance.

Parameter	Estimate	Standard Error	Wald Chi-Square	Pr>ChiSq
Intercept	1.8693	0.2824	6.62	<.00
Gender	-0.0030	0.0643	-0.05	0.96
Manager	-0.0981	0.0932	-1.05	0.29
Age	0.0543	0.0406	1.34	0.18
Meal ordering frequency	0.0492	0.0341	1.44	0.15
Average price paid	0.0899	0.0600	1.50	0.13
Gai jiao fan	0.1142	0.0637	1.79	0.07
Barbecue	-0.1580	0.0641	-2.46	0.01
College student	0.0980	0.0806	1.22	0.22
If you have time do you like	-0.0679	0.0360	-1.89	0.06
Dressing printing LOGO	0.0869	0.0418	2.08	0.04
Health certificate	-0.1153	0.0481	-2.40	0.02
Sigma	0.6420	0.0196	32.77	<.00

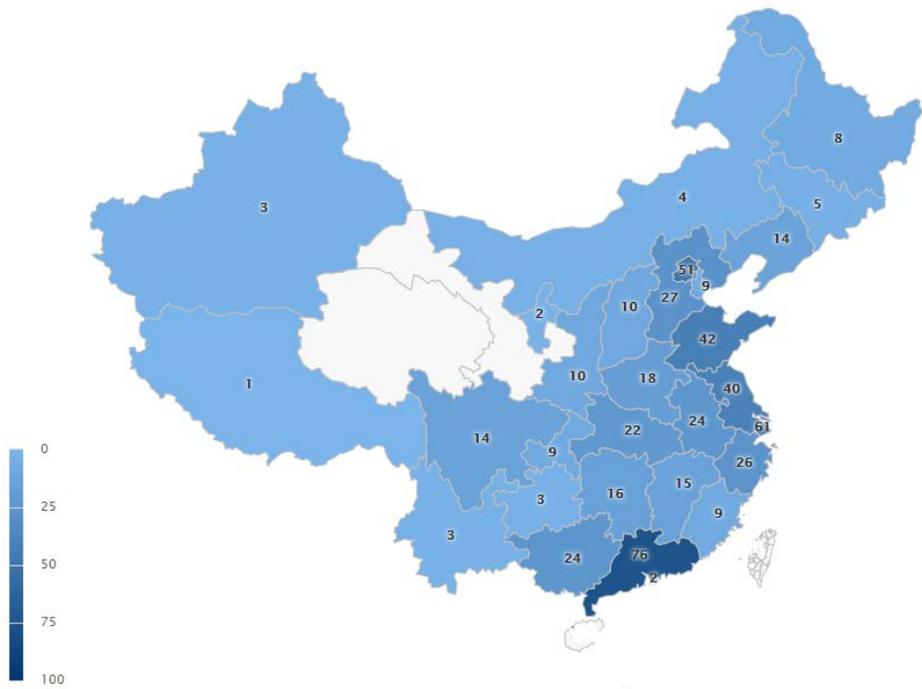


Figure 1. Provinces and number of respondents from each province.