

**DEMYSTIFYING ONLINE FOOD DELIVERY MARKETPLACE OPERATIONS IN
SHARING ECONOMY**

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE FELLOW PROGRAMME IN MANAGEMENT

INDIAN INSTITUTE OF MANAGEMENT, INDORE



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DATE: JANUARY 22, 2023

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ABSTRACT

Over the last decade, consumers' need for *choice* and *convenience* has paved the pathway for technologically transformative innovation in the foodservice industry. This innovation, referred to as online food delivery (OFD), has streamlined the online ordering process and reduced wait times for consumers expecting convenient food deliveries. The thesis is motivated by a two-sided platform-based sharing economy business model comprising four stakeholders – platforms, restaurants, consumers, and drivers. Some highly successful platforms in the OFD marketplace are *Meituan*, *Eleme* in China, *Grubhub*, *Uber Eats* in the United States, *Zomato*, *Swiggy* in India and *JustEat*, and *Deliveroo* in Europe.

OFD platforms are designed to improve restaurants' service quality while handling online orders and making online ordering more user-friendly for consumers. To diversify their revenue stream, primarily comprising commissions (from restaurants) and delivery fees (from consumers), OFD platforms have started operating Cloud Kitchen (CK) services. Within the OFD platforms, the CKs compete with the restaurants for online consumer orders. Platforms exert efforts on restaurants and CK by enabling multiple services like delivery logistics support, app analytics, service capacity utilization and information sharing. The indirect effects of these efforts play a vital role in creating a differentiation in the service quality provided by CK and the restaurant to the consumers through the platform. We address this gap in *research problem 1* by proposing a sequential non-cooperative game-theoretic model capturing the indirect effects of the platform's efforts and investigating its impact on product pricing and platform profits. We find that (i) an increase in the platform's effort on the restaurant indirectly improves CK's service quality, and (ii) even with a lower rate of commission charged from the restaurant, the platform can influence the restaurant's service quality by utilizing the indirect effects of its efforts on CK. Numerical analysis shows that the indirect effect of the platform's efforts, if not

considered by the platform while planning the effort allocations, can significantly reduce its profits.

Setting up a restaurant network is a long-term strategic decision taken by an OFD platform to increase variety in its offerings and, thus, attract more online orders from consumers. This involves the roll-out of incentive-based offers from OFD platforms to restaurants, such as promising a Minimum Business Guarantee (MBG) in lieu of reserving the restaurant's service capacity for serving online orders. To capture this iterative negotiation process of service capacity reservation between an OFD platform and a restaurant, in *research problem 2*, we model a Stackelberg game, wherein the platform acting as a price leader that maximizes its profit. In contrast, the restaurant maximizes its own profit by responding to the platform's proposal for service capacity reservation. We find the optimal commission fee charged by the platform to the restaurant and the optimal pricing of the restaurant's product in both online and dine-in channels. Numerical analysis shows that the service capacity reservation is a function of the restaurant's low or high dine-in demand in the consumer market. We find evidence that price mimicking is a profit-making strategy for restaurants and a loss-making strategy for platforms under low and high dine-in demand scenarios, respectively. We suggest that the OFD platform managers institute tie-ups with restaurants facing low dine-in demand and increase prices in both channels to enhance profit margins for the platform.

In *research problem 3*, we propose an analytical model to understand how implementing the Pay-What-You-Want (PWYW) delivery pricing strategy in place of the standard Pay-As-Asked (PAA) delivery fee impacts platform profits. Under PWYW, the consumer chooses the delivery fee it wishes to pay, and the platform is obliged to accept it. We capture consumers' social preferences such as fairness, reciprocity, warm glow and self-image concerns by segmenting them into three categories: *free riders*, *fair-minded*, and *generous* consumers. Through this characterization, we derive the conditions under which PWYW implementation

results in positive and higher profits for the platform compared to the PAA strategy. PWYW attracts price-conscious consumers to place online orders when the average cost of delivery to the platform is low, and the strength of social preferences among consumers is high. Our study suggests that the OFD platform managers should strive to minimize the cost of delivery as much as possible to maximize profits and increase consumer surplus under PWYW implementation. To prevent free riders from driving down profits under PWYW, we suggest that platforms impose a minimum fee that consumers use as a benchmark when determining the delivery fee they wish to pay.

Overall, we contribute to the extant literature at the intersection of OFD, the restaurant industry and sharing economy by focusing on online platforms that enable food ordering and delivery services. Most OFD platforms are bleeding money, and hence, despite the food delivery market's fast global expansion, are still unable to grow profitably. We believe that productivity and diversification are the missing elements hindering the sustainable growth of OFD platforms. Theoretically, we uncover the operational complexities associated with service quality, service capacity and pricing architecture involving the four stakeholders in the OFD marketplace. Practically, the insights from the thesis can assist OFD platform managers in successfully planning their operational strategies for revenue diversification and improving their productivity by making more informed decisions.

Keywords: online food delivery, online platform, sharing economy, pricing, competition, service quality, service capacity, commission, delivery fee, Pay-What-You-Want, Pay-As-Asked, social preferences

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