



The online-to-offline (O2O) food delivery industry and its recent development in China

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Abstract

This paper offers a unique perspective about the development of the online-to-offline (O2O) food delivery industry from 2017 to 2019 in China. This study demonstrates the latest transformation and improvements of the O2O market that address some common problems in the early stages of the development of this raising industry in China. New strategies and regulations from the O2O platforms, food providers, and national and local governments are discussed. In our view, the mission of the O2O industry in general has shifted from pursuing enormous quantity to ensuring high quality. China's O2O food delivery industry warrants further attention and studies as it grows and develops into the future. We suggest future studies to work on its economic, behavioral, and health impacts on population level as it encompasses both great risks and rewards.

Background of the O2O food delivery industry

A previous published paper about the emerging O2O food delivery industry in China in 2018 revealed the inevitable trend of increased consumption of food delivery service in China, which acts as a third-party platform between customers and restaurants to coordinate orders and delivery online [1]. The study demonstrated that the market scale of O2O

food industry increased from US\$3.4 billion in 2011 to US\$32.5 billion in 2017, and the customers of such industry increased from 114 million in 2015 to 343 million in 2017 in China. It also discussed that the increase of food availability and accessibility provided by O2O food delivery system has brought convenient dining experience. During that time (2015–2017), safety issues and health problems such as foodborne diseases were the major concerns, along with the behavioral changes caused by the O2O food service and its impact on individual's physical and mental health [1].

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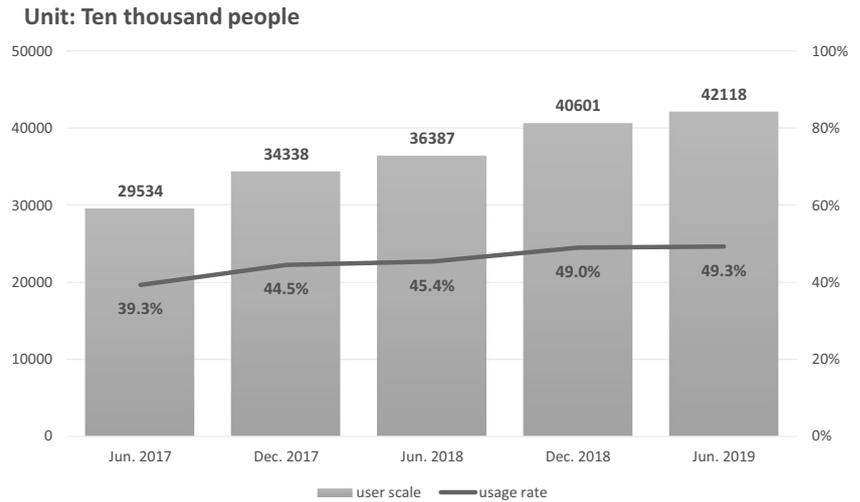
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The changing demands

Developments in China's O2O food delivery industry, along with the increased use of internet, have led to changes within the Chinese food delivery customer population as well as in their demands. From December 2017 to June 2019, internet users in China grew from 772 million to 854 million [2]. Within this period, O2O food delivery customers grew steadily by 22.7%, from 343 million to 421 million [3]. It is evident that the O2O food delivery customer population has been growing steadily [3]. (Fig. 1). Moreover, O2O customers used food delivery services more frequently in 2019 than they ever had before, with the average number of orders placed by an individual customer growing from 18.8 in 2018 to 25.5 in 2019 [4]. These findings suggest that the growth of the Chinese O2O

Fig. 1 2017–2019 O2O food delivery customer population in China. The figure

demonstrates the increase in the customer number of O2O food delivery system between 2017 and 2019. The user scale is the total number of O2O service users in China for each time point (unit: ten thousand people). The usage rate shows the percentage of user amount in each time point (100% = 500 million) in order to show the increase of users across these years. Data retrieved from the 44th Statistical report on the development of China Internet network by China Internet Network Information Center (CNNIC) in 2019. Available from: http://www.cac.gov.cn/2019-08/30/c_1124938750.htm.



industry was more driven by the increasing frequency with which customers used its service than by the increase in customer number. This new pattern demonstrates novel developments in O2O customers' consumption habits.

Customers born in the 80s and 90s dominated the consumption of O2O food delivery services. A prominent O2O food delivery platform in China had 86.3% of its orders placed by customers of between 20 and 34 years old in the first half of 2019 [5]. Surveys reveal that some of the major reasons O2O customers chose to use food delivery service include "bad weather", "convenience of delivery", and "not wanting to cook" [5]. Customers born in the 90s chose food delivery services primarily because they considered cooking a nuisance, while for customers born before the 90s weather was the deciding factor [5]. Data show that the percentage of student customers on O2O decreased from 33% in 2015 to less than 10% in 2019 [5]. The percentage of white-collar workers among O2O costumers have increased from 63% in 2015 to 86% in 2019 [6]. This changing makeup of the O2O customer population may in part explain the increase of higher-priced delivery orders. It is observed that delivery orders above 40 RMB made up 32.9% of all O2O delivery orders in the fourth quarter of 2018, as opposed to 22.7% in the first quarter of 2017 [7]. It is worth pointing out that there might exist a causal connection between a customer's level of education and their O2O food delivery service consumption level. A recent study concerning Chinese undergrads points out that frequent O2O food delivery consumption is tied to a relatively high education level [8]. Research has shown that highly educated individuals are more aware of their health than the less-educated ones [9]. We assume that highly educated individuals would be able

to accept the increasing price of O2O service as long as it is able to meet their needs on healthy and high-quality food. This possible explanation is consistent with the rising demand of O2O service with higher food quality and price.

Shifting goals

The O2O food delivery industry's quick rise in China may be accredited to its early business strategies. The majority of O2O delivery platforms expanded their markets by attracting businesses through generous subsidies and enticing consumers with low, affordable prices during the O2O food industry's early development period [10]. However, food prices with O2O service had been on an upward trend since 2018 [11]. According to the Sina Finance report, O2O platform has raised their prices of delivery food, some are even more expensive than the dine-in food produced from the same restaurants [11]. The Sina Finance report also mentioned that all parties in the O2O food industry have entered a cost recovery period, including labor, rent, social security, disability insurance, and third-party delivery service platform fees. The platform has been inevitably requiring higher intermediate business income [11]. Superficially, this was due to O2O platforms' higher commission fees on restaurants as well as an increase in delivery fee; both led to increased production costs and resulted in higher product prices [12, 13]. Yet there were deeper reasons: First, as the O2O delivery industry matured and its early strategies became largely unprofitable, its goal began to shift from market expansion to generating profits; [10] second, delivery services started to focus on producing higher-quality products instead of providing low, affordable prices [14, 15].

Table 1 List of goods provided on O2O food platforms in China.

Category	Item
Delicacy	Local dish, bento, fast food, snack, hotpot, light food and western food, Japanese and Korean cuisine etc.
Snacks and drink	Snacks, milk tea and juice, bread and cake, coffee, ice cream etc.
Grocery	Goods from large supermarket, convenience store, water-supply station etc.
Fresh food	Vegetables, fruits, seafood, food material, meat and eggs etc
Health and medicine	Drugstore, optical store, etc.
Flowers and plants	Flower, green plants.

The increased investments in research and development, which resulted in better services and shorter delivery time also resulted in higher production costs and delivery prices [11, 16]. Despite the growth in food delivery service expenditure and the increase in average delivery order price, the goals of the O2O food business have already changed from offering cheaper and faster food to providing high quality dining experience, which includes healthier and more a diverse choice of dishes, a safer food-preparation and delivery system, and more efficient service platform in the last 3 years [15, 17]. More discussion on the percentage of increase in average spend across consumer type should be discussed in future studies on O2O food industry in China.

With the epidemic of COVID-19 happening around the world, the Chinese O2O food delivery business has been playing an important role in dietary behavioral change among Chinese people. A study on dietary diversity among Chinese residents during the COVID-19 has shown that more than half of the residents (55.9%) have tried the O2O online food delivery service during the pandemic [18]. According to the O2O food company “Eleme’s data platform, from February 2020 to March 2020, headed by first-tier cities such as Beijing and Shanghai, many high-end brand restaurants such as Michelin restaurant, the Star Hotel Group launched its own delivery business across the country, which has got special attention by the consumer market [19]. The elevated food delivery service provided by the O2O food platforms has become an ideal choice of dining for people who pursue high-quality and safe food at home during the epidemic.

Diversification of the O2O food choice

The O2O delivery industry entered a period where it aimed for greater product diversity and quality. Food delivery was no longer limited to simple meals and fast food [20]. Compared to 2017, more customers in 2019 ordered for lunch and dinner and hot pot delivery service was growing rapidly [21]. The increasing availability and popularity of items such as hotpot and traditional Cantonese food, which were once unsuitable for delivery, reflected a demand for diversification in delivery food [22]. In addition, the delivery service itself had expanded to include fresh

grocery, everyday items and health products, etc., in order to satisfy customers’ everyday needs [23]. Table 1 shows a general list of goods provided by the main O2O food platforms in China. Lastly, the O2O delivery industry witnessed the emergence of new jobs. Besides delivery bikers, novel positions like delivery station managers, delivery dish coordinators, delivery operating planners, and online restaurant decorators generated new employment opportunities [4]. At present, the O2O market is strongly penetrated in first-tier and second-tier cities, with the proportion of second-tier, third-tier, and lower-tier cities rising, among which the proportion of third-tier and lower-tier cities has reached 44.2% [4]. There were more than 10 billion O2O delivery men in 2018 [24]. In the first three months of 2019, Eleme, the largest O2O platform in China owned by Alibaba, recruited more than 6000 employees covering jobs in merchant service, product research and development, distribution management and other aspects [25]. With the expansion of the O2O market, new jobs with different education level requirements offered by this industry emerged around the nation [25].

It is worth noticing that Kentucky Fried Chicken, McDonald’s, and Dicos were among the top 10 delivery food brands. Fast food, desserts, and drinks accounted for a majority of delivery food consumption in 2019 [4]. Fast food and snacks constituted 69.0% of the food category, while milk tea and juice made up 67.7% of the desserts and drinks category [4]. The majority of the delivery food customers preferred food items that were salty and spicy [4]. Some studies have pointed to the connection between fast food consumption and obesity [8, 26–30]. Evidence has shown that some characteristics of fast food, including excessive portion size, palatability that emphasizes taste preferences for sugar, salt, and fat, and high energy density and high glycemic load, could promote a positive energy balance and thereby result in weight gain and insulin resistance, further increase the risk of obesity and type 2 diabetes [1, 31].

The concern and solution on food safety

While O2O food delivery industry is increasingly capable of catering to its customers’ needs with a convenient and diverse

Table 2 Development of the O2O food delivery industry with shifting demands and operation.

	O2O platforms	O2O customers	O2O food providers	Government
2015–2017 Low cost	<ul style="list-style-type: none"> • Goal: expansion by attracting new customers • Attract customers with low prices • Unhealthy competition 	<ul style="list-style-type: none"> • Passively choose O2O service to cover a quick meal • Prefer cheap food 	<ul style="list-style-type: none"> • Mostly cooked food • Lack of food safety awareness • Lack of employment diversity 	<ul style="list-style-type: none"> • Limited regulation
2017–2019 High quality	<ul style="list-style-type: none"> • Goal: profit through increased spending per customer • Entice customers with quality and diverse products 	<ul style="list-style-type: none"> • Actively choose O2O service to achieve quality life • Seek food of high quality and diversity 	<ul style="list-style-type: none"> • Provide cooked food, grocery and everyday items • Food safety strategies with higher level of transparency and supervision • Diversification of employment positions 	<ul style="list-style-type: none"> • National and local policy and regulation to monitor both platforms and businesses

Note: The summary of 2015–2017 was retrieved from our published article “How we eat determines what we become: opportunities and challenges brought by food delivery industry in a changing world in China”¹.

selection of food, concern with regards to food safety emerging from studies in China [32, 33]. The O2O food delivery platforms were considered as a new mode of foodborne disease transmission [32]. Food handling practices were also viewed as a potential risk of acute gastroenteritis outbreaks due to the lack of surveillance and supervision [33]. The Chinese government has been trying to address the food safety issue in O2O food business. China’s regulation named “Measures for the Supervision and Administration of Food Safety in Online Catering Services” took effect on January 1, 2018, which requires O2O food businesses to follow regulations such as acquiring business license and publishing their name, address and quantitative classification information online [34, 35]. China has also published a series of regulations concerning the delivery process in recent years requiring all food delivery businesses to have their delivery packages sealed to prevent contamination during delivery [36, 37]. The O2O food platforms also established regulations to assess different types of non-reusable delivery food containers to ensure their quality and sustainability [38]. In 2018, a prominent Chinese O2O food delivery platform took the lead in promoting new storage equipment, developing a cleaning and disinfection procedure for delivery boxes, and incorporating kitchen live streaming to help ensure delivery food safety [39]. In addition, several major O2O food delivery platforms started to provide food safety insurance, with which customers ordering products with “qualified” labels from the platforms are entitled to a compensation if they experience food safety issues [40]. Going forward, food delivery platforms should encourage businesses to disclose information regarding food safety, such as quantitative classification information, so that customers can make informed decisions and food safety hazards can be avoided [41–45].

Conclusion

As shown in Table 2, the O2O delivery industry in China has developed and changed in many directions since 2017. Having achieved the initial expansion, the O2O industry has shifted its priority from quantity to quality and diversity. In the process, O2O delivery industry both accommodated and reshaped its customers. On top of that, important regulations were put in place to standardize and regulate O2O business practices both online and offline. China’s O2O delivery industry warrants further attention and studies as it grows and develops in the future. Future studies should focus on its economic, behavioral, and health impacts on the population level as it encompasses both great risks and rewards.

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Compliance with ethical standards

Conflict of interest We declare that we have no personal or financial relationships with other individuals or organizations that can improperly affect our work. There is no interest of any nature in any product, service, and/or company that could be considered as affecting the position and views presented in this study.

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