At Your Service on the Table:
Impact of Tabletop Technology on Restaurant Performance

Information technology has been found to be associated with higher productivity by reducing costs, increasing output quality, and intangible aspects such as convenience, timeliness and product variety in certain service sectors, including business services, financial services, and healthcare. Still, many traditional service sectors remain largely undigitized or underinvested in technology because of the intensive human aspects of the service process. Examples of non-digitized consumer activity include shopping at brick-and-mortar retailers, hiring house cleaners, checking in at a hotel front desk, and having a car serviced at repair shop (instead of buying parts online). Nevertheless, many traditional service sectors are starting to invest in technology to digitize (or “disrupt”) their business models.

The restaurant industry is a case in point, though it seems to be one of the latecomers to technology innovation. Because of its people-intensive nature, restaurant managers focus on human aspects of services. Also, because of a low industry profit margin of between 1 and 7%, investing extra budget in technology innovation can seem hard to justify. While some novelties such as reservation systems (e.g., Opentable), delivery services (e.g., Uber Eats), and rating services (e.g., Yelp) are growing in popularity, what happens inside the restaurant with table service has remained largely unchanged for many years.

As one of the nation’s major service sectors, the restaurant industry offers unique opportunities for technology innovation. In the United States, over one million restaurant locations generate more than $799 billion in annual sales, accounting for 4% of the nation’s GDP. These restaurants hire 14 million workers (half of all adults have worked in the restaurant industry at some point during their lives). In addition, restaurants offer an experiential service that can directly trigger customers’ extreme happiness or displeasure. Two in five consumers report that restaurants are an essential part of their lives. Recognizing such opportunities, the restaurant industry has just recently begun to increase spending on technology-related initiatives. Industry reports estimate that the U.S. restaurant industry spent 5.8% of its revenues on technology in 2014, as compared to 3.5% in 2013. Restaurants are adopting technology in several aspects of the restaurant
business, including review and search (e.g., Koshertopia, Foodspotting), reservations (e.g., Nowait, QLess), next-generation ordering/payment (e.g., Ziosk, E la Carte), loyalty and rewards (e.g., FiveStars, LevelUp), and HR analytics (e.g., ServeAnywhere, When I Work).

Implementing new technology incurs escalating costs to the already thin restaurant profit margin. In addition, restaurants (like other hospitality industries) traditionally have not realized the key advantages through technology that they have in location, decoration, and personnel. Human interaction is an integral part of restaurant hospitality, especially for full-service restaurants. Such interaction between customers and service-providers may be harmed by using self-serve technology. Although 20% of customers claim that they would rather use some kind of customer-facing technology than interact with restaurant staff, 45% feel that technology makes restaurant visits and ordering more complicated. Service-providers must devote extra effort to promote the technology and instruct customers to use it. Furthermore, technology that collects customer data may pose a significant risk of data breaches, damaging business performance. For these reasons, it remains unclear whether or not and how new technology may improve restaurant performance.

In this paper, we analyze more than 2.6 million transactions of a large, full-service casual restaurant chain as it implemented a customer-facing tabletop technology, to understand how the technology affects sales and meal duration aspects of restaurant performance. We study the full-service casual restaurants as our empirical setting because this sector is characterized by people-intensive table service. This sector of restaurants charge mid-range prices and collected over $90 billion revenues in 2014, qualifying it as economically significant. We focus on tabletop technology because industry executives are reported to prioritize customer-facing technology represented by the tabletop systems over other restaurant technology in order to enhance business efficiency and customer engagement. For our analysis, we exploit the staggered timing of the technology implementation and apply a difference-in-difference technique to identify the causal impact of tabletop systems on restaurant operations, followed by various robustness checks. In addition, we examine the nuances of the impacts that are oriented towards customers, waiters, and restaurant management, respectively. We find that tabletop technology is likely to improve average sales per check by 2.91%
and reduce meal duration by approximately 9.74%, increasing the sales per minute or sales productivity by approximately 10.77%. We find that those customers who pay their checks with the tabletop device instead of with a waiter tend to spend more money and complete their meal in less time. In addition, consumer engagement level with the tabletop technology has a J-shaped relationship with spending and a reversed-J-shaped relationship with meal duration. That is to say, as consumers spend more time interacting with the device, from no interaction to a very long time using the device, their check size first slightly dips and then keeps rising, while their meal duration steadily shortens until it moderately lengthens. New technology helps reduce the performance gaps between high-ability waiters and low-ability waiters, in that the tabletop technology better increases sales and reduces meal duration for low-ability waiters than for high-ability ones. The new technology also helps waiters more effectively upsell and cross-sell.

Our research findings highlight the value of technology innovation for restaurant operations. We also generate insights for managers to reconsider changes in staffing decisions and the functions of the new systems to fully exploit the productivity gains from the new technology. Finally, our research suggests the importance of effectively managing the relationship with high-value technology-savvy customers.