Gen AI based Catering Management System

D. Nirmala[1]
Assistant Professor,
Department of Computer Science and Engineering
SNS College of Engineering Coimbatore, India

Dhanush Kumar B[2]
UG Scholar,
Department of Computer Science and Engineering
SNS College of Engineering Coimbatore. India

Pradeep S[3]
UG Scholar,
Department of Computer Science and Engineering
SNS College of Engineering Coimbatore, India

Buvanesh Kumar S[4]
UG Scholar.
Department of Computer Science and Engineering
SNS College of Engineering Coimbatore, India.

Sridhar R[5]
UG Scholar,
Department of Computer Science and Engineering
SNS College of Engineering Coimbatore, India

Abstract:- The catering industry continues to face inefficiencies due to outdated manual processes and fragmented management systems. Traditional methods, such as using printed brochures for product selection, often result in poor consumer experiences, limited information, and increased operational costs. To address these issues, this study proposes an advanced online catering management system leveraging generative AI technology. The platform offers users access to detailed product information, dynamic menu customization, and seamless order processing. Developed using PHP, CodeIgniter, and MySQL, and validated with Black Box Testing, the system also incorporates predictive analytics for inventory optimization. By minimizing waste and enhancing customer satisfaction, the proposed platform transforms catering operations into a cost-effective, scalable, and user-centric model.

Keywords:- Catering Management, AI-Driven Optimization, Inventory Forecasting, Online Ordering Systems.

I. INTRODUCTION

In today's corporate environment, providing efficient and reliable catering services is essential for employee satisfaction and productivity. However, managing these services across multiple departments or events can become highly complex, involving numerous vendors, diverse dietary preferences, fluctuating order sizes, and tight delivery schedules. Traditional methods of organizing corporate catering, often reliant on fragmented communication and manual processes, lead to inefficiencies, miscommunication, and increased operational costs.

Managing corporate and social catering demands a seamless blend of operational efficiency and user-centric design. Traditional methods—such as fragmented communication channels and manual record-keeping—fall short in addressing today's diverse and dynamic requirements. Customers now expect real-time updates, personalized menus, and sustainable practices, none of which are adequately supported by existing solutions.

Advancements in generative AI have opened new avenues for integrating real-time customization and operational optimization into catering services. Systems equipped with AI and machine learning can automate routine tasks, reduce errors, and tailor services to individual preferences. Leveraging such technologies, this study explores the development of a unified catering management platform capable of addressing these challenges. By integrating features like dynamic menu generation, predictive inventory analytics, and real-time interaction via AI chatbots, the proposed solution offers businesses a competitive edge while ensuring a superior customer experience.

In today's fast-paced corporate and social environments, catering services play a critical role in ensuring the success of events, meetings, and daily operations. Efficient and reliable catering management directly influences satisfaction levels and operational productivity. However, traditional approaches to catering operations are often riddled with inefficiencies, stemming from fragmented communication, manual data handling, and a lack of technological integration. These challenges are further compounded by the need to cater to diverse dietary preferences, manage fluctuating order volumes, and meet tight delivery timelines.

The rise of digital platforms and generative AI technologies presents an opportunity to revolutionize the catering industry. These advancements enable the automation of routine tasks, personalized menu creation, and real-time data insights, addressing many existing shortcomings. This paper focuses on the design and implementation of a

generative AI-based catering management system. The system is intended to bridge the gap between consumer expectations and operational capabilities, leveraging AI for dynamic menu customization, inventory optimization, and enhanced customer interaction. By adopting such a solution, catering businesses can streamline their operations, reduce costs, and provide a superior experience to their clientele.

II. LITERATURE REVIEW

This review examines the role of data analytics in optimizing sustainable practices within food supply chains, including sourcing, inventory management, and waste reduction. It highlights how real-time data dashboards can provide actionable insights for reducing food waste, managing energy consumption, and improving the traceability of ingredients. The integration of data analytics with sustainable practices allows managers to adapt more quickly to supply demand changes. A sustainable dashboard in catering management can benefit from these insights by adopting similar real-time tracking and data analytics to optimize resource use and minimize waste [5].

The impact of Information and Communication Technology (ICT) tools, such as dashboards, in promoting sustainable practices in the food industry, including catering services. The findings support the use of a sustainable dashboard for monitoring key metrics like energy consumption and food waste in catering, helping businesses streamline operations while reducing environmental impact [6].The application of circular economy principles to the catering and hospitality industry, focusing on waste minimization, recycling, and sustainable resource management. The study finds that using dashboards to track food waste and resource usage helps catering companies transition to a more circular approach by identifying areas where resources can be reused or repurposed. A sustainable dashboard can facilitate the implementation of circular economy practices in catering by providing clear metrics on resource cycles, waste reduction, and recycling rates [7].

The digital transformation of the food and catering industry is driven by the need for operational efficiency and sustainability. Existing literature highlights the role of AI and data analytics in optimizing resource utilization and reducing waste. For instance, real-time dashboards have been demonstrated to significantly lower food wastage by offering actionable insights into inventory levels and consumption patterns.

Circular economy principles further emphasize the importance of recycling and resource efficiency, providing a framework for reducing environmental impact. Studies have shown that integrating such principles into catering operations enhances both profitability and sustainability. Additionally, AI-powered chatbots have been instrumental in improving customer engagement, allowing for seamless order placement and instant query resolution. Despite these advancements, there remains a gap in holistic systems that integrate all these features into a single platform. This research builds upon these

insights to design a comprehensive AI-based catering management solution.

The integration of advanced technologies in the food and catering industry has been widely researched, with particular emphasis on sustainability and operational efficiency. Real-time data dashboards have been shown to play a pivotal role in reducing food waste, managing energy consumption, and improving traceability in food supply chains. These tools provide actionable insights that enable managers to identify inefficiencies and adapt to changes in supply-demand dynamics. For example, predictive analytics allows businesses to optimize inventory levels, minimizing wastage while meeting consumer demands.

Studies have also highlighted the application of circular economy principles, which focus on waste minimization and resource recycling. Dashboards tracking food waste and resource usage help businesses transition to more sustainable practices by identifying opportunities for reuse and repurposing resources. Similarly, the adoption of green practices, facilitated by ICT tools, has been shown to overcome barriers to sustainability by offering transparency and real-time tracking of environmental metrics.

Despite the potential of existing tools, many lack integration with AI-driven features that enable dynamic customization and seamless operations. This research seeks to fill that gap by introducing a comprehensive, generative AI-based catering management system that leverages these findings to provide a unified and efficient solution.

III. EXISTING SYSTEM

Existing catering management systems are fragmented, addressing only specific aspects of operations like order management, inventory tracking, or customer interaction. Traditional platforms such as Cater Trax and Flex Catering focus on streamlining basic tasks like invoicing and event planning but lack advanced automation or personalization. AI-powered platforms like BlueCard and Food Storm introduce features like demand forecasting and inventory management but fail to integrate real-time generative AI capabilities for dynamic menu creation or conversational customer support. Generative AI chatbots like ChatGPT offer front-end customer interaction, such as personalized recommendations and order placement, but remain detached from backend operations like inventory and analytics. Meanwhile, tools like Google Cloud Recommendations AI and Amazon Personalize provide insights into customer behaviour but require significant integration efforts to align with catering-specific needs. Analytics tools like Power BI and Tableau focus on data visualization without contributing to operational automation. These limitations highlight the need for a unified, generative AI-based system that integrates dynamic menu generation, predictive analytics, AI-driven inventory optimization, and seamless customer interaction in real time. By combining these features, a generative AI-based catering management system can transform the industry, automating repetitive tasks, improving personalization, and enhancing decision-making, all while delivering an engaging customer experience. This

approach bridges the gap between existing systems, offering a comprehensive solution to optimize operations and elevate the overall efficiency of catering businesses.

The existing landscape of catering management systems is characterized by a fragmented approach to solving operational challenges. Platforms like CaterTrax and Flex Catering provide basic functionalities such as invoicing, order tracking, and event management. However, these systems often fall short when it comes to addressing the holistic needs of modern catering businesses. They lack advanced automation capabilities, predictive analytics, and dynamic menu customization, which are increasingly essential in a competitive market.

AI-powered platforms such as BlueCart and FoodStorm have introduced features like demand forecasting and inventory management. While these advancements are noteworthy, they remain limited in scope, failing to integrate real-time generative AI for enhanced customer experiences or backend efficiency. Similarly, data visualization tools like Power BI and Tableau focus on analytics but do not contribute directly to automating operations or improving personalization.

The limitations of these systems underscore the need for a unified platform that seamlessly integrates advanced technologies, including generative AI, predictive modeling, and dynamic menu generation. Such a solution would address the inefficiencies of existing systems while providing a comprehensive toolset for catering businesses to optimize their operations and enhance customer satisfaction.

IV. PROPOSED SYSTEM

The proposed Generative AI-Based Catering Management System The proposed Generative AI-Based Catering Management System is a state-of-the-art solution designed to transform catering operations through the integration of advanced artificial intelligence capabilities. It seamlessly combines dynamic menu creation, personalized customer service, inventory optimization, and predictive analytics into a single platform. Using generative AI, the system tailors menus according to customer preferences, dietary requirements, and seasonal ingredient availability, ensuring a unique and personalized dining experience.

An AI-driven chatbot serves as the interface for customer interactions, managing inquiries, processing orders, and offering real-time assistance. This functionality reduces reliance on human intervention, improving response times and boosting operational efficiency. The system also incorporates machine learning to forecast inventory needs, helping businesses predict stock levels based on past data and current demand trends. This minimizes food waste, optimizes inventory use, and ensures smooth operational flow.

Predictive analytics provides businesses with valuable insights into sales patterns, consumer behavior, and market trends, allowing them to make informed decisions and stay ahead of the competition. Furthermore, the system supports real-time synchronization across all modules, ensuring that data is accurate and up-to-date. Integrated payment gateways simplify transaction processing, while automated notifications keep customers informed of their order status and delivery updates.

In contrast to fragmented, standalone solutions, this unified platform addresses multiple aspects of catering management, delivering efficiency, personalized service, and operational transparency. By automating routine tasks and optimizing resources, the generative AI-based system empowers businesses to streamline operations and enhance the customer experience, making it a revolutionary solution for the catering industry.

V. ARCHITECTURE

➤ *Sustainable Dashboard:*
Revolutionizing Food Waste Management and Sourcing Practices

As sustainability becomes a critical focus for businesses in the food and hospitality sectors, it is essential for companies to adopt practices that not only contribute to environmental preservation but also enhance operational efficiency and reduce costs. One major challenge is food waste, which accounts for nearly one-third of all food produced globally, leading to significant financial losses and environmental harm through greenhouse gas emissions and wasted resources.

The Sustainable Dashboard is designed to address these challenges by enabling businesses to track, analyze, and minimize food waste while making more informed decisions about eco-friendly sourcing. This tool is indispensable for companies striving to reduce their environmental footprint, optimize resource usage, and improve profitability in an increasingly eco-conscious marketplace.

The dashboard leverages advanced data analytics to monitor the volume and types of food waste generated over time. It identifies patterns such as overproduction, unused inventory, and other wasteful practices. This data helps businesses pinpoint the root causes of waste, such as the overstocking of perishable items or the frequent leftovers from specific menu items. By visualizing these trends, businesses can make more informed adjustments—such as refining portion sizes or optimizing purchasing schedules—to prevent waste and reduce costs. This proactive approach leads to significant long-term reductions in food waste, benefiting both the environment and the company's bottom line.

The Sustainable Dashboard goes beyond just waste management by promoting responsible sourcing. It tracks the proportion of ingredients that are sourced locally or from organic suppliers. This feature helps businesses make more sustainable purchasing choices, reducing the carbon footprint associated with transportation and supporting local agriculture. Sourcing organic ingredients also promotes eco-friendly agricultural practices, reducing reliance on harmful chemicals. By displaying this data in real-time, businesses are encouraged to prioritize sustainable sourcing, fostering

relationships with local suppliers and contributing to a more ethical and resilient supply chain.

In addition to tracking waste and sourcing, the Sustainable Dashboard provides actionable insights for optimizing overall resource use. By monitoring key metrics such as energy consumption, water usage, and packaging materials, the dashboard helps identify areas where businesses can reduce their environmental impact further. For instance, it might reveal that certain kitchen appliances are consuming excessive energy or that an opportunity exists to switch to biodegradable packaging options. Through this information, companies can adopt energy-efficient practices, reduce water waste, and minimize single-use plastic or non-recyclable materials. These resource optimizations contribute to a more sustainable operation and often result in cost savings, helping businesses cut expenses related to energy bills, water usage, and packaging procurement.

A critical feature of the Sustainable Dashboard is its ability to set targets and measure progress toward sustainability goals. Businesses can establish specific objectives, such as reducing food waste by 20% within a year or achieving a certain percentage of local sourcing. The dashboard then tracks progress against these targets, displaying real-time data and providing reports that illustrate achievements and areas for improvement. This goal-oriented approach encourages continuous improvement and makes sustainability an integral part of the business's strategy. By

reaching these targets, companies not only enhance their reputation as socially responsible organizations but also build stronger relationships with consumers who value environmentally conscious brands.

Another notable benefit of the Sustainable Dashboard is its potential to enhance transparency and accountability. In an era where consumers are increasingly interested in the ethical practices of the brands they support, businesses can use the dashboard's insights to communicate their sustainability efforts effectively. By sharing data on waste reduction, energy savings, and eco-friendly sourcing with customers, companies demonstrate their commitment to sustainable practices. This transparency fosters trust and loyalty among consumers, who are more likely to support businesses that align with their values.

The Sustainable Dashboard also has significant implications for employee engagement and training. By incorporating data and insights from the dashboard into staff training programs, businesses can empower their employees to contribute to sustainability goals actively. For example, kitchen staff can be trained to adopt best practices for minimizing food waste, while purchasing teams can learn to prioritize eco-friendly suppliers. Engaged employees who are aware of the company's sustainability objectives are more likely to participate in waste reduction and energy-saving initiatives actively, creating a ripple effect that amplifies the dashboard's positive impact.
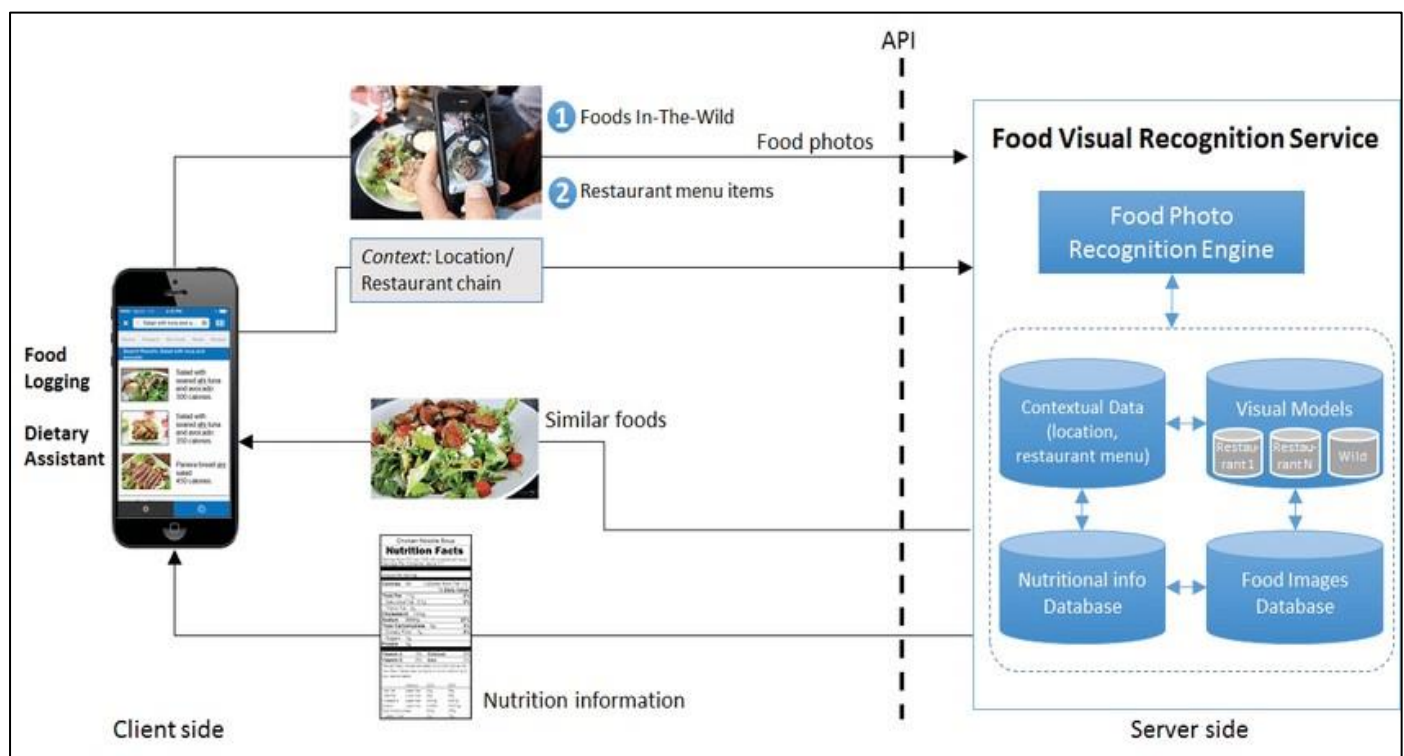

Fig 1 Architecture Design

In conclusion, the Sustainable Dashboard is a transformative tool for businesses committed to minimizing their environmental footprint while optimizing resource use and cutting costs. By offering a clear picture of food waste patterns, responsible sourcing metrics, and resource

consumption, it empowers companies to make informed decisions that align with their sustainability goals. The dashboard not only aids in waste reduction and eco-friendly sourcing but also promotes transparency, enhances employee engagement, and fosters customer loyalty. As more businesses

recognize the benefits of sustainable practices, the Sustainable Dashboard will play an increasingly vital role in helping the food and hospitality industry embrace a greener, more resilient future. By leveraging the power of data and analytics, this innovative tool allows businesses to achieve both ecological and economic success, ensuring that sustainability becomes an integral part of their operational strategy.

VI. DISCUSSION

> *Q: What is a Generative AI-Based Catering Management System?*

- A: A Generative AI-Based Catering Management System leverages AI technologies to automate and optimize catering operations. It uses generative AI to create personalized menus, manage inventory, and streamline customer interactions, providing a seamless experience for both businesses and customers.

> *Q: What are the Key Features of the System?*

- A: The system offers dynamic menu generation, AI-driven chatbots for customer support, predictive analytics for sales and demand forecasting, real-time inventory optimization, and integrated payment processing. It also provides automated notifications and personalized recommendations for enhanced customer engagement.

> *Q: How does the System Personalize Menus?*

- A: It analyzes customer preferences, dietary requirements, and seasonal ingredients using AI algorithms. This allows it to generate tailored menu options that meet specific customer needs and ensure a personalized experience.

> *Q: What are the benefits of using this system?*

- A: Benefits include enhanced operational efficiency, reduced food waste through optimized inventory management, improved customer satisfaction via personalized services, and actionable insights through predictive analytics. It also simplifies repetitive tasks and integrates seamlessly with payment and notification systems.

> *Q: Where can this system be implemented?*

- A: It can be deployed in catering businesses of all sizes, including corporate catering, event management services, restaurants offering catering, and large-scale food operations.

VII. CONCLUSION

In conclusion, our centralized online platform streamlines corporate catering by simplifying food ordering and management. This platform enables businesses to efficiently coordinate meals for events, meetings, and daily needs, saving time and ensuring reliable, high-quality service. With intuitive tools for managing dietary preferences, order

tracking, and invoicing, the platform provides a seamless experience for corporate clients. By bringing all aspects of corporate catering into one place, we enhance convenience, flexibility, and satisfaction in workplace dining. The catering landscape continues to evolve, a generative AI-powered management system provides organizations with the agility needed to adapt to changing market trends and customer preferences. This forward-thinking approach not only positions businesses for success in a competitive environment but also cultivates a culture of innovation and efficiency. In summary, adopting a catering management system utilizing generative AI enhances operational efficiency, promotes personalization, reduces waste, and supports informed decision-making. As businesses increasingly recognize the importance of effective food service management, integrating advanced technology will be crucial in achieving optimal outcomes in corporate catering.

REFERENCES

[1]. B. D. H. a. V. R. M. N. Anugrah, "SISTEM INFORMASI PEMESANAN CATERING PADA," *Jurnal Riset dan ,* vol. 3, 2022.

[2]. Khairunnisa and F. Damayanti, "Jurnal Pengolahan Bisnis," *Jurnal Sistem ,* vol. 2, p. 63–71, 2018.

[3]. M. Syani and N. Werstantia, "PERANCANGAN APLIKASI PEMESANAN CATERING BERBASIS MOBILE ANDROID," *Jurnal Ilmiah Ilmu dan Teknologi Rekayasa,* vol. 1, p. 2, 2018.

[4]. Z. a. G. N. Siregar, "Sistem Informasi Catering di Ratu Catering Berbasis Web," *Jurnal Sistem Informasi,* vol. 1, p. 104–114, 2019.

[5]. M. M. & C. Y. S. Aung, "Traceability in a food supply chain: Safety and quality perspectives," *Food Control,* vol. 39, pp. 172-184, 2014.

[6]. A. & R. A. A. A. Rahdari, "Designing a general set of sustainability criteria for small and medium-sized enterprises.," *Journal of Cleaner Production,* pp. 10451056., 2015.

[7]. M. S. P. B. N. M. P. & H. E. J. Geissdoerfer, "The Circular Economy – A new sustainability paradigm?," *Journal of Cleaner Production,* pp. 757-768., 2017.

[8]. H. H. L. T. J. & S. C. Han, "Application of the Theory of Planned Behavior to green hotel choice: Testing the effect of environmental friendly activities," *Tourism Management,* pp. 325-334, 2010.

[9]. E. L. R. S. J. K. W. N. & U. Z. Papargyropoulou, "The food waste hierarchy as a framework for the management of food surplus and food waste," *Journal of Cleaner Production,* pp. 106-115, 2014.

[10]. T. S. D. I. N. S. R. T. Kirti Bhandge, "A Proposed System forTouchpad Based Food Ordering System Using Android Application," *International Journal of Advanced Research in Computer Science Technology ,* 2015.

[11]. P. J. K. T. Varsha Chavan, "Implementing Customizable Online Food Ordering System Using Web Based Application," *International Journal of Innovative Science,Engineering Technology(IJISET) ,* 2015.

[12]. P. T. N. D. S. S. Resham Shinde, "Design and Implementation of Digital dining in Restaurants using Android," *International Journal of Advance Research in Computer Science and Management Studies ,* pp. 192253, 2014.

[13]. N. J. A. J. P. O. S. R. L. Ashutosh Bhargave, "Digital Ordering System for Restaurant Using Android," *International Journal of Scientific and Research Publications,* 2013.

[14]. A. J. M. H. A. W. M. E. A. M. I. A. M. A. A. Khairunnisa K., "The Application of Wireless Food Ordering System”," *MASAUM Journal of Computing,* 2009.

[15]. S. K. A. K. M. F. A. M. K. Z. S. Noor Azah Samsudin, " A customizable wireless food ordering system with real time customer feedback," *IEEE Symposium on Wireless Technology and Applications(ISWTA),* 2011.

[16]. H. H. Serhat Murat Alagoza, " A study on tam: analysis of customer attitudes in online food ordering system," *Elsevier Ltd,* 2012.

[17]. P. P. R. N. P. L. Patel Krishna, "Automated Food Ordering System," *International Journal of Engineering Research and Development (IJERD),* 2015.

[18]. P. C. M. Mayur D. Jakhete, " Implementation of Smart Restaurant with e-menu Card," *International Journal of Computer Applications,* 2015.

IEEE conference templates contain guidance text for composing and formatting conference papers. Please ensure thet all template text is removed from your conference paper prior to submission to the confere3nce.Failure to remove template text from your paper may result in your papernot being published