A Study of AI Impact on the Food Industry

Seong Soo CHA[1]

Abstract

The integration of ChatGPT, an AI-powered language model, is causing a profound transformation within the food industry, impacting various domains. It offers novel capabilities in recipe creation, personalized dining, menu development, food safety, customer service, and culinary education. ChatGPT's vast culinary dataset analysis aids chefs in pushing flavor boundaries through innovative ingredient combinations. Its personalization potential caters to dietary preferences and cultural nuances, democratizing culinary knowledge. It functions as a virtual mentor, empowering enthusiasts to experiment creatively. For personalized dining, ChatGPT's language understanding enables customer interaction, dish recommendations based on preferences. In menu development, data-driven insights identify culinary trends, guiding chefs in crafting menus aligned with evolving tastes. It suggests inventive ingredient pairings, fostering innovation and inclusivity. AI-driven data analysis contributes to quality control, ensuring consistent taste and texture. Food writing and marketing benefit from ChatGPT's content generation, adapting to diverse strategies and consumer preferences. AI-powered chatbots revolutionize customer service, improving ordering experiences, and post-purchase engagement. In culinary education, ChatGPT acts as a virtual mentor, guiding learners through techniques and history. In food safety, data analysis prevents contamination and ensures compliance. Overall, ChatGPT reshapes the industry by uniting AI's analytics with culinary expertise, enhancing innovation, inclusivity, and efficiency in gastronomy.

1. Introduction

In the modern era, the convergence of advanced technologies and traditional industries has brought about tremendous change across various sectors, resulting in innovations that redefine existing practices and challenge established norms. One such innovation that has received widespread attention is the development of language models based on artificial intelligence (AI), which have demonstrated remarkable abilities to produce human-like text, understand context, and engage in coherent conversations. Among these language models, ChatGPT, developed by OpenAI, stands out as a pioneering example of AI-powered natural language processing (Lund et al.,

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1 Corresponding Author. Professor, Dept. of Food Science & Service, College of Bio-Convergence, Eulji University, Email: sscha@eulji.ac.kr

2023). As ChatGPT's capabilities expand beyond traditional applications into areas such as creative writing, customer service, and education, it's becoming increasingly clear that its impact transcends traditional boundaries and pervades even the most complex and sensory-rich sectors, such as the food industry.

As an integral component of global culture and economy, the food industry has undergone significant changes over time, from the adoption of innovative cooking techniques to the proliferation of fast food chains and molecular gastronomy (Schwark et al.,2020).

However, the convergence of AI, specifically in the form of ChatGPT, with this industry presents a new wave of possibilities that could redefine the way we approach food production, consumption, and experience. This study aims to explore the multifaceted impact of ChatGPT on the food industry and shed light on its implications (Dwivedi et al., 2023). This study aims to explore how ChatGPT is impacting the food industry in a domain-specific manner. Researchers will be asked to consider how ChatGPT can help with recipe re-creation, food personalization, menu development, food outlet marketing, and more (Dwivedi et al., 2023).

2. ChatGPT Using in the Food Industry

2.1. Recipe Creation and Innovation

The robot watched a video of making a salad from a recipe and immediately recognized the recipe. It recognized not only the ingredients but also the human's hand gestures, figuring out which way the hands, tools, and ingredients should move to cook efficiently. This allowed the robot to develop a ninth recipe that wasn't in the original video (Noever, & Noever, 2023).

The robot that developed the new recipe also added its own new recipe to the cookbook by comparing the similarity of the new recipe to the existing recipe in the video. By watching the video, the robot was able to recognize the characteristics of the ingredients, which allowed it to create

the new recipe. In the future, cooking robots will be able to identify the cooking process faster and more accurately through video, no matter how complex the recipe is (George, & George, 2023). The cooking, cleaning, and laundry masters you see in internet videos could become robots.

2.2. Personalized Cooking Experience

You can send ChatGPT a picture of your fridge and it will analyze it and come up with dishes and recipes that you can make with the ingredients in your fridge. It can also analyze difficult economic graphs in a simple way. In South Korea, community-based fresh food direct sales platform startup 'Good Sanghoe' has launched an 'AI Chef' service in conjunction with ChatGPT. AI Chef allows users to input the ingredients they want to cook and provides various cooking recipes through ChatGPT integration. Users can easily cook at home by following the recipes recommended by the AI chef and enjoy delicious dishes with ease. In addition, if a user applies for delivery of a recipe recommended by an AI chef, a meal kit is actually produced and randomly delivered for free. Goodwill Merchants Association prepared for this event by utilizing its know-how in developing and manufacturing various meal kit products.

ChatGPT asked three apps, OpenTable (restaurant recommendation), Wolfram (calculation), and Instacart (shopping), and asked ChatGPT, 'Recommend a restaurant to go to on Saturday. 'Recommend a simple recipe to cook on Sunday. Calculate the calorie content of the dish," and ChatGPT completes a shopping order that works with the three apps to create a chickpea salad with the nutritional level the user wants. On a smartphone, this would require the user to touch three different apps, but with the ChatGPT plugin, it's all done in one fell swoop. The more services ChatGPT can support, the more it will be possible to provide ultra-personalized services that can achieve maximum satisfaction in a short time with simple commands (Fusté-Forné & Orea-Giner, 2023).
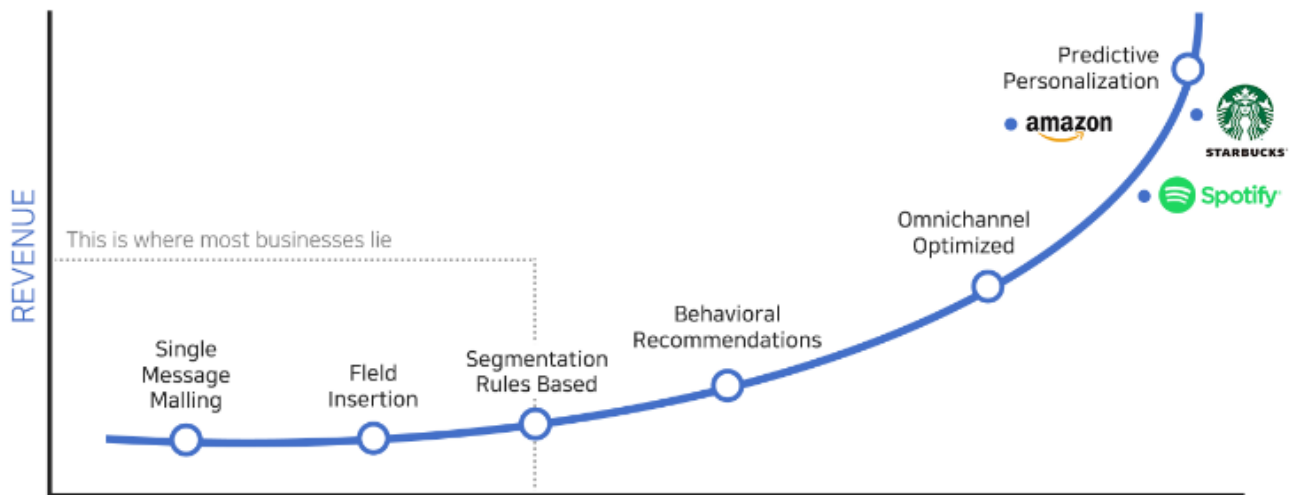
Figure 1: Personalization Maturity and Corporation Revenue

2.3. Menu Development

A recent concept in Australia is a pop-up restaurant that serves as a marketing vehicle while experimenting with AI technology. The owners used OpenAI's ChatGPT and Canva's Text-to-Image AI generator to develop a theme for the restaurant. The owners asked ChatGPT to come up with a name and concept for an experiential, modern, and industry-specific restaurant in Sydney, Australia. They also used the chatbot for details like the restaurant menu and lighting decor.

After finalizing the overall concept, Stephanie used Canva's AI tools to create a demo image of the restaurant. The result was a restaurant decorated with various lights and a menu based on the four elements (Beksh, 2023). As the food industry continues to embrace technology and innovation, ChatGPT is emerging as a valuable ally in the menu development journey (Kargaran et al., 2023).

3. Food Marketing

3.1. Foodtech

As the number of industries based on artificial intelligence (AI) expands, the food industry is also expanding its business areas to apply AI to expand customer contact. Especially in the food industry, AI is becoming increasingly important as a core technology in the food tech sector. Foodtech, a portmanteau of food and technology, is a new industry that incorporates various innovative technologies into the food industry (Carvalho & Ivanov, 2023). The food tech industry is expanding due to the advancement of robotics, Internet of Things (IoT), and AI technologies.

According to the Korea Agriculture, Fisheries and Food Corporation, the global foodtech market grew by 12% from $211 billion in 2017 to $238 billion in 2019. In 2021, it grew to $272 billion, and this year, it is expected to exceed $300 billion at $311 billion and reach $360 billion by 2025.

This is partly due to the decline in agricultural trade and the number of farmers in each country since COVID-19, which has led to increased concerns about food security. The importance of non-face-to-face services, such as online transactions, has also increased due to COVID-19, accelerating the development of related industries. AI is one of the key technologies in food tech. The applications of AI technology are endless. In particular, the API (Application Programming Interface) of 'Chat GPT' has been released, making it possible for anyone to provide services and lowering the barrier to entry. It is expected to speed up the streamlining and automation of processes such as food production, development, distribution, and cooking across various industries, from large companies to startups.

It's not uncommon to see AI-powered robots in restaurants, food manufacturing plants, and grocery retailers. A number of companies are also introducing personalized food through the combination of AI and big data. By using data such as personal health and taste, they can mass-produce customized food or cook food based on it and provide customized services. It is also possible to search for trends in real time to suggest new products or respond to consumers. ChatGPT can help you create food descriptions, blog posts, and marketing content. For example, a restaurant could create interesting stories about the origin of ingredients, the cooking process, or the cultural significance of a dish. (Piriyakul, 2023). If AI detects positive aspects of a product's sustainability, marketers can highlight them in future campaigns to connect with environmentally

conscious consumers. ChatGPT can also help with ad copy. (Dwivedi et al., 2023).

3.2. Customer Service and Ordering

ChatGPT-powered chatbots can handle customer inquiries, assist with orders, and provide personalized recommendations. Customers can interact with these chatbots on a restaurant website or food delivery app to get assistance with menu selections, allergy information, and order tracking. By combining the excellence of AI-powered interactions with the nuances of human preferences, ChatGPT is emerging as a game-changing force within the food industry to improve customer service and enhance the ordering experience. ChatGPT integrates seamlessly into the various touchpoints of the customer journey, transforming interactions into personalized, efficient, and satisfying encounters that leave a lasting impression (Paul et al., 2023). One of the pivotal contributions of ChatGPT is customer engagement. It provides immediate and responsive support to customer queries through chatbots, virtual assistants, and even voice interfaces. Whether customers want information about menu items, dietary restrictions, or opening hours, ChatGPT provides accurate answers quickly, increasing customer satisfaction and convenience (Lakhani, 2023).

3.3. Culinary Education

ChatGPT can explain the step-by-step process, provide troubleshooting tips, and even provide historical context about the sauce's origins. With this level of personalized, comprehensive instruction, learners can master their culinary skills with greater confidence. ChatGPT's text generation capabilities also apply to recipe creation and modification: you can guide students through the process of creating recipes that comply with specific dietary restrictions, exploring fusion cuisine, or experimenting with avant-garde ingredients. By sparking creativity and allowing experimentation in a safe digital environment, ChatGPT transforms culinary education into an immersive experience that bridges theory and practice (Mogavi et al., 2023). For culinary schools and institutions, ChatGPT serves as a versatile tool for curriculum enhancement. ChatGPT can also simulate real-world scenarios to give students real-world challenges to solve. For example, you can present a scenario where ingredients are limited and students must create a dish that caters to a specific cultural preference. This gamified approach not only sharpens culinary skills, but also fosters critical thinking and adaptability. In the context of professional development for chefs and culinary professionals, ChatGPT becomes a platform for continuous learning (Bozkurt et al., 2023). It

can analyze industry trends, suggest innovative ingredient combinations, and recommend advanced techniques that push the boundaries of culinary expertise. This allows culinary professionals to stay up-to-date in an ever-evolving field. ChatGPT's capabilities extend to language translation, facilitating access to culinary knowledge across language barriers. Recipes, articles, and educational content can be translated to make culinary education more inclusive and global. In essence, ChatGPT transforms culinary education into an immersive journey of exploration, innovation, and mastery (Gursoy et al.,2023). It combines the artistry of human expertise with the accuracy of AI-powered insights to create a generation of culinary professionals who are not only skilled practitioners, but also creative thinkers well versed in the traditions of the past and the possibilities of the future.

4. Conclusion

As the food industry adapts to the digital age, the synergy between AI and gastronomy is becoming an important topic of discussion. ChatGPT's unprecedented ability to generate human-like text and facilitate natural conversations has far-reaching implications for recipe creation, culinary education, and personalized dining experiences. By embarking on a journey to uncover the dynamic interplay between technology and gastronomy, this study aims to provide a holistic understanding of ChatGPT's impact on the food industry and offer insights into the opportunities and challenges it presents in reshaping the way we cook.

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