Automation in the Food Service Industry, and its Wide-Reaching Effects

Sieger Canney

Department of Computer Science

Buena Vista University

610 W 4th St, Storm Lake, IA 50588

cannsie@bvu.edu

Abstract

Automation in the food service industry is rapidly advancing and most are either unaware of the developments or consider them interesting but relegate them to nothing more than "just another flashy tech demonstration". Automation is quickly moving to the forefront of the industry and these changes forecast wide-reaching effects not only across the food service industry but also society as a whole.

The purpose of this paper is to research and educate on the recent developments in automation within the food service industry and its potential industrial, ethical, and economical effects.

1 Introduction

When it comes to automation, the food service industry is no stranger. It is common knowledge that most large food service chains have their own dedicated factories where ingredients are automatically processed, packaged, and shipped out to franchise locations with minimal human interaction. This process has been automated for a long time due to the consistent and repetitive nature of ingredient preparation. Alternatively, at franchise locations there is a lot more manual labor with employees taking orders, preparing the meals, and delivering the food to customers. In the past, it was technologically challenging and highly expensive to try to implement automation in local franchises due to the complexity and nuance needed to handle local tasks. But with recent technological advances in AI and robotics, it is both cheaper and easier to implement automated systems into local franchises and restaurant chains are starting to chase this trend. If this pace is kept, it could have wide-reached industrial, ethical, and economical effects.

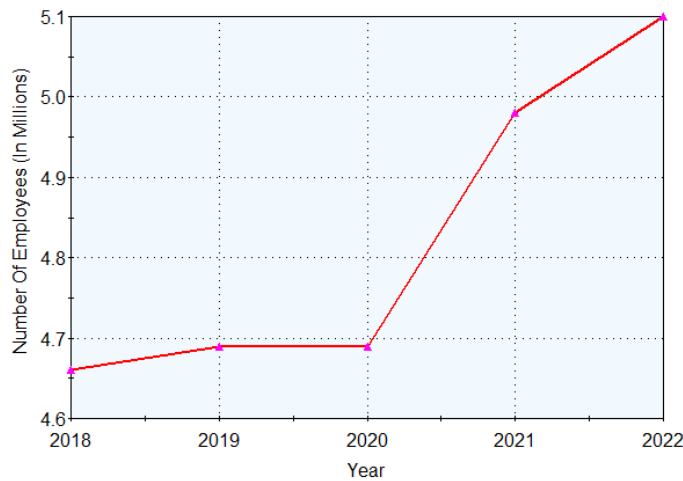## 1.1 Number of Restaurant Workers

Table 1: Number of Fast-Food Employees Working in the United States [1]

As of 2021, there were 11 million people working in the restaurant industry [1], with almost five million working specifically in fast food, with this number continuously

growing [2]. With an industry that affects this many lives, any huge shift could have ripples across all of society. With automation being known to drastically change how industries function, the recent trend of automating more and more restaurant processes forecasts potential drastic societal and economic repercussions. It is imperative that the general public be informed and well-educated on these potential outcomes so that they may be prepared for when they occur.

2 Emerging Examples

The automating of the food service industry is emerging in many different ways. One example is robotics companies such as Miso Robotics, a company based on creating robots that automate kitchen tasks. Another example is the food service giant, McDonald's, which is experimenting with automating all aspects of customer interaction including taking orders and food delivery. There are even examples of some smaller restaurant chains in the midst of developing fully automated "ghost kitchens" that will be able to take orders, produce, and serve meals with minimal interaction needed. An example of an establishment that has already fully implemented automation, Mezli, is quoted to be the first fully automatic restaurant.

2.1 Miso Robotics

Miso Robotics is one of the most prominent robotics companies in the world of food service automation. They are best known for their robot named Flippy. Flippy first debuted in a restaurant in 2018 solely to flip patties on a grill when an AI deemed it the proper time. Since then, Flippy has evolved into being able to track and manage multiple deep-frying stations while using AI and visual machine learning to determine when food is properly cooked [3]. Many businesses have already started implementing Miso robots in stores with White Castle being a prominent example using specifically a Flippy model. Other examples are Panera trying out a robot called Sippy to moderate coffee temperature and volume and Chipotle experimenting with a Miso robot named Chippy in an attempt to automate the process of cooking tortilla chips in stores [4].

2.2 McDonald's

In contrast to Miso robotics, McDonald's seems to be experimenting with automating all of the tasks outside of the kitchen. Recently in Fort Worth, Texas, a mostly automated McDonald's was opened specifically designed to minimize human interaction. When placing an order, a customer must either access the digital kiosks located in the small interior or go online and use the McDonald's app. The drive-through window utilizes a conveyor belt system, promoting zero contact between customer and employee. This unique McDonald's still contains a restaurant crew, though they mainly work in the kitchen. McDonald's states this model of restaurant is designed for people who want to pick up their food and go [5].

2.3 Fully Automated "Ghost Kitchen"

Ghost kitchens are typically places that cook and prepare food, but then have it delivered somewhere for off-site consumption. They are a relatively new type of restaurant that lives and dies based on the nature of apps such as Grubhub and DoorDash [6]. Typically, ghost kitchens are only manned by a staff dedicated to cooking orders while leaving the handling and serving of orders to delivery apps. Companies such as Pizza HQ, Cala, Hyper-robotics, and Nommi are currently attempting to automate the kitchen side of the process [7].

The pizza franchise 800 Degrees is launching a new spinoff called 800 Go. It is set to be a robotic ghost kitchen hybrid almost like a pizza vending machine. They have partnered with the robotics company Piestro in order to design and produce the machines. They plan on opening 3,600 locations from 2021-2026. The more compact design and nature of these "ghost kitchens" are projected to have double the profit margin of one of their traditional venues [8].

2.4 Mezli

Mezli had its grand opening on August 28, 2022, and claims to be the world's first fully autonomous restaurant. It was founded in 2021 by three Stanford engineers and is located in San Francisco. The restaurant features a highly customizable Mediterranean-themed menu with a large variety of grain and protein bowls. Ingredients are prepped every morning in an off-site kitchen and are then brought and inserted into the food truck-sized restaurant. The on-site restaurant has a digital kiosk where customers order and pay.

After receiving an order, the machine uses a high-tech oven to reheat the meat and then utilizes a conveyer belt to combine it with other ingredients within a bowl. It is then possible to pick up your order in small pickup windows located at the far side of the restaurant [9].

3   Potential Effects

The food service industry contains millions of jobs so understandably any potential shift would affect millions of people. When McDonald's new mostly automated franchise hit the mainstream media, there was a lot of public backlash and criticism claiming that instead of raising wages, they simply replaced workers with autonomous machines [5]. While this may not be the exact reason, if the trend of replacing food service jobs with automated machines continues by expanding not only to other McDonald's locations but also to other chains, it is highly likely that we will see increased job loss. On the contrary, ever since the 2019 COVID-19 outbreak, restaurants have been reporting labor shortages. They state that they received a drop in labor during the pandemic and that it has been a struggle to return to a number of employees that makes it comfortable to run their businesses. This is also a reason that a lot of fast-food cashiers have been replaced with electronic kiosks [10].

Both 800 Go and Mezli have stated interest and intent in their ability to rapidly expand using their new automated systems [8,9]. The ability to rapidly expand could change the food service industry as we know it and could quickly rise to be the next big food service trend. The convenience of fast food is only expanded upon by allowing for smaller, more autonomous experiences more akin to the convenience of a vending machine with the quality of a restaurant's level of food.

References

[1] IBISWorld, "Fast Food Restaurants in the US - Employment Statistics 2005–2029," IBISWorld, [Online]. Available: https://www.ibisworld.com/industry-statistics/employment/fast-food-restaurants-united-states/. [Accessed 17 March 2023].

[2] S. R. Department, "Number of employees in the restaurant industry in the United States from 2010 to 2021," 1 August 2022. [Online]. Available: https://www.statista.com/statistics/203365/projected-restaurant-industry-employment-in-the-us/.

[3] Miso Robotics, "sec.gov," 31 12 2020. [Online]. Available: https://www.sec.gov/Archives/edgar/data/1710670/000110465921059344/tm2114854d1_partii.htm. [Accessed 18 2 2023].

[4] A. Lucas, "Why restaurant chains are investing in robots and what it means for workers," CNBC, 27 12 2022. [Online]. Available: https://www.cnbc.com/2022/12/27/restaurant-chains-are-investing-in-robots-bringing-change-for-workers.html. [Accessed 13 2 2023].

[5] P. Aitken, "McDonald's unveils first automated location, social media worried it will cut 'millions' of jobs," Fox Buisness, 24 12 2022. [Online]. Available: https://www.foxbusiness.com/technology/mcdonalds-unveils-first-automated-location-social-media-worried-will-cut-millions-jobs. [Accessed 20 2 2023].

[6] J. Miller, "What's a ghost kitchen? A food industry expert explains," The Conversation, 1 6 2021. [Online]. Available: https://theconversation.com/whats-a-ghost-kitchen-a-food-industry-expert-explains-163151. [Accessed 3 3 2023].

[7] M. Wolf, "Our Ghost Kitchen Future Will Be Automated," The Spoon, 17 11 2021. [Online]. Available: https://thespoon.tech/our-ghost-kitchen-future-will-be-automated/. [Accessed 25 2 2023].

[8] J. Guszkowski, "800 Degrees unveils robotic pizza spinoff, 800 Go by Piestro," Restaurant Business, 12 11 2021. [Online]. Available: https://www.restaurantbusinessonline.com/technology/800-degrees-unveils-robotic-pizza-spinoff-800-go-piestro. [Accessed 25 1 2023].

[9] T. Huddleston, "These Stanford engineers built a fully autonomous restaurant in San Francisco that could make your lunch cheaper," CNBC, 26 8 2022. [Online]. Available: https://www.cnbc.com/2022/08/26/mezli-stanford-engineers-built-fully-autonomous-restaurant-in-sf.html. [Accessed 1 3 2023].

[10 J. Dorer, "Labor Shortages for Restaurants: A Look at A Long-Term Solution," QSR
] Magazine, 1 12 2022. [Online]. Available: https://www.qsrmagazine.com/outside-insights/labor-shortages-restaurants-look-long-term-solution. [Accessed 20 2 2023].