

Impact Of Artificial Intelligence on Chain Catering Enterprises Operating -Taking Starbucks as An Example

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Abstract. This paper focuses on how artificial intelligence impacts catering enterprise operating from different aspects such as the big picture, why traditional way isn't better, efficiency, customer experience and so on. This study found out that most of the large Catering Enterprises operate using AI to help their management, for example the Starbucks APP. This article aims to demonstrate the critical significance of implementing AI technologies in the chain catering industry, highlighting that the integration of Artificial Intelligence (AI)—whether in individual store operations or across the entire enterprise ecosystem—plays a pivotal role in enhancing operational efficiency, customer satisfaction, and overall business performance. There will be an introduction including study background, existing problems, and sufficiency. Following by a list of what other studies have found and this finding and what others are missing. Finally, the shortcomings of previous research and related suggestions are summarized. This paper provides a reference for the intelligent and personalized development of catering industry.

Keywords: Artificial intelligence; chain catering enterprises operating; Starbucks.

1. Introduction

The restaurant industry is undergoing a profound transformation driven by advancements in AI, particularly generative AI applications. These technologies are reshaping operational models, with public acceptance of AI service robots rising steadily—from automated order-taking systems to AI-powered inventory trackers. Starbucks, a global giant with over 30,000 stores spanning more than 80 countries and serving millions daily, stands at the forefront of this shift. By examining Starbucks' integration of AI, people can clearly illustrate how technology impacts every facet of catering enterprises, from backend logistics to customer-facing interactions [1,2].

Traditional chain restaurant management has long grappled with deep-rooted inefficiencies that hinder growth: selecting optimal store locations often depends on outdated manual market analysis, resulting in underperforming outlets with low foot traffic; imprecise inventory forecasting leads to massive food waste—from perishable ingredients to prepared dishes—significantly inflating operational costs; and generic, one-size-fits-all marketing campaigns fail to resonate with specific customer segments, squandering valuable resources. In the fiercely competitive coffee market, where consumer tastes shift rapidly (e.g., from classic lattes to specialty cold brews), these issues become even more critical, threatening brand competitiveness. Starbucks, a global coffee giant, has turned to AI to tackle these pain points head-on, leveraging advanced machine learning algorithms to refine key operations—from smart ingredient sourcing and dynamic stock level adjustments to hyper-personalized customer service that boosts loyalty.

Analyzing AI's role at Starbucks offers actionable insights for other chain restaurants. It demonstrates how technology can boost efficiency—reducing waste, cutting operational costs, and enhancing customer satisfaction—ultimately driving profitability. However, as a relatively new technology, AI also carries risks, such as data privacy concerns or over-reliance on algorithms that may misinterpret local market nuances. This study aims to highlight both AI's transformative potential in store management and the need for balanced, context-aware implementation, guiding other companies to harness AI effectively while mitigating its pitfalls.

2. Literature Review

This research mentioned that AI may bring customer inconveniences. Starbucks needs to have contingency plans and alternative solutions in place to minimize customer inconvenience. In scenarios where operations are disrupted by technical glitches, power failures, or system outages—situations that effectively "hijack" business continuity—here are some technological solutions and best practices that Starbucks, or any business facing similar issues, can consider adopting [3].

Another research also mentioned that using digital tools can bring huge benefits but also risk exist. The catering industry is entering the era of digital transformation, with the rise of hybrid business models integrating the Internet of Things, big data, AI, social media, and shared economy platforms. The ecosystem, which focuses on customer experience and helps businesses create significant value, is rapidly emerging. However, if the customer experience, the interface of shared economy platforms, or the management of delivery personnel is subpar, more risks will arise [4].

This paper mentioned about usage of AI in different restaurants, not only Starbucks, amid today's fast-paced lifestyle, people especially white-collar workers in particular are left with shrinking time for meals. To address this, a growing number of restaurants are turning to AI technologies to boost cooking efficiency and cut down service time. Examples include quick payment systems (such as QR code and facial recognition payments), AI-driven service robots, intelligent self-ordering kiosks, and robotic chefs. Since the onset of the COVID-19 pandemic in early 2020, food safety and hygiene have become increasingly critical considerations for diners eating out. In this context, chef robots and server robots have emerged as valuable solutions, as they help minimize close human contact [5].

With the global population on the rise, the demand for food is projected to surge by 59% to 98% by 2050. To meet this growing demand, AI has found applications across various domains, including supply chain management, food sorting, production development, food quality enhancement, and the maintenance of proper industrial hygiene. Sharma noted that the food processing and handling industries are anticipated to grow at a compound annual growth rate (CAGR) of at least 5% through 2021. Artificial Neural Networks (ANN) have emerged as a valuable tool for addressing complex real-world problems in the food industry, as highlighted by Funes and colleagues. Additionally, Correa et al. pointed out that ANN simplifies the classification and prediction of parameters, which has led to a growing demand for its use in recent years. Furthermore, Fuzzy Logic (FL) and ANN have functioned as controllers to ensure food safety, enhance quality control, boost yields, and reduce production costs. AI technologies have also proven beneficial in food drying processes, serving as effective tools for process control in drying operations [6].

Starbucks leverages artificial intelligence to gain insights into customer preferences, enabling it to offer tailored product recommendations and relevant promotions—for instance, suggesting an iced beverage during warm weather. This data-driven approach boosts customer satisfaction and loyalty by making every interaction more meaningful. Predictive analytics facilitates real-time optimization of inventory management, marketing strategies, and staffing decisions. The Starbucks mobile app and rewards system provide personalized experiences that integrate smoothly across various platforms. The shift toward hyper-personalization has resulted in improved customer retention rates and higher revenue. An examination of Starbucks' strategic use of predictive analytics, including its technology applications and conceptual models, reveals observable performance outcomes. The conceptual model illustrates how AI processes customer data to deliver personalized experiences and generate feedback [7].

3. Specific Application and Value of AI in Starbucks Operation

3.1. AI Makes Supply Chains Work Better

Starbucks uses past sales data and AI to guess how much it will sell. For example, in summer, it knows people will buy more iced coffee, so it orders the right amount of ingredients. Sustainability has emerged as a worldwide corporate imperative, with its implementation shaped by two major

trends. The first is the acknowledgment that global supply chains exert a significant influence on sustainability, necessitating the "greening" of the entire supply chain. The second trend is technology—encompassing digitization, AI, and "big data"—which has become omnipresent. These technologies are affecting every facet of how companies' structure and oversee their supply chains, while also exerting a strong impact on sustainability. In this essay, we synthesize the prevailing dominant themes in research concerning sustainable supply chains in the digital era [8]. AI uses those facts to make good guesses. This means less waste and no running out of ingredients.

3.2. AI Improves Stores Running Day-to-Day

Some Starbucks stores in New York use AI to schedule workers. The AI looks at how many customers usually come in and which workers are available. Why It Works: Scheduling workers based on real data means there are enough workers when the store is busy, making service faster and workers happier. In USA people consider Starbucks as a quick coffee pickup so the efficiency and time are valuable to customers. Whether the application of AI technology can improve enterprises' operational efficiency, enhance their market value, and gain competitive advantages is a matter of greatest concern to enterprises. In the modern society where the Internet, big data, and AI are developing rapidly, manufacturing technologies in the real economy have gradually integrated these new-generation information technologies, promoting the rapid development of intelligent manufacturing represented by industrial robots, human-machine intelligent interaction, and intelligent logistics management. The new-generation production technologies can boost enterprises' total factor productivity. Robots used in production and manufacturing have greatly improved productivity, reduced production costs, and achieved dual optimization of technology and cost. Intelligent manufacturing can control the production process in real time, quickly collect product information, improve market response speed and core product competitiveness. The key to improving enterprises' operational efficiency lies in intelligent production, and the positive effect of AI technology on enterprises' operational efficiency can be promoted through the improvement of marketization. Liu Jun and others, by using the stock data of industrial robots by industry from the International Federation of Robotics (IFR) from 2014 to 2019 and the micro-data of 1,710 Chinese manufacturing listed companies, verified that the application of industrial robots has improved the operational efficiency of Chinese manufacturing listed companies. Industrial robots can flexibly adjust industrial scales, quickly respond to sudden shocks, and help enterprises gain competitive advantages. However, some studies believe that the widespread application of AI technology will have a negative impact on enterprises' operational efficiency. Aghion and others argue that emerging technologies may mismatch with high-end talents and reduce the demand for labor, thereby lowering the production efficiency brought by automation. Gasteiger and Prettnner hold that the application of AI technology can replace manual labor, leading to a shrinking demand for labor, a decline in wages, a reduction in the proportion of labor in economic growth, and thus a slowdown in economic growth. Cheng Hong and others, through their research, showed that the use of industrial robots can improve enterprises' management capabilities and reduce uncertainties in the operation process. The 2018 IFR report pointed out that as an important representative of the AI era, the use of robots will promote the improvement of manufacturing industry in terms of production processes, organizational management, and product quality [9].

3.3. AI Makes the Customer Experience Better

In Japan, Starbucks has an app with a virtual barista that can understand voice orders and suggest drinks. AI makes ordering easier and more personal, so customers enjoy their experience more and want to return. In Japan a lot of people avoid face to face contact since their culture don't courage them to get others in trouble, this makes online ordering very helpful.

4. Suggestion

Chain restaurants should spend money on AI making their operations more digital. AI significantly boosts operational efficiency by automating repetitive tasks, reducing human errors, and cutting costs. It optimizes resource allocation—from inventory management to staffing—using real-time data analysis, ensuring optimal utilization. Predictive analytics help anticipate demand fluctuations, minimizing waste and improving supply chain responsiveness. AI-driven insights enhance decision-making, enabling businesses to adapt quickly to market changes. Customer service improves via chatbots and personalized recommendations, boosting satisfaction and loyalty. For manufacturing, AI-powered robots streamline production, increasing throughput and quality consistency. Overall, AI fosters agility, scalability, and competitiveness, driving sustainable growth across industries. They should use data to understand customers better, create personalized ads, and improve customer experience. AI helps physical businesses understand customer needs by analyzing vast amounts of data—from purchase history and feedback to in-store behavior and social trends. Machine learning algorithms identify patterns, revealing preferences, buying triggers, and unmet demands that might go unnoticed manually. Real-time analytics let businesses track shifts in customer behavior promptly, enabling quick adjustments to products or services. Personalization tools, powered by AI, segment customers into distinct groups, allowing tailored interactions and offerings. Chatbots and sentiment analysis also capture direct feedback, translating it into actionable insights. By turning raw data into clear customer insights, AI helps physical businesses anticipate needs, enhance satisfaction, and build stronger, more loyal relationships [10].

The risk of using AI can also be detected using other methods instead of putting large money on AI trainers. The European Union (EU) Artificial Intelligence Act also called AIA classifies AI into four risk categories: unacceptable, high, limited, and minimal. Yet, these categories are statically tied to AI's broad application fields—this not only risks misestimating the actual magnitude of AI risks but also undermines the effective enforcement of the AIA. This issue poses a particular challenge for regulating general-purpose AI as known as GPAI. Given GPAI's versatile and frequently unpredictable application scenarios, the AIA's existing classification framework struggles to adapt. While recent amendments to the AIA's compromise text have incorporated context-specific assessment mechanisms, these adjustments remain inadequate to address the core problem. To resolve this, we put forward a solution: instead of anchoring the AIA's risk categories solely to broad application fields, they should be applied to specific AI scenarios. To support this, we propose an integrated risk assessment model that combines the AIA's regulatory framework with the risk assessment approach derived from the Intergovernmental Panel on Climate Change as known as IPCC and relevant academic literature. This integrated model allows for more accurate estimation of AI risk magnitude, as it takes into account the interactions between three key elements: risk determinants, the individual drivers behind these determinants, and various types of risks [11].

Current advances in the research, development, and application of artificial intelligence systems have sparked a far-reaching discourse on artificial intelligence (AI) ethics. As a result, a number of ethics guidelines have been released in recent years. These guidelines include normative principles and recommendations designed to harness the “disruptive” potential of new AI technologies. AI ethics is also a concern for the Chain Catering Enterprises if they are trying to use ai to help them in operating, such as AI may not have ethic or law awareness to set some operating planes that let employees to work 14 hours a day which is against the law and not ethical to the employees [12].

5. Conclusion

Artificial Intelligence significantly impacts how Starbucks runs its business. It cuts costs by optimizing inventory to reduce waste from expired or unused ingredients and adjusting labor schedules to avoid overstaffing during non-peak hours, lowering unnecessary labor expenses. AI speeds operations by simplifying order processing—customers place orders via apps in advance, so stores prepare items ahead to reduce wait times—and improve supply chain communication to ensure

materials like coffee beans and packaging arrive exactly when needed. It also boosts sales by analyzing customer purchase histories to offer personalized promotions such as discounts on favorite drinks and suggest new products matching individual tastes. However, AI effectiveness depends on its specific use cases, integration into daily operations, and alignment with local cultural norms—for example, understanding regional drink sweetness preferences or in-store seating habits that shape customer-brand interactions.

This study mainly uses public information including industry analyses, news on Starbucks' AI efforts, the company's public business reports, and a small number of internal documents from limited academic partnerships. As a result, the data is imperfect: public sources often lack specific numbers on AI's cost-saving or sales-boosting effects, and available internal reports are incomplete, leaving gaps in understanding. It also fails to thoroughly examine AI's consequences, such as customer concerns about data privacy when AI collects purchase information or employees' difficulties learning new AI-driven tools.

More research is needed to explore AI's performance across different countries and cultures, as customer expectations, labor laws and market trends vary by region and affect AI's function. Another key area is investigating how new technologies collaborate with AI in restaurants, including smart devices that enhance in-store efficiency like automated coffee machines and secure data systems that protect customer information while supporting AI's data needs.

Using a method of summarizing other scholars' articles, this research explains AI's importance for chain catering enterprises. It notes AI benefits store operations by optimizing staffing and daily tasks, supply chains by speeding delivery and reducing delays, and customer service by providing quicker responses and personalized experiences. But it warns enterprises to watch risks in AI-generated operational plans—AI is not fully mature and may produce incorrect results that disrupt business, so plans need checks by technically skilled humans. In the future, more mature AI will make fewer mistakes and offer greater help. A limitation is that as a literature review, it has little data, most of which is secondary and may be less accurate or up to date than primary real-world data.

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