International Adaptations of Food Delivery Technology

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

Ankith Yennu
Spring 2020

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Signature _____ Date _____
Ankith Yennu

Approved _____ Date _____

Travis Elliott, Department of Engineering and Society

Abstract

Food delivery technology has become increasingly essential to our busy daily routines as well as to large and small food businesses looking to attract more customers. To best understand the global impact of this technology, this thesis will analyze the similarities and differences in the societal impacts of different food delivery applications around the world, how they were introduced into society and how they were adopted by society. As different food delivery businesses are discussed, we will uncover how fundamental differences in existing food businesses influence and limit the technology they are able to introduce into their respective society. Major demographical differences including, but not limited to cost of living, cost of labor, population density, food sanitation, and traffic control heavily influence how food delivery technology must be developed in order to maximize its adoption by its respective culture. Some of the most popular food delivery applications that are influenced by these differences in their country of origin that will be discussed are UberEats (USA), Swiggy (India) and Deliveroo (London).

Introduction

The average American works 44 hours per week, which means about 8.8 hours per work day. In addition to this, Americans need time to run household errands, drive their kids around and exercise. With this increasingly busy lifestyle that has developed as a result of corporate growth, having a meal during a workday has become more of a task rather than a social, relaxing experience. Consequently, food delivery technology in America has emerged to become a booming industry where a click of a button brings you food directly to your home or office. However, food delivery technology has also become a lucrative business in other, very different cultures. To understand how this technology can be modified in order to become successful in any cultural context, we must analyze the similarities and differences of food delivery technology across the globe.

The central question surrounding this thesis will be how this technology or its policies are modified from culture to culture in order to become a trustworthy, reliable source of meal service in the city, country, or society it releases in. This will help us uncover how much of an impact society has on the design and development of technology in this field and as a whole. This thesis will analyze specific processes within the food delivery cycle from real food delivery applications that differ from application to application and culture to culture. SCOT will be the method in which we present fundamental differences from culture to culture to show how the technology must adapt in order to gain the largest userbase. There are two key sides to the userbase that make food delivery applications successful. The obvious one being the customers, however the delivery drivers who must sign up to make the infrastructure successful are equally as important to discuss. We will discuss differences from both sides of the business model.

Social Construction of Technology

The theory of Social Construction of Technology, or SCOT, is a constructivist theory introduced by Wiebe Bijker and Trevor Pinch that emphasizes how a society's characteristics influence and shape works of engineering. SCOT's main principle is that the success of an innovation is not simply a result of the fact that it works better or is fundamentally better designed than other solutions, but is a result of the societal context that promotes the solution and its level of conformity with the society it is introduced to. The key aspects to consider in SCOT will be the relevant social groups, interpretive/design flexibility, closure and stabilization, which will be discussed from the perspective of these successful businesses within their respective societal contexts.

The theory of SCOT is built around the idea of interpretive flexibility, in which design is an open process that can produce different solutions based on the societal circumstances under which development occurs. In discussing the different food delivery technologies developed by these businesses around the world, we will see key differences showing evidence of societal differences influencing design decisions. The relevant social groups within these successful businesses to be considered consist of the users, delivery personnel and food businesses that work with these companies.

Origins and Introductions of Food Delivery Applications

UberEats was first developed in 2014 in the United States by its parent company, Uber, which was already taking off in the market as a ride hailing service. The goal was to use the

existing, successful infrastructure from Uber to provide a reliable food delivery service with affordable delivery fees for the average consumer. Restaurants and other food businesses nationally were enticed by the increase in sales UberEats promised for them, while Uber was interested in the commission it could charge on those businesses. Thus, they grew as a business building around a reliable brand to $3.7 billion gross revenue in the year 2020. UberEats continues to expand globally, dominating the Indian and European markets as well.

Swiggy was founded in 2014 by Sriharsha Majety and Nandan Reddy in Bengaluru, India as an e-commerce site to ship goods within India. But in year they instead shifted focus to enter the food delivery market. It currently operates out of over 100 Indian cities and has expanded to general product deliveries including household items, laundry, and documents. Despite entering the market at a time where other food delivery startups were in turmoil due to high operation costs, Swiggy excelled and has become the predominant food delivery app in India.

Deliveroo is another online food delivery company that is based out of London, England, developed in 2013 and now operates in over 200 cities globally. Deliveroo was exceptionally successful through their development of a network of ghost kitchens. Ghost kitchens are kitchens located off-site from restaurants solely for the preparation of delivery-only meals from successful food businesses that Deliveroo decides upon . These were advantageous because the operational cost of running these ghost kitchens was extremely low, but the kitchens still generated revenue close to that of their respective brick-and-mortar dine-in restaurants.

UberEats and Building a Brand

One of the strongest consumer-based forces is brand loyalty; customers love feeling safe with their decisions. This concept shows us precisely why UberEats was so successful. In order to form a successful brand, building trust with a consumer base is an essential and extremely difficult task that companies must go through in order to move society towards adopting a technology they are not used to. In relation to SCOT, the relevant social groups that are involved here are the customers who depend on this brand reliability and the developers of the brand. Uber introduced their ride hailing technology into a market that was generally dominated by taxicab companies, however they were able to completely revolutionize the transportation industry through thorough safety regulations such as background checks, ease of use through an app and reliability in that rides would arrive within minutes. This moved a large part of the market away from taxicabs and public transportation and into Ubers. Later, they decided to further capitalize on their now widely available infrastructure by shifting their focus to the food delivery industry. UberEats dominated the market by depending on the trust it built with its Uber consumer base; if their consumers trusted them to drive them safely and efficiently around any city at any time, they could trust them just as much to deliver food within a reasonable amount of time.

Building trust was a result of two major pillars of Uber's technology: ease of use and punctuality. Uber in the USA operates 100% on cashless transactions. This minimizes transaction errors between customers and drivers, while also serves as a point of convenience for those that no longer carry cash. Second, Uber has extremely accurate delivery/drop-off times with an intuitive tracking system that allows riders to view the status of their driver's arrival and drop-off (Staff, 2018). In major US cities where punctuality is essential to a society, these features prove essential to those who live extremely busy, fast-paced lifestyles. As Uber has

displayed, in addition to many other companies, taking a predominantly customer-based focus in developing technology proves successful: Uber now holds about 75% of the US market share in ride-hailing. The creators of Uber understand the need for these features in their technology as they have to maintain their strong relationship with the customers they acquire; these features, serve as their interpretation of design as to how to develop this technology to best serve the most people.

Swiggy: Cash on Delivery

On the contrary, most daily transactions in India run primarily on the use of cash. Due to infrastructure limitations, cash seems to prevail as the leading form of payroll and payment in large dense Indian cities, making the success of food delivery applications highly dependent on cash transactions. According to reports, India's average number of card transactions per inhabitant is 6.7 which is among the lowest in the world. The Central Bank of India believes that the lack of infrastructure to issue Debit/ATM cards is the primary reason behind why cash is still the most widely used method of payment in India (Kopf, D., 2018). Differing from the ease of use that cashless applications such as UberEats provide in the US, Swiggy, the leading food delivery system in large Indian cities such as Hyderabad or Bengaluru had to figure out a way to become equally as competitive without being able to use the "better" technology of cashless service. Usability engineers can all agree that cashless service easily provides a more seamless and easy experience for a customer, but in India cash proves to be a limiting factor for technological development and food delivery. System engineers need to adapt to this social norm in order to provide the most convenient experience to delivery drivers and customers. Consequently, Swiggy uses a cash on delivery system with an insurance policy for delivery

drivers and restaurants, but also limits their potential losses from unethical consumers with a maximum limit for cash on delivery (Anand, 2019). Due to its ongoing success, this interpretation of how the payment system should function serves the greatest amount of people and therefore, is the best way for Swiggy to operate in India according to SCOT's theory about stabilization.

Impatience: A Universal Problem

A major similarity between the two nations previously discussed is their consumers' ever-increasing impatience. Consumers always want things delivered easier and faster; even when this ease is delivered, customers are still unsatisfied. In the food delivery technology industry, speed to delivery is an essential factor that has to be taken into account in order to have a successful system. The simplest way to increase your speed to delivery is to have more delivery drivers, another key actor in the network of food delivery systems. Unlike existing delivery drivers who are hired to be paid hourly on a full-time or part-time basis, food delivery technology allows pretty much anyone to become a delivery driver and offers them the convenience of choosing their own hours by being paid on a delivery by delivery basis. This widely increases the availability of delivery drivers at almost all hours of the day, a key aspect of almost all successful food delivery applications today, including UberEats, Zomato and Swiggy.

However, large Indian cities are notorious for their lack of proper traffic control and monstrous amounts of traffic throughout business days, so how is it that Swiggy is so reliable in making timely deliveries? The main relevant social group consider here are the delivery drivers, heavily impacting the way Swiggy must operate to be successful. This comes back to SCOT as two major socioeconomic aspects of India explain why this is possible: cost of labor and cost of

living. Considering that India has the largest percentage of citizens living under the poverty line, many are willing to work tirelessly at the low pay rates of delivery drivers. This extremely low cost of labor allows Swiggy to flourish off the sheer number of people that are willing to make these small amounts from delivering food (Bhattacharya, A, 2018). Delivery drivers for Swiggy make around 40,000 rupees per month on average, which is around $529, which is nothing compared to the average of $6000 that an UberEats driver makes in the US (Bhattacharya, A, 2018). Consequently, the cost of delivery is also significantly cheaper in India than in other nations. The cost of living also happens to be fairly low so that even menial labor is enough to survive, attracting a large group of individuals to perform food deliveries as a full-time occupation, a key difference in the Indian society versus wealthier nations. As we can see, the delivery drivers shape how the developers of Swiggy have orchestrated their business model and plans for expansion to spread into the smallest of streets in the largest of cities with affordable delivery pricing. This system works and has expanded throughout India, leading to a state of stabilization as in accordance to SCOT.

GPS Struggles in India

Uber was able to launch its extensive food delivery service UberEats in 2014 to many cities in the USA, but it was not until 2017 that Swiggy was able to reach the depths of large Indian cities and become profitable. Google Maps, the leading name in the satellite-based road mapping and route planning industry, is a key external actor in food delivery networks. Many food delivery systems globally depend on a Google Maps plugin that provides extremely accurate route planning and destination information to food delivery drivers.

A major problem that Google faces in large, dense Indian cities such as Hyderabad is that there are many smaller, unpaved roads that are extremely hard to map and document via satellite (Bhattacharya A., 2018). These smaller roads make up a large portion of residences in heavily populated Indian cities, where delivery networks need to reach to build a larger consumer base. In the United States, however, almost every road and residence are mapped in detail, making it all the easier for maps technology to be implemented within delivery applications and launch much sooner than their Indian counterparts. As satellite mapping technology expanded and was able to more accurately pinpoint roads and intersections, the Indian public was able to adopt the technology as being a reliable source for navigation. In turn, this meant delivery drivers were able to deliver to many more locations that were unknown to them.

This was a key limitation of growth that was overcome in the Indian food delivery industry. Here, Google is in fact a relevant social group to consider in the development of food delivery applications in India as it is the leading provider of maps technology for many businesses that need these resources around the world. Google's input is directly correlated with the efficiency and success of food delivery applications in India and is therefore partly responsible for this aspect of the technology's design.

Deliveroo and the "Ghost" Kitchen

Setting up brick-and-mortar restaurants are generally extremely high initial investments, especially in metropolitan cities where real estate value is high such as in London. According to a survey in the UK, the median cost to open a restaurant is $275,000 USD, but this number can vary from a few thousand to a few million depending on the location. Consequently, starting and maintaining dine-in food businesses are extremely tough. The majority of the costs are rent and

renovations, which for a metropolitan region such as London, are at rates that are extremely hard to capitalize on in short periods of time. In addition to this, there are other costs in the UK including, but not limited to building insurance, waste management, service charges, pest control, utility bills, and property tax. The creators of Deliveroo had to innovate and find the best possible alternative to scale their business rather than depend on food business entrepreneurs to take these high cost risks. The key relevant social group to consider here are restaurant owners who are very reluctant to brick-and-mortar based business as with related costs, it is extremely difficult to scale.

Deliveroo grew quickly through its clever idea of setting up "ghost" kitchens. Ghost kitchens are generally small, offsite locations (not in high value real estate locations) where popular dishes from popular restaurants registered on Deliveroo can be prepared in bulk, meant only for the purpose of delivery. The advantage of these ghost kitchen networks is that they are extremely low in investment and extremely high in rate of production (Bell D., 2019). They allow restaurant owners to focus on the quality of their dishes without worrying about the difficulties that come with the startup and maintenance costs of physical restaurants.

Restaurant owners can depend on Deliveroo to scale their business for them, a profitable option for both Deliveroo and restaurant owners all around Europe. The increasing demand for quick meal options, both for the public and for food business owners, directly impacted this design for Deliveroo which is unique to other designs we have discussed. The key group involved in Deliveroo's adaptation using ghost kitchens is the restaurant owners as the change of the desired business model over time resulted in Deliveroo's adaptation to make food delivery successful. As we can see, the ghost kitchen innovation is heavily impacted by the economic

difficulties related to setting up full-service restaurants and unquestionably a necessary addition to Deliveroo's business model for success. This innovation is analogous to how necessary a cash-on-delivery system was to Swiggy in densely populated Indian cities. Simply put, these businesses thrive due to their adaptions to the socioeconomic aspects of their respective societies.

Conclusion

Overall, we can see that the emergence of food delivery applications results from a globally increasing need for speed to delivery and convenience. Whether its Deliveroo in London, Swiggy in India, or UberEats in the US, there is a very similar demand worldwide for timely meals with minimal effort. This exposes the accelerated pace of lifestyle faced by people everywhere due to both the increasing number of work hours and availability of technology, steering us away from worrying about providing for our own meals. SCOT helps us analyze how the fundamental differences in behavior of people in different areas of the world determines the plausibility of technological innovation instead of the other way around. In the future, I expect the public's adoption of self-driving technology, drones and other such autonomous vehicles to further influence and accelerate the food delivery industry.

References

Anand. (2019, June 24). Swiggy Business Model: How does Swiggy make money. Retrieved from https://bstrategyhub.com/swiggy-business-model-how-does-swiggy-make-money/.

Bell, D. (2019, August 27). Deliveroo's Virtual Restaurant Model Will Eat The Food Service Industry, As Amazon Piles In To Fund U.S. Expansion. Retrieved from https://www.forbes.com/sites/douglasbell/2019/08/26/deliveroos-virtual-restaurant-model-will-eat-the-food-service-industry-as-amazon-piles-in-to-fund-us-expansion/#7d225bce5e89

Bhattacharya, A. (2018, March 14). Google Maps has found a better way to navigate India's chaotic roads. Retrieved from https://qz.com/india/1228422/google-maps-introduces-new-features-to-navigate-indias-chaotic-roads/.

Bhattacharyya, R. (2018, October 31). Delivery jobs demand twice number of available jobs in festive season. Retrieved from https://economictimes.indiatimes.com/jobs/delivery-jobs-demand-highest-in-bengaluru/articleshow/66443462.cms?from=mdr.

Kopf, D. (2018, May 23). India's use of cash is back to the levels before demonetisation. Retrieved from https://qz.com/india/1284590/indias-use-of-cash-is-back-to-the-levels-before-demonetization/.

Saboo, Shivani. (2019). HomeEats Development Timeline. [Figure 1]. Prospectus (Unpublished undergraduate thesis). School of Engineering and Applied Science, University of Virginia. Charlottesville, VA.

Singal, A. (2018, December 23). Swiggy Timeline: From a Bootstrapped Venture to India's Fastest Growing Unicorn (Infographic). Retrieved from https://www.entrepreneur.com/article/325292.

Staff, V. B. (2018, October 4). Uber Eats and the $6 billion bookings run rate: The AI success story no one is talking about. Retrieved from https://venturebeat.com/2018/10/02/uber-eats-and-the-6b-bookings-run-rate-the-ai-success-story-no-one-is-talking-about/.