Automation for All?: A Historical Analysis of the Automation of the Food Service Industry

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Entering the McDonalds, a consumer sees the usual one or two cashiers taking people's orders. There are large screens displaying the menu, and an array of cooking machines behind them in an open kitchen. Standing between the long line of customers and the impatient buyer, are one or two tall, white screens. These are self-service kiosks. They entice the newly entered client to take a closer look by displaying a picture of a big mac and fries, with large white letters in the middle of its shiny screen that read, "ORDER HERE". Another shopper has opted to order and pay at the drive-thru, in order to quickly grab their food and head to their destination. Arriving at the large menu screens, the buyer lowers their window to wait for the McDonalds employee to greet them. Instead, an automated, robotic sounding voice asks them what they would like to order. The patron hesitantly goes through their order, with the AI drive-thru voice repeating it back to them and asking if the order is correct. The consumer corrects the machine, telling it that they ordered 6 chicken nuggets, not 60. The machine asks the client to hold for a moment. A human voice sounds through the speakers, asking the buyer what they would like to change. Stepping away from the expected quick pace of the fast-food industry, it makes sense that local restaurants or food establishments would also change their norms and service to keep up. Now, even before arriving to most restaurants, one can make a reservation online, browse the menu, and even order for pick-up or delivery, cutting the need to even step foot in the establishment to order.

The food service industry has evolved a lot over time, leading to the constant present-day reports of a great labor shortage, and complaints about the lack of worker efficiency, accuracy, motivation, and overall productivity, issues which food service employers have sought out new

ways to offset. McDonald's, for example, has been facing a decreasing supply of its traditional teenage labor force throughout the years, forcing them to broaden their hiring scope and include people from distant communities, disabled adults, older employees, and foreign-born workers.[1] Even after initiatives like these, many food service companies and establishments still grumble about the lack of people willing to work, or the issues that plague the cooking and serving process. Employers have increasingly turned to technology in order to automate some of the "menial" and "burdensome" tasks that human employees have had to complete, cutting costs that would have gone towards human worker wages. Facing such technological developments in various industries, protests and concerns have arisen from the general public that robots, AI, machines, and other such technologies are stealing jobs from human workers. Companies automating the workplace defend mechanization by explaining that automation enhances human work quality and efficiency, allowing workers to focus better on customer service or other tasks. They justify that with new machines will come new jobs that will be focused on the maintenance of those machines, hence public concerns will be offset.

Though automation of the food service industry provides a variety of benefits to the company, and even some to consumers and employees, it is important to keep in mind the populations of workers that historically comprise this "inadequately supplied" labor force. Many food service jobs are already classified as "low-skilled", which companies and clients alike use to justify the low wages granted to those who do toil in the industry, calling into question the assertions that automation concerns will be resolved. The demographics of the industry include a large majority of historically financially troubled communities, such as people of color, and foreign-born workers or immigrants. This, in turn, earns these communities a close association with the term "unskilled worker". Many of these "low-skilled" workers are also identified as

[1] George Ritzer, *The McDonaldization of Society* (Los Angeles: Pine Forge Press, 2008), 192.

such due to their lack of higher education and "specialized skills". So how likely is it that these workers, who are identified as "uneducated" and "low-skilled", will go back to school or be qualified enough to actually complete maintenance on these machines? These populations of "low-skilled" and "minimum-wage workers" already, historically, have a hard time finding jobs that will allow them to live a decently comfortable life, or even simply survive, with many of them even taking on multiple jobs at once. Regardless of the many benefits that come with automation, mostly for the benefit of the employer, much of its past and current effects seem to project a negative future for these "low-skilled" food service employees. The automation and introduction of new technologies into the food service industry has brought various benefits and consequences for both companies, consumers, and employees, both substituting and enhancing human labor, but it has ultimately been negatively affecting various vulnerable populations of human workers, particularly immigrant and racialized communities.

What is "Automation"?

Automation can be used to describe "any single or multiple functional machine or group of machines that performs a predetermined or reprogrammable sequence of tasks."[2] However, when talking about automation, particularly in the food service industry, it is important to remember that this usually refers to the automation of a single (maybe even a few) tasks or duties (such as "inputting data in a reservation system, cleaning the floor, etc."[3]) rather than the automation or computerization of entire professions or jobs.[4] A deep fryer may have a timer and even deep fry

[2] David A. Collier, "The Service Sector Revolution: The Automation of Services," *Long Range Planning* 16, no. 6, (1983): 11.
[3] Stanislav Ivanov and Craig Webster, *Robots, Artificial Intelligence and Service Automation in Travel, Tourism and Hospitality*, (Bingley: Emerald Publishing, 2019), 48.
[4] Ibid.

the French fries on its own, but it cannot package and hand them to the patron, nor can it make hamburgers.

Service automation technologies (such as self-service kiosks, robot waiters, etc.) not only replace human labor but they can also be thought of as transferring "the responsibility of the service-delivery process from the company employees to the customers and transform them [the buyers] into prosumers of the service process."[5] "Prosumer" refers to the concept of mixing the roles of "consumer" and "producer" into a single role, whereby the purchaser takes on additional roles that would have previously been provided by a human employee.[6] Buyers become a sort of "partial employee", taking charge of some aspects of their food service experience, without being paid to do so by the company from which they are shopping at.[7] For clients, this can include tasks like checking themselves in to a restaurant via a smartphone or self-check in machine, taking sushi plates off a conveyor belt, etc. A host would have checked a patron in, and a waiter would have served the dishes, but this is now done (partly or almost entirely) by the buyer themselves.

Most of these newly implemented technologies affecting both the employee and customer experience include Robots, Artificial Intelligence, and Service Automation or "RAISA".[8] A "Robot" can be defined as a mechanism that is programmed or programmable in two or more axes with a certain level of autonomy, which allows it to sense, manipulate, and move within its environment, and complete certain tasks.[9] This is different from Artificial Intelligence (AI), which can be defined as a computer system's ability to accurately interpret and learn from external data using mathematical algorithms, and use machine learning tools and techniques in

[5] Ivanov and Webster, *Robots*, 10.
[6] Ibid, 8.
[7] Ibid 60.
[8] Ibid, 7.
[9] Ibid, 19.

order to accomplish a specific goal, function, or task.[10] Though AI do not themselves *have* human intelligence, they do *exhibit* intelligent behavior, as part of their learning and study of human objectives or actions.[11] Current AI development, especially in the realm of food service labor, is at an Artificial Narrow Intelligence, or weak AI, stage where AI can really only work in fields where they outperform humans due to their algorithms.[12] So for now, most technology being implemented is made to complete a single, or handful of tasks, but it is not wide-ranging.

As RAISA tech becomes further implemented into the labor sector as a whole, it is important to define two very important processes that affect human employees: "De-skilling" and "Up-skilling". By delegating some, or many, tasks of a certain job to RAISA technologies, the number of responsibilities or skills required by humans to complete said tasks decreases, allowing for less trained, skilled, or specially educated workers to complete the job, a process known as "de-skilling".[13] In contrast to "de-skilled" jobs, where now "less-skilled" workers can get the job done, "up-skilled" jobs require more skills, training, and education from their human workers in order to complete tasks efficiently using new RAISA tech. Companies often assert that de-skilling will allow productivity to increase because more workers will be able to complete their work, whilst requiring little to no skill at all.[14] But by decreasing job qualifications or skills needed, employers are ultimately "homogenizing" labor, creating highly specialized jobs, such as vegetable slicer, which makes their human employees highly replaceable.[15] These processes noticeably affect the human workforce, raising various concerns over human labor substitution with RAISA tech.

[10] Ibid, 15.
[11] Ibid, 16.
[12] Ibid, 16.
[13] Ibid, 48.
[14] Ritzer, *McDonaldization, 45.*
[15] Ibid.

"Low-skilled" labor is often used to refer (as it will also be used in this paper) to the perception of labor, work, professions, or forms of employment that are thought of as not requiring a high number of specialized skills, nor special education, training, or experience. Though "low-skilled" labor is often commonly perceived as consisting of tasks that are repetitive, and require little thought, such as that of cashiers, hosts, busboys, waiters, etc., this should not insinuate anything about the humans who carry out these roles, or the importance of such jobs. The term carries various negative associations and connotations, which may hold a certain degree of offensiveness towards the workers it is used to describe. "Low-skilled" is also often used to justify the low wages proportioned to these employees, without care of the current or historical social and economic contexts from which this "low-skilled" labor force arises. For the purposes of this paper, the term "low-skilled" does not mean to imply nor perpetuate any of these negative societal connotations, much less does it mean to justify the low wages and value placed on their work and labor. In contrast, "high-skilled" labor will refer to work that requires a high number of specialized skills, and/or special training, education, or experience, such as lawyers or software engineers. Their work and intelligence to finish their education or gain their professional skills has earned them their large pay and respect, but I must note that no one's skill set makes them more or less superior or inherently intelligent. Nor does it affect someone's worthiness of a livable wage, employment, life fulfillment, and basic human respect, or anyone's personal value as a human.

The Evolution of the Food Service Industry and its Labor Force

Though automation within the food service industry can look differently according to the time period, the food preparation process and service industry has clearly evolved due to technological developments. Between 1958 – 1976 the productivity of eating and drinking locations, though varying widely, rose by an annual average rate of 1%, whilst its output increased by 3.1% and its hours rose by 2.1%. [16] This productivity rise could be attributed to the spread of (at the time) modern management techniques, work organization, new technologies, and a rapidly increasing demand and supply of fast-food services.[17] In 1976, the per capita spending on meals eaten away from home had risen 24% since the mid-1960's, landing at $159 per capita.[18] This "overall increase in spending for meals and snacks eaten away from home was accompanied by a shift from full-service restaurants to fast-food establishments", leading to a rise in the frequency people were eating out, and the consumption and demand for quick, convenient, and lower priced meals.[19]

Alongside this change in where we eat food, comes a shift in the way we prepare food. Menus became simplified and standardized (what you can order at a Wendy's in the state of Wyoming does not differ from what you can order in Illinois), and many of the menu items or foods were being increasingly prepared or packaged away from the cooking or eating establishment.[20] Innovations like the microwave, pressure container, deep fat fryer, etc., not only led to cooking time reductions but deeply altered the way we cook, what we eat, and our perspectives on food convenience or quality. Technological developments in food preparation

[16] Richard Carnes and Horst Brand, "Productivity and New Technology in Eating and Drinking Places." *Monthly Labor Review* 100, no. 9, (September 1977): 9.
[17] Ibid, 9.
[18] Ibid.
[19] Ibid.
[20] Ibid.

and service meant to alleviate human work and time consumption, seemed to not only create an insatiable hunger for quick and economically convenient meals, but it also kickstarted a new cycle. Food service companies, in conjunction with other societal institutions, would accustom their patrons to new eating and cooking practices, leading to increasing demand for food and further development, a development that often meant constructing new technology to fit new needs. Places that could not keep up with calls for shorter wait times and more convenience for patrons, were unable to compete and shut down. This was a particular threat to smaller businesses and a big win for restaurant chains and corporations, as during 1958 – 1976, the number of food and drinking establishments dropped 4%, with drinking places accounting for most of this drop.[21] The number of multi-unit establishments (those run by higher corporations, or under a brand-name that exists in multiple locations) almost doubled during this period, making them 10% of all eating places.[22] Alongside shopper requests for a faster and more convenient food experience, came a heavy demand by producers for new food production techniques and a labor force able to keep up.

New methods began to be implemented and experimented with in the food service industry, things which, by 2022, we have grown accustomed to. "According to a 1974 survey, 70 percent of all [food service] respondents used fresh frozen meats and 56 percent used meats prepared to some extent off premises (for example, pre-cut to meet portion standards),"[23] all of which was done to reduce labor costs, control portions, and improve kitchen efficiency.[24] New equipment also arrived at food establishment kitchens, with innovations like convection ovens (which reportedly reduced cooking time by 50%), fat fryers, and thawing equipment being

[21] Ibid, 11.
[22] Ibid.
[23] Ibid, 12.
[24] Ibid, 12.

increasingly used to improve cooking speed and quality control.[25] Such developments and changes in the food production process, though revolutionary for their time, are now expected when we enter these establishments.

Likewise, new technology developments at the beginning of the 21st century, like websites, social media, specialized software's, and mobile apps, have become an integral part of our current society, including the food service sector. RAISA tech has become increasingly implemented into restaurants, bars, and the food service industry, affecting our diets, work force, and consumer culture. AI's and robots have increasingly entered into the restaurant industry, joining the kitchen as robot chefs, serving guests, making reservations, and even making drinks.[26] Some restaurants, such as Spyce, Jingdong X Future, Moley, and Café Dawn have even shown off their robot chefs or waiters, and others feature bartending robots like at Yoronotaki restaurant.[27]

So far, there appears to be 2 types of restaurant robots: "Back of the House" robots, and "Front of the House."[28] Back of the house robots are mostly used as kitchen assistants, with their main point of interaction being restaurant staff. An example is Cali Burger's "Flippy" robot, a mechanical arm that helps flip burger meat and then helps assemble the burger.[29] These robots can aid in: food preparation; service or cooking time reduction; productivity increase; and ensure food quality or preparation consistency.[30] However, these robots can also cause major issues if, as main food preparers, they have a glitch or technological malfunction, which means they will need some human employees nearby to work alongside these robots if they are to be

[25] Ibid, 13
[26] Nozawa, et al., "Consumer Responses to the Use of Artificial Intelligence in Luxury and Non-Luxury Restaurants" *Food Quality and Preference* 96, (March 2022): 1.
[27] Ibid, 1.
[28] Ivanov and Webster, *Robots*, 196.
[29] Ibid, 196-197.
[30] Ibid 197.

implemented.[31] Front of the house robots are usually those service robots that interact directly, and mostly, with customers. They can greet and seat patrons (with some robots saying pre-programmed phrases that can even be customized for different languages.[32]), suggest menu items, take orders, deliver food, or even serve as entertainment.[33] For example, there has been implementation or proposals of interactive tables or tablet additions in various restaurants and chains, such as Olive Garden, Dominos and Pizza Hut, which would allow users to place their orders and play games on them. There are also sushi places which depend on conveyor belts to transport food and help entice patrons to try new or more dishes, as diners watch other plates travel along the belt next to their table. Amongst front of the house robots, "The most commonly used… are robotic food runners. The main task of these robots is delivering food to the table and bringing dirty plates back to the kitchen."[34] Mobile or waitressing robots are increasingly being able to detect obstacles, with some programmed to memorize restaurant floor plans, and others only navigating on elevated platforms.[35] Based on the research and experience so far of the "Bear Robotics" company and operating restaurants, 3 main tasks seem to be up for automation in the food service industry: dishwashing, carrying food and drinks, and single tasks related to the cooking process (such as patty flipping.).[36] Still, these robot runners or waiters will rely on human employees for support, such as to load completed orders onto the robot, interact with guests, and clean up tables.[37]

Another AI technology implemented into the industry has been chatbots. Chatbots are online programs that are programmed to carry out conversations and interact in a human-like

[31] Ibid, 197.
[32] Ibid, 199.
[33] Ibid, 198.
[34] Ibid, 198.
[35] Ibid, 199.
[36] Ibid, 203.
[37] Ibid, 198.

manner, relying on machine learning, natural language processing, and constant customer interaction to improve their abilities.[38] In the food service industry, chatbots are quite capable of providing a variety of services. Before a patron's arrival to the establishment, chatbots can aid in the setting up of reservations, answering frequently asked questions, and placing to-go or delivery orders. At the food establishment, chatbots or AI can also serve as entertainment, process payments, assign loyalty points, and/or provide food establishments with data that can help them better service their clients.[39] Such technologies, though helpful to buyers and employees, queries how many more tasks employers plan to "alleviate" their human workers of, particularly those who historically and systematically do not find accessible employment elsewhere.

Additionally, rather than lessen burdens on workers, some restaurants have actually started using biometric technology (such as facial and fingerprint identification) to help with personnel authorization and time management.[40] Fingerprint tech has been tested and used to prevent employees from clocking in for each other, help companies "fight fraud", aid HR record-keeping, and to keep track of employees within the building.[41] Thus, current technology and RAISA have been sneaking into the food service sector not just to entertain guests or aid human tasks, but also to watch and manage said workers, something not originally considered when discussing the topic. Though automation and technological developments within the food production and service process has altered the way we eat and what we consume, it has also impacted the way we perceive the employees within the industry. We have not only come to label these workers as "unskilled," "uneducated," and "shameful" but we have used such labels to

[38] Ibid, 187.
[39] Ibid, 187.
[40] Ibid, 192.
[41] Ibid, 192.

spread the ideas that large capitalistic food corporations have fed us. We have consumed the idea that workers, especially if they are "crime-prone" people of color or "illegal" foreigners, deserve the low wages handed to them. We have proceeded from shaming "prostitute-like" bar or food establishment waitresses in antiquity to shaming all the "uneducated" and "lazy" food service workers who help feed us today.

The Pros and Cons of Labor "Automation" in the Service Industry

In a world where technology is constantly and rapidly advancing, the use of RAISA tech depends not only on the profits, productivity, and labor savings that may incur from their increased use, but it also causes and depends on "macroenvironmental drivers." Drivers such as dropping fertility and birth rates, resistance to immigration, competition for employees between labor sectors, national labor laws, and consumer acceptance of technology services affects the labor market and ultimately makes RAISA tech more attractive to employers.[42] As RAISA technologies further develop and improve, these solutions to food service industries become more practical, widely used, and ultimately increasingly inexpensive to purchase.[43] Dropping fertility and birth rates mean a lower domestic population from which to employ, especially in an industry which has historically relied on teenage labor, leading food service companies (amongst many other labor sectors) to import cheap labor from neighboring or foreign countries. However, new, and current RAISA tech will now help them avoid paying for any human labor at all, dodge any negative nationalist publicity, and elude dealing with labor and immigration laws, making this automation of labor even more enticing than the historical reliance on or importation of ethnic or immigrant labor to subside "labor shortages". Nevertheless, we have to consider how

[42] Ibid, 27-29.
[43] Ibid, 29.

the implementation of computers, robots, artificial intelligence, and service automation systems in the food service industry inholds a range of benefits and negative consequences for producers, employees, and patrons alike in a variety of different contexts within the industry.

For companies, and employers, RAISA tech can benefit them through increasing their service capacity (how many customers can be serviced simultaneously for a certain period of time), which in turn increases their productivity, and profit.[44] RAISA can also help facilitate scheduling and planning of operations, turning an increasing number of establishments into 24/7 food service locales.[45] Tech will not ask for sick or vacation days, and can serve numerous customers in a work day or even at the same time.[46] Moreover, RAISA can help improve a company's environmental and financial sustainability due to its decreased use of resources, waste produced, tasks in the production cycle, etc.[47] This new tech also aids management and employers by: enhancing perceived service quality via changes in how service is provided and how technologies engage with patrons (such as robots or services that can communicate in different languages); aid in high employee turnover rates; provide predictive analytics or consumption patterns, which can help them better cater their products and services, and personalize or automate their pricing; and the introduction of RAISA can also help attract publicity from the press (in a positive sense, in this case) for their "high-tech" or innovative methods of service.[48] This, in turn, will pique the curiosity of shoppers who want to see automated food services they saw in the media.[49] Some food service companies will consequently use automation and new tech as a marketing tool like robot waiter restaurants, or rotary sushi restaurants. Companies depend on consumer demands and opinions to decide what

[44] Ibid, 25.
[45] Ibid, 25.
[46] Ibid, 27.
[47] Ibid, 25.
[48] Ibid, 25-26.
[49] Ibid, 27.

to sell, how to sell it, how to organize and provide service, and ultimately how to make profits. As food service industries become more interested in using and implementing RAISA tech into their establishments, they have to devise how to convince clients to embrace RAISA tech as well. Some consumers even seem to prefer RAISA tech products or services when utilitarian or cognitively driven goals, consumption desires, or tasks are required.[50]

With the recent pandemic of COVID-19, which demonstrated the value of the food service industry, it has been predicted that the use of RAISA in kitchens will increase or new innovations will arise to meet new global expectations.[51] Additionally, to combat the "lack" of workers available, many companies have shifted client-company relations and expectations through RAISA, turning customers into "prosumers" or "partial employees". For instance, some restaurants advertise "online-only" deals, promoting users to order online and simply pick-up their food, which frees up employees from taking orders manually and adds to the "convenience" of fast-food or restaurant service. In 2022, the pizza chain Dominos, promoted a $3 "no-delivery" credit, whereby the company encouraged purchasers to not only order online, but also pickup their pizza, instead of having it delivered, in order to receive a $3 credit. Though this may seem like an expense or disadvantage, many corporations have been attracted to implementing more RAISA, in order to further turn the "food service for the customer" into a "food service for the company", and all without having to pay human employees' minimum wage. They save big from not hiring and retaining delivery workers, instead encouraging people to go into the store themselves for "store credit", which can only be used there.

The most feared or cited reasons for the implementation of technology is of course the same financial benefits that companies and employers can enjoy. Reducing human workers

[50] Nozawa, et al., "Consumer Responses," 3.
[51] Ibid, 9.

means displacing people from their jobs, and for certain communities or groups of people, it means closing them off from the job market almost all together. Still, RAISA is applauded for helping food service establishments speed up their service process, making services funnier and entertaining, and decreasing human employee errors by eliminating certain jobs or tasks from humans, things which humans could have done if offered better wages.[52] Instead, this automation and "de-skilling" of food service labor allows the industry to hire and use "low-skilled" employees to complete the tasks they need, allowing companies to expand their pool of potential employees.[53]

The implementation of RAISA tech can, however, still provide a variety of benefits to employees. RAISA, as it is meant to handle particular tasks, can save personnel time from having to perform "3D tasks (dull, dirty, dangerous)" and gives employees more time to focus on more creative, revenue generating, and/or customer orientated tasks.[54] Self-service and other technologies can also help reduce the amount of responsibilities that employees must complete, and allow them to focus on other aspects of their job.[55] Another benefit, as found by Bear Robotics, a company that created "Penny" a service-oriented, waitress robot that delivers food, is that it can minimize physical burdens on servers. Based on pedometer readings they gathered from servers at a restaurant, a server (in a typical 8 – 12-hour shift) could walk "between 5 to 9 miles [8 to 14.5km] in a small (about 1,500 sq. ft.) restaurant."[56] By having penny help deliver food, you can minimize the exhaustion servers face by carrying food and drinks around restaurants, which could allow them to better focus on customer experience. Likewise, robot waiters have also been considered and implemented, by some, in order to help integrate people

[52] Ivanov and Webster, *Robots*, 43.
[53] Ibid, 24.
[54] Ibid, 25.
[55] Ibid, 60.
[56] Ibid, 202.

with disabilities into the workforce. For example, Café Dawn in Tokyo, Japan explains that one of the missions of its robot waiters is to help increase the employment of people with disabilities (such as spinal cord or mobility disabilities), allowing these newly integrated workers to operate robots and work from home.[57] In a good case scenario, employees could receive a job "up-skilling" or additional education or training to enhance their employment. Employers would need to invest in employee training, which could increase employee bargaining power, competition in the labor market, and consequently increase salaries.[58] With new tech, workers could also have "more leisure time to pursue hobbies, family and community interests and self-improvement activities."[59]

RAISA technology could even bring benefits to food service clients. Self-service technologies can shorten customer waiting time, ensure quality control, consistency of service provided, and improve patron's dining experience due to convenience and relative ease of use.[60] Service quality and experience of patrons can potentially be enhanced with "attractive, efficient, and interactive ways of delivering service, engagement, and communications with customers" through RAISA and by using tech like "chatbots, robots, and self-service kiosks [which] could have multilingual capacities beyond the limited linguistic capabilities of human employees."[61] From a customer perspective, these technologies can offer a more convenient, customized, accessible, and less burdensome service experience. Services such as reservations, can be made online 24/7, and orders can be customized easily in a variety of ways. Online ordering services, sometimes promote restaurant accounts, which can keep track of customer orders, payment information, and sometimes offer rewards. These online or "Self-Service Technologies" (SST)

[57] Ibid, 203.
[58] Ibid, 24.
[59] Collier, "Service Sector Revolution," 18.
[60] Ivanov and Webster, *Robots*, 10.
[61] Ibid, 44.

can also occasionally be more accessible, with some ordering kiosks even having hearing impaired services or a variety of languages to choose to order in.[62] Many buyers also report using SST's simply to avoid or minimize direct and personal contact with employees, allowing them to order ahead of time online, and/or even have it delivered by the company itself or a food delivery service. SST's can also empower purchasers, in a way, by allowing them to easily make changes and view the details of their orders or reservations.[63] Furthermore, prices from food services could decline if properly combined with both high productivity (on part of human and machine labor) and lower labor costs, caused by the automation of certain tasks or removal of some human employees.[64]

Despite these pros, there are a variety of different drawbacks that may arise from implementing RAISA or new tech into the food service industry, for businesses, employees, and clients alike. RAISA tech can, "generally only work in highly structured situations, lack creativity and personal approach", which could actually decrease the service quality or dining experience for some patrons.[65] Though efficiency and serving time are common issues in the food service industry, especially fast-food restaurants which market their speed, computers and tech do not seem like a way to completely eliminate long lines, but rather, at most, seem like a human "enhancer". For example, "a Hong Kong restaurant serves about 600,000 (versus 400,000 in the United States). To handle long lines, 50 or more employees move along in the lines taking orders with handheld computers. The orders are transmitted wirelessly to the kitchen."[66] This process did not eliminate lines nor the human workforce, but rather enhanced the efficiency and quality of human labor, allowing them to serve customers personally, and quickly.

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[62] Ibid, 62.
[63] Ibid, 72
[64] Ibid, 24.
[65] Ibid, 23-24.
[66] Ritzer, *McDonaldization, 142.*

With new types of technology also comes a higher investment of time, resources, and money, on part of the mother company or employer. The implementation of RAISA may decrease the flexibility of food customization (as orders are made increasingly pre-portioned or prepared off-site), and may require the reorganization of the food establishment, in order to permit robots to freely move about.[67] Just as new positions could supposedly be created for employees at the food establishment, corporations themselves may also need new departments, jobs, and communication links in order to accommodate the implementation of RAISA into franchises or service areas.[68] There are also a variety of other costs that come with simply obtaining RAISA technologies, including: initial acquisition fees; installation; maintenance; software updates; tech insurance; and even damage costs that must be paid for by the company for RAISA accidents.[69] Even on the lower end, some of the costs for purchasing robots, kiosks, chatbots, AI software, or other technologies, can be quite high. "A self-check-in kiosk can easily cost above 1,000 USD, although cheaper and more basic versions also exist. A restaurant waiter robot can be purchased at prices between 2500 and 7500 USD."[70] More advanced tech will therefore likely only be accessible to larger corporations, such as big brand fast-food chains, and is much less likely to be seen, though not unthinkable, at a small or local restaurant. More readily available to almost all food service businesses are commercial and automatic cooking machines, credit/debit card machines, and online reservation systems. There will also still be human labor costs that come with the introduction of RAISA tech. Companies may have to hire "specialists to operate and maintain the robots/kiosks/chatbots" or they may have to pay for staff to be trained

[67] Ivanov and Webster, *Robots*, 25.
[68] Ibid.
[69] Ibid, 27.
[70] Ibid, 45.

to “effectively and efficiently operate the new technology”, which could be initial or even periodic training.[71]

However, there are developing changes in technology acquirement methods. RAISA tech is indeed still a very costly thing to invest in. But there have been efforts made, on part of RAISA technology manufacturers, to offset this issue. Manufacturers are starting to lease their technology, which can eliminate large initial investments, making them more affordable as they will be paid monthly or so.[72] Leasing also prevents companies from investing heavily in RAISA tech that could quickly become outdated, and allows them to slowly implement tech into their businesses, so they can compare tech costs with human labor costs, and test how employees and patrons react to the new RAISA tech.[73] Nonetheless, tech rental still leaves gaps in the implementation process of RAISA tech in the food service industry.

Labor shortage issues, though meant to be offset by new tech, have not yet disappeared for companies. Though they can now access a larger pool of potential employees, since tasks do not require “high-skills”, companies still risk not finding employees due to the unattractive salaries or wages that may accompany the deskilling of jobs.[74] With the increasing use of RAISA, there have been changes in the demand and salaries for specific human jobs, adjusting their job descriptions, skill requirements, and time needed.[75] When a job is ultimately de-skilled the salary for it decreases or does not stay in line with other company salaries, discouraging many from applying for these jobs in the first place.[76] Due to these wage cuts, many companies and service sectors have come under fire for attempting to replace human employees in order to satisfy their own capitalistic needs. Many of the benefits cited for both employers and employees

[71] Ibid, 46.
[72] Ibid.
[73] Ibid.
[74] Ibid, 48.
[75] Ibid, 51.
[76] Ibid, 51.

(made by the same employing companies) are all the same reasons ethnic, working-class communities have heard throughout history when it came to the job market and historical "de-skilling" of many professions. After seeing the disastrous socio-economic consequences of manufacturing cities, like Detroit, Michigan in the early 20th century, it is hard to believe that the food service industry will result in the benefits claimed by other automated industries. This has led employees to hold negative attitudes about RAISA technologies because they, along with much of the general public, consider these as attempts by employers to substitute, rather than enhance, human labor. This causes a great anxiety amongst workers over the security and stability of the food service sector, which may, in turn, cause increasing turnover rates.[77] Immigrant, ethnic, and working-class communities have not only historically faced high levels of job insecurity and instability, but as they traverse through employment industries, these issues follow them. Companies implementing or considering tech must work to prevent complaints or issues from arising. They must consider the image of their company's transition and the impact on employees, as a negative transition may, in turn, affect buyer's perceptions and consumption.[78]

This backlash is not simply an employee or anti-technological issue but also stems from consumer experiences. Since many shoppers tend to view AI or technology as having less emotional experiences or being less sociologically orientated, many devalue some of the emotion or social oriented services, products, or tasks provided by RAISA.[79] A study done on consumer responses to luxury or non-luxury restaurant use of AI, found that patrons tended to evaluate restaurants where AI is the service provider, much more negatively, especially in luxury

[77] Ibid, 23.
[78] Ibid, 63.
[79] Nozawa, et al., "Consumer Responses," 3.

restaurants. [80] Furthermore, the presence of AI alongside cooking staff seemed to also negatively affect the expectations of food quality, service, ambiance, and the intention of clients to return to the establishment.[81] Tech usage may benefit restaurant efficiency, productivity, accuracy, and speed, but businesses must keep in mind who their target audience is and how their reputation or food service classification may affect the implementation of RAISA.[82] Other things that can affect RAISA adoption is the size, market positioning and market culture of the company, the complexity of RAISA tech (how easy it can be used or employed by workers or clients), "the cultural characteristics of customers and service providers", and public safety concerns.[83] Shoppers may avoid Self-Service Tech if they do not feel that: customization options are enough; their needs are not met; that their personal information is safe; and if they feel unable to properly use the technology.[84] Furthermore, sometimes the failure of SST's, with no employees to turn to, may lead to a negative experience or reluctance to use such machines again.[85] The usage of SSTs by buyers can also be affected by the presence of other customers, where a purchaser unaccustomed to SST's may be discouraged to use them if other people are nearby, though reluctance does decrease with familiarity.[86] What use does tech provide anyone if no one can or wants to use it?

In terms of who RAISA implementation is going to affect in the labor force, it has been historically detailed by various companies and civilians that if a task or job can be done by a machine, most companies will choose to do so. As the de-skilling of jobs continues to break down the service process into smaller and "less-skilled" tasks, it becomes easier for employers to

[80] Ibid, 8.
[81] Ibid, 9.
[82] Ibid, 9.
[83] Ivanov and Webster, *Robots*, 52.
[84] Ibid, 63.
[85] Ibid, 64.
[86] Ibid, 68.

replace workers, following a seemingly "Taylorist" ideal that anything that is unnecessary or inefficient, must go. In the same fashion, if tech were not perceived as enhancing the service provided, or not well received by customers, it would be highly unlikely that the job will be replaced, for now.

Demographics of Human Labor in the U.S Food Service Industry

Cited benefits and consequences of the automation of the food service industry must be put into perspective by discussing who historically makes up the labor force and how automation is projected to affect them. Between 1958 – 1976, employment in eating and drinking establishments rose by an annual average of 3.9% and by 1977, there was an estimated total of 3.7 million food/drinking service workers.[87] This meant that people were starting to eat out more, and the food service industry needed to adjust to fit increasing demands. But, by 1975, 51% of all food/drink industry employees worked part-time, dropping its proportion of full-time, year-round jobs to a mere 22% in 1976 (the lowest of any occupational sector at the time).[88] A part-time job, would mean a part-time wage, and for people who already generally do not earn as much, this means financial trouble. Surges in fast food establishments being opened and changes in food, technology, equipment, and consumer demands were occurring, causing increased demand for "low-skilled," "cheap" workers in the food industry.[89] The demographics of and outlook on food service employment was now shifting. Women made up 64% of all workers in the food service industry and were "generally more likely than men to hold part-time jobs in the

[87] Carnes and Brand, "Productivity and New Technology," 11.
[88] Ibid.
[89] Ibid.

industry."[90] Women, who historically have faced a gender pay gap, were now fighting the negative connotations that surrounded the role of "food service employee," connotations which supposedly justified their lower wages. "Between 1960 and 1970, the median age of food service workers declined from 42 to 33 years", resulting in, by 1975, teenagers making up 30% of all food service workers, particularly in the growing fast-food sector.[91] The need for "skilled", experienced, and full-time labor, worthy of a higher wage, was dwindling.

As of the 21st century, the demographics of this industry have undergone some changes. As of 2021, there were approximately 76.1 million (16 years or older) workers that were being paid hourly rates (PAR), and out of these, an estimated 910,000 received below minimum wage.[92] Of the 58 million White paid hourly workers, 1.2% were at below minimum wage, with the statistics of Hispanic or Latinos following at 17 million PAR workers and 1.1% of them earning below minimum wage.[93] Black PAR workers numbered at 11 million, with 1% of them receiving less than minimum wage, and Asian PAR workers numbered at 3.8 million, with .9% of them earning below minimum wage.[94] Though the statistics may not seem staggeringly different, with all of them being at about 1%, one must take into account the population sizes. Whites make up the largest population of PAR workers and thus have the highest percentage of workers receiving less than minimum wage. However, it should be noted how the White population and Hispanic or Latino population have very close percentages of below minimum wage earners, despite the White PAR population having nearly 3X the amount of workers that the Hispanic or Latino population has. Of the 76.1 million PAR workers that are at or below the federal minimum wage, 6.4 million of them work in the "Food preparation and serving related

[90] Ibid.
[91] Ibid.
[92] U.S. Bureau of Labor, "Characteristics of Minimum Wage," 3.
[93] Ibid.
[94] Ibid.

occupations," (FPSO) with 51,000 of those employees working at minimum wage, and 593,000 working at below minimum wage.[95] In regard to the education of PAR workers, it is reported that approximately 8.5 million have less than a high school diploma, 67.6 million have graduated high school, and 16.8 million have a bachelor's degree or higher.[96] Millions of people work in the food preparation industry, many of whom are people of color, working-class, and immigrants. They come from communities who have faced underfunded social services, including education, and whose work has historically been devalued and underpaid. Even now, as new tech is constantly implemented, the vulnerability of these workers has not changed statistically. When so many employees are being paid at below the minimum wage, it is no wonder the food service industry struggles with a low staff turnover rate. Of the workers paid at hourly rates, people of color seemed to face higher rates of below minimum wage employment in relative comparison to the White population.

Another shift in the food service labor force can be seen in 2021, where approximately 7.37 million people (aged 16 or older) worked in "Food Preparation and Serving Occupation" (FPSO), with the largest age group being 25–34-year old's, numbering at 1.56 million.[97] The "Food Preparation and Serving Occupation", includes: chefs and head cooks; first-line supervisors; cooks; food prep workers; bartenders; fast food and counter workers; waiters and waitresses; food servers, non-restaurant; dining room, cafeteria attendants, and bartender helpers; dishwashers; hosts and hostesses; and, all other food prep and serving related workers.[98] The positions that had the highest median ages were chefs and head cooks at 41.5 years, and cooks at 34.9, whom made up the biggest group of workers in the occupation, estimated at 1.9 million

[95] Ibid, 9.
[96] Ibid, 12.
[97] U.S. Bureau of Labor, "Occupation and Age," 7.
[98] Ibid, 7-8.

workers .[99] The youngest median age was the hosts and hostess workers at 21.4. This age shift, towards older workers, contrasts the younger groups of people that the FPSO used to rely on.

As of 2020, 115.3 million White people (16 or older) were employed, with 4.2% of this labor force working in the FPSO.[100] Black or African Americans numbered at 17.8 million with 5.1% in FPSO, Asians at 9.4 million with 4.4% in FPSO, and Hispanic or Latinos totaled at 25.95 million with 6.9% in working in FPSO. Though none of these communities came even close to the total amount of people employed that the White population had, all of them held disproportionately higher amounts of their populations working in the food service industry as compared to the White labor force. Though Asians held the lowest population employed, at 9.4 million, even they still had a larger percentage of their workers in FPSO than did the 11X larger White population. Additionally, of the 6.56 million food prep workers, 74.8% were White, 13.9% were Black, 6.4% were Asian, and 27.3% were Hispanic or Latino.[101] Although White people seemingly make up a majority of food prep workers, one must take into account how little of the White population itself these workers make up (only 4.2% of the White labor force), and how high their total population is in general (115.3 million), as compared to that of any of the other reported races. This means that any negative consequences resulting from the automation of the food service industry will very disproportionately target and impact certain communities, such as working-class, impoverished, exploited, ethnic and immigrant populations. Communities that are historically relegated to low-paying jobs, may begin to see themselves without any employment options.

The food service industry has also increasingly become a viable employment path for the foreign-born. Out of 24.8 million foreign born workers, 5.7% (approx. 1.4 million) worked in

[99] Ibid.
[100] U.S. Bureau of Labor, "Race and Ethnicity", 28.
[101] Ibid, 41.

FPSO in 2020, whilst out of 122.99 million native born workers, only 4.2% (approx. 5.17 million) worked in the food prep industry.[102] Immigrants have historically been relied upon to fill labor gaps, and the food service industry is no exception. Looking at the populations of 25 or older, approximately 3.2 million foreign born workers (out of a total of 17.9 million), in comparison to only 2.5 million native born workers (out of a total of 83.2 million) had less than a high school diploma.[103] These statistics may also not fully account for undocumented immigrants, a highly exploited population. Immigrants are desirable for their exploitable and replaceable nature. So, how likely is it for foreign-born, minimum wage, barely high school graduate workers to pay or be recommended for new job trainings or education to implement RAISA tech?

Though these statistics may not be entirely representative of the whole labor force they represent, they give us a pretty good idea as to the patterns that exist in the food service industry. The industry relies on communities of color, and an older, foreign labor force, with a majority of the force being represented by cooks, a profession which is currently being threatened by RAISA tech such as Miso Robotics' "Flippy". Though the White population seems to hold higher percentages or a higher amount of people, their overall population majority in the United States, should be considered when contemplating which populations work the most in FPSO.

This demographic (older, less educated, foreign-born, POC) should also be considered when we discuss how automation ultimately affects people. Corporations and businesses will justify their turning to RAISA tech and the automation of their "de-skilled" jobs by clarifying that it will "enhance" current human labor, and bring new jobs for those who may lose their current ones. However, this shift towards automation or machine maintenance-based

[102] U.S. Bureau of Labor, "Foreign-Born Workers", 12.
[103] Ibid, 13.

employment places bigger requirements and demands on American workers, requiring them to learn new skills. If a worker could not afford (or for some other reason) to complete a college or high school degree in the first place, how do companies, the government, and the general public expect workers to do so whilst receiving a disappointingly low minimum wage? What about workers who have families to support? How can these companies and the discouraging public expect a minimum wage worker, who is already deemed "low-skilled", "uneducated", and "unworthy" of a livable wage, to give up additional time and money to get retrained or learn a new skill for such an unstable job market?

Though automation and new tech will certainly bring new jobs, it is hard to believe that those who are being replaced (dishwashers, fryers, cashiers, etc.) will be able to easily obtain one of those new specialized jobs. Some workers will not be able to make or survive this shift due to "economic resources, training opportunities, mobility of family and friends, age, or education level. These workers will be permanently displaced… [and] Older workers, less-skilled workers and some lower and middle managers are prime candidates for this permanent job loss category."[104] If a majority of the workforce is already made up of historically marginalized, poverty-stricken communities, how are they going to find a way to keep up with the automating labor force that tries to force them out of the few jobs available to them and into the jobs that have traditionally been kept from them? A major problem with such a rapid automation and tech-based movement in the food service sector is that "skills of the workforce tend to lag the capabilities and advances of technology. Some segments of the U.S. workforce lack the economic resources or local opportunities or motivation to update or change their job skills."[105] So when employers constantly remind you of your replaceability, and deny you livable wages, it

[104] Collier, "Service Sector Revolution," 19.
[105] Ibid, 18.

is hard to be motivated to do anything that would "benefit" you, even at your own expense. If a job was slowly de-skilled and automated once, how are these employees sure they will not be on the chopping block again?

How to Aid Human Displacement and Offset Effects of Automation

After the COVID-19 pandemic, the importance and necessity of workers in the food service industry was blatantly displayed. Apart from this, the issues that arose from people who lacked proper livable wages was also a major point of discussion. Though these people were termed "essential workers", the way they have been historically treated, even 2 years after the start of the pandemic, does not match up with this identification and sentiment. Many have increasingly been quitting their jobs, tired of the working conditions and barely sustainable wages, only to be called "lazy", "uneducated", "unmotivated", or "unskilled". If already looked down upon and deemed unworthy of even having enough money to live, how are they to feel motivated or hopeful that they can survive the impending automation and further de-skilling employers are choosing?

The first step in offsetting and aiding the displacement of human employees in food service is to simply recognize that their labor is hard work too and that they are worthy of livable wages. The negative dichotomy that exists within US society, between low-skilled and high-skilled workers, must vanish and instead recognize that people can host a variety of different skills depending on their experiences, education, physical and mental abilities, and personality, whilst still deserving a livable wage, one that changes in conjunction with the economy and cost of living.

Though presented with various "objective" statistics, numbers, data, and reports (even including those within this paper, which may not be all encompassing but attempt to depict the effect that automation will have on certain populations), one must remember that those numbers are something much more than what is presented: they are people. It can become quite easy for many to hear about the labor shortage or view the statistics of food service employment and simply dismiss the workers as being "unmotivated" or "lazy", with many even attributing these characteristics to certain populations due to the existing stereotypes placed on the people who make up the labor force and the job itself. One has to examine such statistics with care, as no such national poll has ever been "truly" representative of the food service work force, whether intentionally or not. Assumptions and patterns must be based off the few interviews or polls we have whilst taking into consideration what factors (migration, language barriers, culture barriers, inaccessibility, etc.) may have prevented all-encompassing statistics. We must be aware that the "history of science [is] tied to militarism, capitalism, colonialism, and male supremacy [factors that could be looked into by further studies] – to distance the knowing subject from everybody and everything in the interests of unfettered power."[106] When viewing statistics, reports and claims that support the idea that automation will benefit "all" workers, consider who it is that is claiming that and who benefits from making such claims. It is easy to distinguish one's own situation from that of the food service employees and justify their loss of employment, but though numbers seem to be objective, do not remove the bodies that belong to those statistics from those numbers, for "objectivity turns out to be about particular and specific embodiment and definitely not about the false vision promising transcendence of all limits and responsibilities."[107]

[106] Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14, no. 3, (Autumn 1988): 581.
[107] Ibid, 582-583.

Though seemingly exciting to some customers or like a great business opportunity for small employers, the automation of the labor force can really come to represent a "scientific revolution" of sorts for those employed. Accordingly, it must be considered how new technologies have affected and continue to impact existing FPSO worker populations, especially with some of them being nearly up for replacement.

To aid those being displaced, and at the receiving end of such a worldly change, compromise must be reached between unions, workers, governments, consumers, and employers, in order to help members of such ostracized populations. An actual attempt and effort must be made (especially on part of corporations who say they are adding new jobs into the economy) "to retrain displaced workers. For those workers capable of learning new skills, tax credits must be provided to individuals and corporations to encourage the upgrading of skills (job enrichment), more cross training (job enlargement), and developing totally new skills (job shift). Training must be viewed as a sound investment in human capital."[108] More money will need to be invested (properly) into the community and displaced workforce by governments and food service businesses. Considerations should also be made for those workers who "are caught in a complex set of social, economic, and technological forces beyond their control or ability to rectify and need permanent help from society during this transition period. An alternate approach would provide the worker with job displacement insurance as protection against being automated or skilled-out of a job."[109] A shorter work week should be considered as well, "the government could aid this process by making overtime more expensive compared to regular time, by gradually paying shorter overtime premiums (such as '36 hours in 1900 and 32 hours in 2000'), or by giving employees compensatory time off."[110] If labor automation will truly be able to offer

[108] Collier, "Service Sector Revolution," 19.
[109] Ibid.
[110] Ibid, 20.

employees the "popularly cited" extra leisure time, then attempts should be made to actually provide this time for employees to spend with family, friends, or doing other things they need or like.

Conclusion

In conclusion, though the automation of the food preparation and service sector may offer a wide array of benefits to employers, consumers, and laborers alike, it is important to take into consideration the exact communities and people that this automation is affecting, as many of these are already, historically, heavily racialized, looked down upon, and disadvantaged economically. There is nothing wrong with wanting to see the cool robots, try out the automated establishments or services, or trying to make our work easier, but we must reflect on how RAISA affects our consumption practices, and impacts those who toil in these industries. Not all workers are made the same, and some may be more deeply affected by the ever-quickening automation of the food preparation sector. The implementation of RAISA tech ultimately depends on the usage and acceptance of clients, as a major fast-food chain is nothing without its profits and customers. One does not need to boycott or give up these automating establishments all together, but one does have the responsibility, as a fellow human, consumer, and laborer in the capitalistic system of the United States (and the world), to fight for the right of all to have a livable wage, and/or have access to employment. These technologies, in practice can and do enhance human employees labor in a variety of ways, such as the integration of disabled workers, and the alleviating of physical burdens on servers. However, one must also be aware that these technologies though efficient, are not always necessary or successful, and hold the power to substitute certain jobs entirely. Where a kiosk may help workers during busy periods, they can

also be used to completely take over the food ordering process. Awareness of the communities that these technologies can threaten and how these communities may react towards these upcoming changes is imperative. These communities that have been racialized, marginalized, and stripped of pride in their employment, may find it hard to adjust their skills with a constantly changing work environment. By truly attempting to provide for the basic needs of everyone, instead of simply claiming to do so, one can help subside the anxiety and fears of robots taking over the labor force and world. Though certain jobs may be replaceable to many employers, the human body, mind, and soul is not.

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