
Smart Food Ordering System – A Literature Review

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Abstract

As technologies has evolved around the world in the past centuries, we see many ideas has emerged and improvement being built and developed to make people's life easier. With the advancement of technology nowadays, people can easily perform or do any tasks they need or order any services they required with just a few touches on their smart devices like mobile phones from anywhere and anytime they desire. With this convenient new way taking over the world, majority of people now would prefer to order food from the convenient of their own home instead of going out using public transportation or using their own vehicle to the restaurant and order from there. The old traditional method of ordering food is very time consuming and tiring to say the less. Imagine having to come back home tired from work, and going out again to order food and queuing at the restaurant to wait for their order for at least 30 – 40 minutes, it is very tiring and not something that many would prefer to do after a long day. Therefore this paper investigate the literature review of food ordering system to contribute in developing a smart ordering system

Keywords: *smart food ordering system, mobile app*

1. Introduction

With the advancement of new technology now and the surge of mobile application in the application store now, there is an easy way to make sure the task of ordering food can be simplified and make the process more efficient. Having a mobile application that allows the user to order food from anytime and anywhere they want is not only convenient but also helps customer to make a more informed decision as they have more time to view and analyze the menus before placing an order.

Previously, people need to physically visit and be in the store to place a food order if they are craving for a specific food from the restaurant or placing an order just simply because they do not have the energy or time to cook and make a meal on their own at home.

Also, if a user wants to get food for dinner, they don't have the option to place an order ahead of time, of course they have the option to actually call the restaurant up to place an order, but what if the restaurant is engaged on the phone with another customer? Because of that, they need to rush to the restaurant early and place an order to ensure the food is prepared by the time they wish to enjoy the meal.

Furthermore, they would also need to pay using only cash payment to the merchant most of the time due to the unawareness of the advanced technology such as e-wallet or card payment at certain food places. This traditional method of ordering requires ample amount of work and energy to be put in just to have a plate of food and it is cumbersome for both merchant and customer.

These problems have led to the idea of building a food ordering application for a specific restaurant call Planet Food. This application would help customer to place an order anytime and anywhere they desire from the Planet Food restaurant that serves multiple variant of cuisine and user can use any payment method they want which includes e-wallet, FPX or even cash on delivery.

The application will also allow user to place an order ahead of time if needed and get the food delivered at their location at their desired time and enjoy their meal whenever they want.

2. Literature review

Because of how convenience it is, online food ordering application has undoubtedly become one of the most sought-after systems by any merchants and end users. For end users, the flexibility to place their order for any menu they want on the food ordering application is definitely a huge advantage because they can avoid the hassle of driving or going to the restaurant. For merchant on the other hand, they can manage the order easily without the need to actually face the customer in the restaurant and listening carefully to the customer's speech to capture the order which often could lead to order not being properly captured and customer become unsatisfied with the restaurant's service.

In this section, we will discuss in detailed the data findings based on studies that has been conducted and what are the advantages of having an online food ordering system as well as what kind system will impact user's behavior to continue using online food ordering system to place an order.

2.1 History of Online Food Ordering System

The food delivery concept believes it or not has actually been around since the 1990s, though it may not be as advance as the current technologies we have now but the concept was rather the same where customer will place an order through a different mechanism such as phone calls to the restaurant, and the restaurant will prepare and deliver it to the user.

Back in 19th century, a pair of Italian royals was considered the first customer to accept a pizza delivery from a pizza restaurant called Pizzeria di Pietro e Basta Così by placing an order through a phone call.

Before online ordering through websites and smartphone was even a thing, restaurants back in the days used to accept orders through fax machines and phone lines which can be a bit of a hassle for customers as they need to call in to place an order and this sometimes could be met by a busy line if the restaurant is engage with another customer or go to the restaurant to place an order.

However, with the evolvement of technologies such as the world wide web, it was much easier for customers to communicate with the restaurant rather than using a fax machines. In 1994, Pizza Hut launches a web-based food delivery site called Pizzanet. Although at that time Pizzanet was only available in California, the advancement of it provided an early model for digital food delivery.

In December 1995, the first online restaurant delivery service was introduced and launched called World Wide Waiter where it consists of 60 restaurants in the San Francisco Bay Area and in 2017 has expand over 1300 restaurants and offer a home or office delivery service.

Then, in the 2000s food delivery evolved again as smartphone become a thing and food delivery applications was built and dominate the food industry. New food delivery apps have been continually introduced since the early 2000s and now some companies such as GrubHub, Grab Food and Foodpanda has dominated the market greatly and more companies and restaurant are establishing their own mobile application and websites for users and allowing more flexibility for end users to order food from the comfort of their own home anytime and anywhere they want.

2.2 Data Findings Perceived Convenience

According to Silva et al (2016), Convenience is the most important factor to influence customer's motivation to adopt to online purchasing method compared to the traditional method. Lee et al (2017) states that customer will be more satisfied

and be willing to adopt to online food ordering technology in E-commerce is the application is able to provide evidence of being convenient to end user. According to study by Lee et al (2017), restaurant owners now are more focus on capturing the millennial attention to adopt to online purchasing method as their collective purchasing power is forecast to exceed \$3.39 trillion in the coming years as they prefer things that are convenience to them.

Perceived Ease of Use

Mun (2017) in a study suggested that ease of use factor also is the main attributes that influence customer's intentions to switch and adopt to online food ordering and delivery service. Which means if the application is easy to use, it is most likely for user to adopt to the technology. If the application is hard to navigate, even though it is useful, user will most like not use it.

Perceived Enjoyment

Vries et al (2018) in a research state that stated positive enjoyment does influence consumer's intentions towards adopting to online food ordering and delivery services. Yeo et al (2017) also stated that customer that had enjoyed using the application first time will most likely to use such application again in the future. Hence, the study suggested, the higher the enjoyment factor is, the more significant the customer's intention to order food online.

Perceived Usefulness

Luna (2017), suggested that the usefulness of an online application will increase the customer purchase activities. According to Veja (2017), a positive relationship between usefulness and online booking services is present. This means that usefulness is one of the factors that influence customer's intention when it comes to using online food ordering and delivery services.

2.3 Literature Review Self-Ordering Technology

According to a blog article by Katherine Pendrill in Touch Bistro website, self-service or self-ordering kiosk since the Covid 19 pandemic has become a staple in almost all restaurants and has radically changed how restaurants think about self-ordering method. She also pointed out on how with the existence of self-service option, it not only is a cost-effective solution for restaurants, but also a convenient option for customers. The use of self-ordering mechanism in restaurant has indeed been proven to benefit those who choose to invest in the technology.

According to Hopper (2018) in a study, the evolution of digital has stirred up restaurant industry and made them to adapt in various ways to enhance customer experience, such as implementing ordering apps and digital dining technologies in

their restaurant to attract more customer. KPMG (2019) in a statistic shares new technologies in the food industry has also driven new trends to emerge, enhance decision making for restaurant owners and give better customer satisfaction especially in the millennium market share that attracts most revenue for restaurants.

In a study done by Tillster (2020), it was mentioned that over 65% of consumer are more likely to go and become regular customer of a restaurant if the restaurant provides self-service technology such as kiosks for making the process of ordering food easy and fast. This further prove the study of Neiman (2019) that suggested restaurants owners could really benefit from the opportunities to adopt to self-service technology such as kiosk and mobile application.

2.4 Pre-liminary Studies 2.4.1 Questionnaire

To understand the customer's point of view and their needs and want for the proposed system and to address research objectives, I have chosen to use the questionnaire method to gauge end-user requirements for the application. The questionnaire consists of list of questions used to gather qualitative data from the participating respondents about their experiences, opinions or thoughts when using an existing online food ordering system.

2.4.1.1 Respondents

All respondents that had participated in the study are between the age of 25-30 and all of them have used and is currently using mobile food ordering application such as Grab, AirAsia Food, Beepit, and FoodPanda.

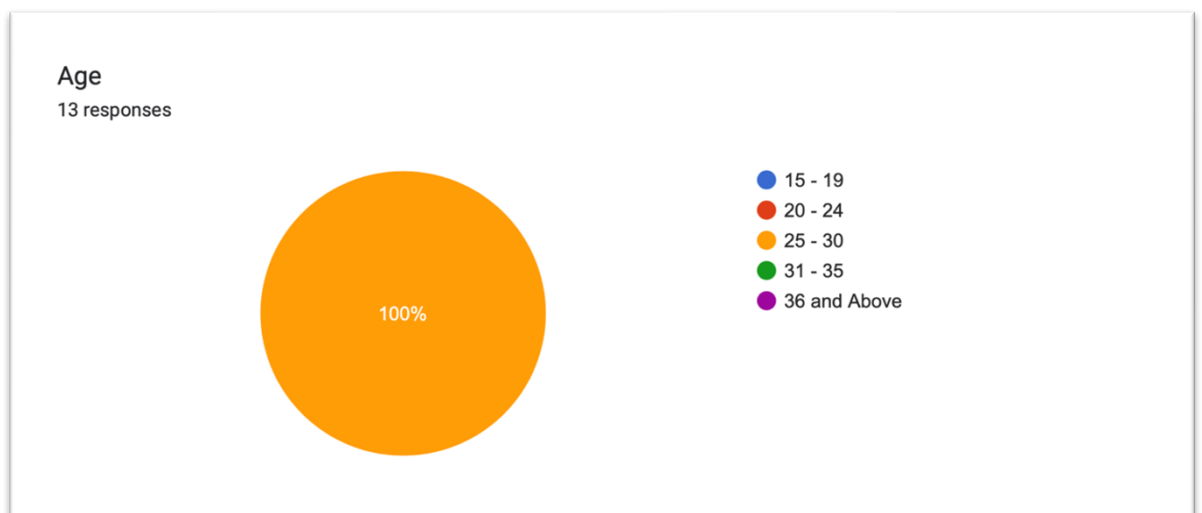


Figure 2 : Age of respondent

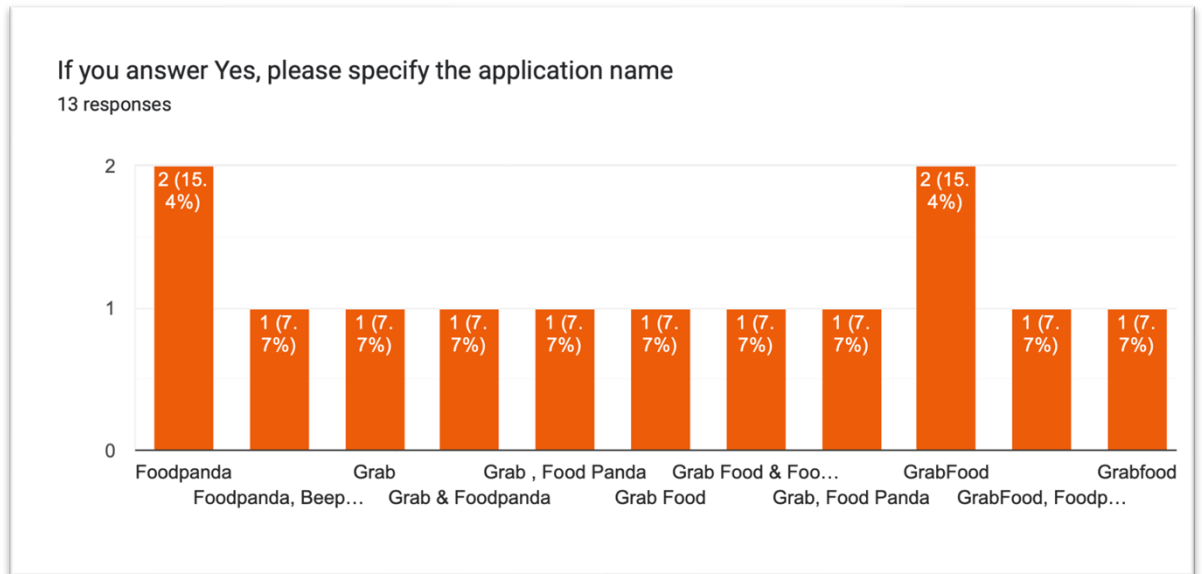


Figure 3 : Application often used by respondent

2.4.1.2 Interview Results

Based on the study performed, below are the observations for data of the study 1.
Survey Question : Have you used any mobile food ordering applications

before?

Feedback: 100 % of the respondent has used mobile food ordering application before.

2. Survey Question : What are some of the reasons you enjoy using mobile applications to order food?

Feedback: 100 % responded on the reason on why they enjoy using the application is because of convenient factor. They can order food from anywhere and anytime they prefer.

3. Survey Question : What are some of the improvements or features you would like to see when using a mobile food-ordering application?

Feedback: There is several difference improvements listed by users on this question which includes:

- A more friendly and simpler UI for the application
- 2 participants suggested to enable more rewards, discounts and vouchers to attract them more to order from the restaurant.

- 1 participant suggested a chatting option to contact vendors directly
- 1 participant suggested to enable an option for them to choose dine-

in, take-away, or home delivery.

- 2 respondents wanted to have a tipping system for riders and enable the option to bid on how much to pay for delivery service instead of it being set by restaurant.

4. Survey Question : What are some of the factors/challenges that stopped you from purchasing anything from any mobile application food ordering system

Feedback: Majority of the respondent suggested that application lagging is the biggest factor they don't want to use the technology to place an order. A portion of respondent also suggested that the pricing of the food that might differ and more expensive compared to going to the restaurant themselves is also a factor they opt out of using the application.

2.4.1.3 Summary

Based on the study and through the survey I have performed, I can conclude that millennials and young people nowadays are more likely to use food ordering application to order food because of how convenient it is for them.

Some of the factor that would influence the users to continue using the application is adding more rewards system and give users the flexibility of tipping their riders or determine and bid on delivery fee as supposed to having a fixed rate set by the restaurant. Based on the surveys also, we can conclude that a poor performance application such as lagging issue can drive users away and make them opt out from using the application. This is a critical element that need to be considered when developing this project later on.

Other than that, a more user friendly and simpler User Interface also is only of the improvement suggested from respondent that has been using mobile food ordering application.

In conclusion, this survey has definitely provided a more-clearer picture of the elements and parameters that needed to be considered when developing this application later on.

2.4.2 Analysis of Existing Systems

2.4.2.1 Functions and Interface Design Supported

Reward System Yes Yes Yes Yes

System Function	Pizzahut	Domino's Pizza	MyBurgerlab	Proposed System
Macro Information on Menu	No	No	No	Yes
Ingredient Details on Menu Catalogue	Yes	Yes	No	Yes
Order Customization Features	Yes	Yes	No	Yes

Figure 4 : Comparison between Existing Systems with Proposed System

2.4.2.2 Summary

Based on the comparison above, the proposed system will have more features compared to other online food ordering application. Some features that will be available for proposed system is macro information on menu for users to make a more informed decision.

3.1 System Development Modelling

3.1.1 Waterfall

The methodology that will be used to develop this system will be the waterfall model. The reason this model was chosen it because of its simplicity and ease of use. In this model, each phase needed to be completed first before the next phase can begin and there is no overlapping in the phase. Because there is a clear requirement on the project objective, this model is the most suitable to be used.

The waterfall model is illustrated in a linear sequential flow and each phase in the development process will only start to begin when the previous phase is completed. Typically, the outcome of the previous phase will act as an input to the next phase in the sequence.

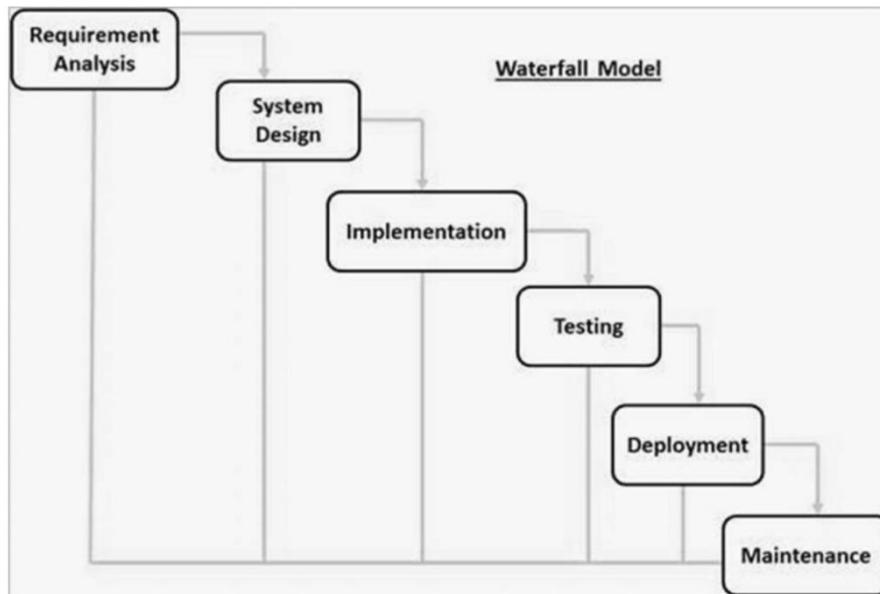


Figure 5 : Waterfall Model phase

3.2 Requirement Analysis

The structure of the application will be segregated to three main components or modules. The first component will be the ordering system itself that will allow customer to place, view or modified their orders and provide all necessary details such as additional notes and etc. The second component is menu management system that will allow the restaurant employees to add, modified, delete or amend menus on the application. The last component will be an order retrieval or displaying panel for the restaurant employees to view and accept orders and update orders that has been processed. Below diagram will show a brief view of the system model.

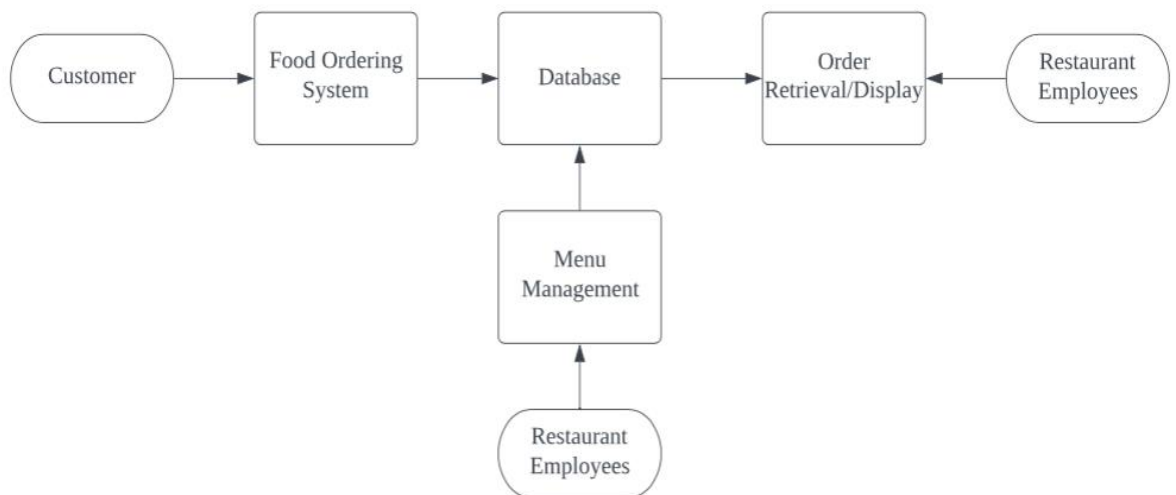


Figure 6 : System Model

3.2.1 Functional Requirements

Based on the system model above, each of the component will give a layer of isolation between the interaction of end user and the database. This isolation will allow end user to have an interaction with the system through a user-friendly interface to enhance customer experience, especially for non-technical users. Apart from this, this isolation layer also will give more protection to the database component by disabling the users from exploiting and performing any actions that are outside of what the system can handle. This layer also acts as a more structured order management system for restaurant employees to handle without having to use the user facing interface. Due to this design pattern, it is important to enumerate the exact function the user will be seeing and these functions are described in detailed below, grouped by component.

Food Ordering System

The user will be presented by the following functionality:

- Account creation
- Application login
- Manage account
- Navigating restaurant menus
- Selecting item on menu
- Order customization
- Add item to cart
- Review cart orders

- Remove item from cart
- Place an order
- Receive confirmation of order and order number

Menu Management System

The restaurant employees will be presented by the following functionality:

- Add/update/delete menu item
- Add/update/delete menu category
- Update pricing for items on menus
- Update information such as macros information, ingredients details and pictures of item.

Order Retrieval/ Display System

The restaurant employees will be presented by the following functionality:

- Display orders based on first come in a readable way
- Mark order as complete or in process

3.2.2 Non-functional Requirements

The database that will be used to store the menu information and user data will be MySQL server. Hence the server must be installed on the host devices. This software is freely available and can be installed and run under almost all operation system. The server hardware however can encompass any devices that is able to run the application and database servers and also handled expected traffic.

In terms of compatibility, the application needs to be able to support and load for both Android and iOS devices and for performance to measured successfully, the application needs to load the welcome screen within 2 seconds maximum when user open it.

3. Conclusion

In conclusion, through this chapter, we can conclude through the studies done by the authors there are various factor that influence user buying intentions and there are clear advantages for restaurant owner if they decide to adopt to the technology. We can see as well from the surveys done from the pre-liminary studies, customers especially millennials are more likely to opt in using online ordering food application as it is convenient for them

REFERENCES

1. Hopper, G. (2018). *Futuristic feeds: The best digital dining experiences*. Suitcase Magazine Ltd. <https://suitcasemag.com/travel/explore/digital-dining-experiences/>
2. Kelso, A. (2019). Self-Order Kiosks Are Finally Having A Moment in The Fast-Food Space. *Forbes*. <https://www.forbes.com/sites/aliciakelso/2019/07/30/self-order-kiosks-are-finally-having-a-moment-in-the-fast-food-space/?sh=2fdc20024275>
3. KPMG. (2019). *Customer first customer obsessed: Global customer experience excellence report, 2019*. KPMG International Cooperative. <https://assets.kpmg/content/dam/kpmg/it/pdf/2020/01/Global-customer-experience-excellence-2019.pdf>
4. Lee, E., Lee, S., & Jeon, Y. (2017). *Factors influencing the behavioral intention to use food delivery apps*. *Social Behavior and Personality: An international journal*, 45, 1461-1474.
5. Luna, R. I., Montoro-ríos, F., Liébana-cabanillas, F., & Luna, G. J. (2017). *NFC technology acceptance for mobile payments: A Brazilian Perspective*. *Review of Business Management* 19(63). <https://doi.org/10.7819/rbgn.v0i0.2315>
6. Mun, Y. P., Khalid, H., & Nadarajah, D. (2017). *Millennials' Perception on Mobile Payment Services in Malaysia*. *Procedia Computer Science*, 124, 397– 404.
7. Neiman, H. (2019). Why are self-order kiosks on a roll in US markets? Retrieved 17 Mac 2020 from Kiosk Marketplace: <https://www.kioskmarketplace.com/blogs/why-are-self-order-kiosks-on-a-roll-in-us-restaurants/>
8. Nicola, J. (2019). Digital transformation sweeps over restaurant industry. *QSR Magazine*. <https://www.qsrmagazine.com/outside-insights/digital-transformation-sweeps-over-restaurant-industry>
9. Silva, F. Q., Freire, O., Lima-Filho, D. O., Brandão, M. M., Isabella, G., & Moreira, L. B. (2016). *Intentions to purchase food through the internet: developing and testing a model*. *British Food Journal*, 3(118), 572-587.
10. Tillster. (2020). Self-service kiosk industry: Continued growth and advancements across restaurant industry. <https://www.tillster.com/blog/2020/3/26/self-service-kiosk-industry-continued-growth-and-advancements-across-restaurant-industry>
11. Veja, M., & Štofa, T. (2017). *Influence Of Security and Trust on Electronic Banking Adoption in Slovakia*. *The Journal E&M Economics and Management* (E&M), 4(20), 135–150. <https://doi.org/10.15240/tul/001/2017-4-010>

12. Vries, R., Jager, G., Tijssen, I., & Zandstra, E. (2018). *Shopping for products in a virtual world: Why haptics and visuals are equally important in shaping consumer perceptions and attitudes*. *Food Quality and Preference* 66, 64-75. <https://doi.org/10.1016/j.foodqual.2018.01.005>
13. Yeo, V., Goh, S. K., & Rezaei, S. (2017). *Consumer Experiences, Attitude, and Behavioral Intention toward Online Food Delivery Services*. *Journal of Retailing and Consumer Services*, 150–162.
14. Electronic Materials:
15. *An Introduction To Software Development Methodologies*, Alliance Software Blog, <https://www.alliancesoftware.com.au/introduction-software-development-methodologies/>
16. Aliona Nikolaieva , *8 Best Software Development Methodologies*, Up Tech Blog, <https://www.uptech.team/blog/software-development-methodologies>
17. *History of food delivery and how its changed*, Thistle Thoughts blog, Nov 18, 2021, <https://www.thistle.co/learn/thistle-thoughts/history-of-food-delivery-and-how-its-changed>
18. Katherine Pendrill, *Why Self Ordering Kiosks are Becoming the Secret Weapon for Successful Restaurants*, Touch Bistro Blog, <https://www.touchbistro.com/blog/why-self-ordering-kiosks-are-becoming-the-secret-weapon-for-successful-restaurants/>