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The Virtual Reality Dining & Social Food Hub concept

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Abstract: The application of Virtual Reality (VR) technology in the food industry is revolutionizing dining by fusing immersion with social interaction and instant food delivery. The concept of Virtual Reality Dining & Social Food Hub (VRDSFH) offers a new solution where users explore virtual restaurants, interact with chefs, and socialize with friends before ordering food cooked in cloud kitchens and delivered in real life afterwards. The present study examines the usability, feasibility, and potential limitations of VR dining based on qualitative and quantitative research. Empirical data indicate potential consumer interest in experience-based dining by tech-savvy consumers. Greater accessibility, usability, and immediate availability of VR-based dining are, however, needed to make mass consumption a reality. The present study presents insights into potential future development of VR-based dining and implications for the foodservice industry on the basis of technology and consumer trends.

Keywords: Virtual Reality Dining, Cloud Kitchen, Metaverse Restaurants, Social Food Hub, AI-driven Dining, VR Food Delivery, Consumer Behaviour in VR, Smart Restaurant Technology, Digital Dining Trends

I. INTRODUCTION

Food intake has always been a part of human society, as much as it is a means of survival as a social and experiential activity. However, traditional eating experiences are typically bounded by geographical, spatial, and temporal constraints. Since digital technologies are changing rapidly, particularly Virtual Reality (VR) and Artificial Intelligence (AI), the food industry is also changing with a revolution where the food industry is embracing digital, interactive, and immersive dining. Virtual Reality Dining & Social Food Hub (VRDSFH) aims at bridging the gap between the virtual and the real when eating by enabling one to explore virtual restaurants, speak with chefs, and network with friends—only to place order for actual food that gets ready in cloud kitchens and gets delivered to their homes or desired food pod locations.

Increased consumer interest in new and experiential dining and increased accessibility of VR technology have created a space to re-conceptualize the food industry. This research explores the viability, consumer acceptability, and potential effects of VR-based dining experiences. It assesses the significance of technology adoption, user engagement, social engagement, and food delivery logistics in determining the future of immersive dining. Drawn from qualitative and quantitative approaches, the report strives to account for the feasibility of VR consumption and establish how digitalization is transforming the human subject's relationship with food in the contemporary era.

II. LITERATURE REVIEW

The fusion of virtual reality (VR), artificial intelligence (AI), cloud kitchens, and the metaverse is reshaping food experiences, offering immersive interactions that bridge digital and real-world dining. Studies highlight VR's role in altering taste perception, enhancing engagement, and improving customer satisfaction (Spence, 2021; Seo et al., 2022). However, research on metaverse-driven dining integrated with real-world food delivery remains limited (Covaci et al., 2023). The metaverse allows users to explore digital restaurants, interact with virtual chefs, and socialize before ordering meals. Research suggests it enhances brand engagement and personalization through AI (Dwivedi et al., 2022), though concerns about realism and adoption persist* (Ramos et al., 2023). Covaci et al. (2023) emphasize co-designing metaverse dining spaces to enhance user experience, but frameworks linking AI personalization and cloud kitchens remain underdeveloped.

AI plays a pivotal role impersonalizing the virtual dining experiences, offering food recommendations, interactive customer service, and predictive ordering (Shin et al., 2021; Kumar et al., 2023). However, privacy concerns, bias in recommendations, and consumer trust remain challenges (Dwivedi et al., 2022).

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Gamification and social engagement in metaverse dining also lack sufficient empirical validation (Seo et al., 2022). Despite these advancements, key research gaps persist. There is limited integration between cloud kitchens and metaverse dining, with open questions about logistics, AI-driven personalization, and user adoption (Covaci et al., 2023). Future studies must explore seamless virtual-to-physical dining transitions, ensuring scalability, user trust, and immersive engagement.

Several studies have divided the dining experience into different phases based upon Intelligent technology. Before meal, Online reviews, word of mouth, and promotion all affect customers' expectations at this stage (Wijaya et al., 2013). During meal, (Namkung & Jang, 2010), the determinants of the dining stage satisfaction include food attractiveness, service employees' contact, and ambiance at the restaurant. After meal (Zeithaml et al., 2012), Consumer ratings and opinions and online contacts like loyalty card and mobile app influence future meal choices.

The current systematic review synthesizes the available scientific evidence on the applications of VR to food and consumer behavior research to test the validity of VR and the capabilities and limitations of applying VR technology to this kind of research. The findings reveal that VR has been used extensively in food and consumer behavior research. It has been used in research subjects that explored food sensory evaluation in VR context environments, food selection in VR buffets, shopping behavior and product perception in virtual simulated shopping malls, and emotional and physical reactions to virtual food or food-related stimuli or environment. Evidence reveals that VR is a valid research instrument that can be used to study consumer behavior with respect to food. VR supermarkets and VR buffets can be employed as new substitutes for RL tools. VR food stimuli can also effectively induce food-related emotional reactions. Nevertheless, more evidence may be required to completely comprehend whether VR food stimuli can always yield better outcomes than picture stimuli. Based on the findings of this paper, the authors suggest that future studies be conducted with a broader range of food categories. Further studies that investigate the comparability of consumers' behavior in VR and RL would be appreciated. Future studies can also explore the effects of offering more than visual sensory modalities on food and consumer behaviour study outcomes.

By fusing digital interaction with in-person food delivery, the metaverse, cloud kitchens, virtual reality (VR), and artificial intelligence (AI) are revolutionizing eating experiences. According to research, virtual reality (VR) can improve multimodal experiences, customer engagement, and flavor perception (Spence, 2021; Seo et al., 2022). Nevertheless, there are still few investigations on cloud kitchens and metaverse-driven meals (Covaci et al., 2023). Through AI-driven personalization, the metaverse improves brand engagement by allowing users to chat, communicate with chefs, and visit virtual restaurants before placing food orders (Dwivedi et al., 2022). However, issues with technological viability, adoption, and realism still exist (Ramos et al., 2023). While privacy concerns and trust are still obstacles, AI is essential for predictive ordering, food recommendations, and customer service (Shin et al., 2021; Kumar et al., 2023). Although co-design techniques have been used for metaverse dining areas, there is currently no complete framework that links cloud kitchens, AI, and user experience (Covaci et al., 2023). Furthermore, more study is needed to confirm the effects of gamification and social interaction on user behaviour in virtual dining (Seo et al., 2022). Future study must examine smooth virtual-to-physical dining integration, AI-driven customisation, and consumer adoption to guarantee a scalable and captivating metaverse dining experience, as logistical and technological barriers still exist despite progress. Through menu visualization, consumer interaction, and culinary training, the gastronomy industry's use of virtual reality (VR) and augmented reality (AR) is revolutionizing food experiences (Chai et al., 2022). Risk-free culinary simulations are made possible by VR, while interactive step-by-step instructions provided by AR improve learning. Restaurants use augmented reality (AR) to see 3D menus, which enhances consumer engagement and decision-making. Furthermore, brand connections are strengthened by immersive marketing techniques like VR-driven farm-to-table storytelling. Adoption is hampered by obstacles like high implementation costs, technological constraints, and problems with user acceptability. In order to promote further industry integration, future research should concentrate on improving accessibility, cost, and user-friendliness (Chai et al., 2022).

The intersection of virtual reality (VR), artificial intelligence (AI), and cloud kitchen technologies has brought revolutionary dining experiences that blend digital interactions with physical dining spaces. The Virtual Foodscape Simulator (VFS) and the concept of a Virtual Reality Dining & Social Food Hub offer a platform for analyzing how immersive technologies influence consumer behavior, education, and engagement towards food options. This literature review analyzes the development, use, and implications of virtual food realities on behavioral nutrition, consumer decision-making, and social dining experiences. The intersection of virtual reality (VR) and metaverse technologies in the food industry has brought new avenues for exploring consumer behaviour, improving dining experiences, and developing innovative business models. This literature review presents the current state of VR applications in food behaviour research and the emergence of virtual dining experiences in the metaverse.

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Virtual Reality Dining & Social Food Hub

The Virtual Reality Dining & Social Food Hub extends the principles of the VFS to real-world food consumption. By integrating cloud kitchen services with a metaverse-like experience, users can explore digital restaurants, interact with chefs, and order meals for real-world delivery.

Comparison of Virtual Food Experiences 4.1 VFS vs. VR Dining & Social Food Hub

Feature	Virtural Foodscape simulator (VFS)	VR Dining & Social Food Hub
Purpose	Research & Education	Social Dining & Entertainment
Environment	Simulated Supermarket/Buffet	Virtual Restaurant spaces
Interaction	Behavioral tracking & gamification	AI-driven social engagement
Outcome	Consumer Insights & Health education	Enhanced dining experience

III. RESEARCH METHODOLOGY

3.1. Research Design

This study is based on quantitative approaches in studying how connected and interoperable smart technologies enhance interactive experiences for diners. The primary objective is to analyze consumer interest, behavioural patterns, and feasibility of a VR-driven cloud kitchen experience. Quantitative research measures usability, efficiency, and impact by collecting and analyzing numerical data from surveys, system logs, and experimental trials. Combining these methods allows the study to take a holistic approach in the interaction between users, smart technology, and dining environments. This study follows a systematic literature review method to analyze VR applications in food consumer behavior research. Studies using VR in food consumer behavior research. Research with quantitative data on consumer preferences, food choice, and sensory evaluation.

3.2. Research Approach Data and Collection Methods

To carry out an investigation in a structured manner, this study adheres to a combination of exploratory, descriptive, and experimental research approaches. The research uses various data collection methods to ensure a complete understanding of the interactive smart dining experience. The data collection is set in the Google Form with close-ended and multiple-choice questions to gather structured responses. The main areas addressed are:

IV. ANALYSIS AND INTERPRETATION

The deployment of a prototype smart dining system, for example, is carried out via an AI-based menu, AR-enhanced dining experience, or smart table interface.

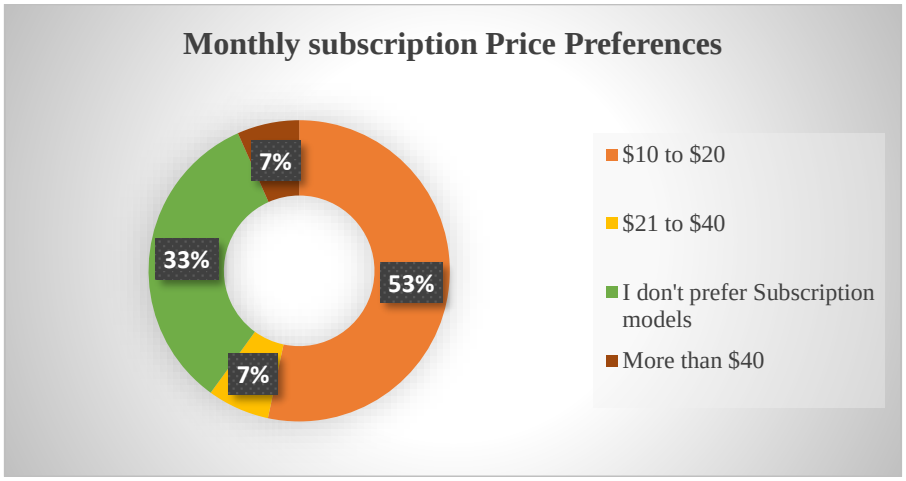

Figure 4.1 Price Preferences

From the above figure we can see that the about 53.3% of respondents are most interested and would pay $10-$20 per month. 33.3% would not prefer to pay for a subscription-based pricing. There's a mix of interest in subscription-based services. Some users are willing to consider subscribing depending on the pricing.

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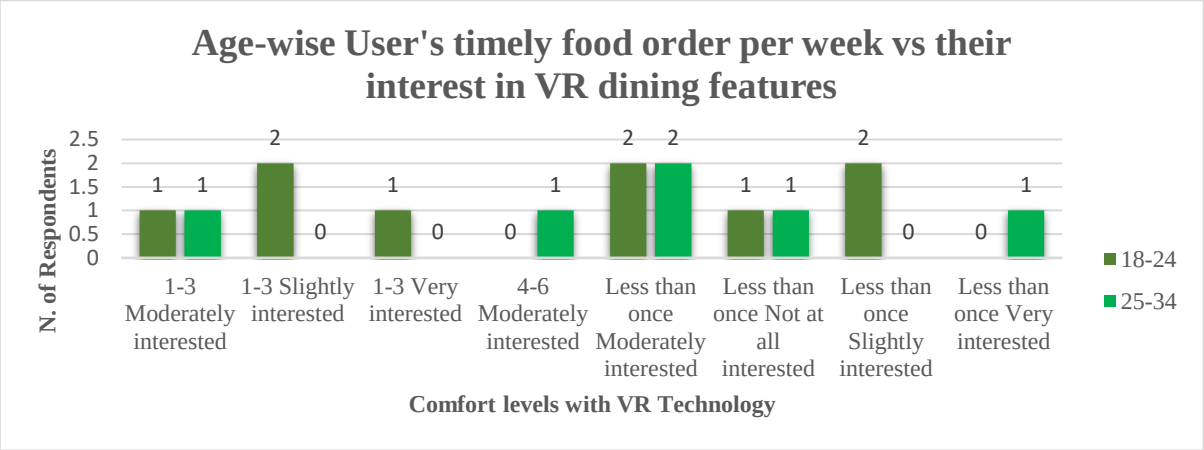

Figure 4.2 Comfort levels

From the above figures, which shows the **"Age-wise User's timely food order per week vs their interest in VR dining features"**, we can see that the people of the age group 18-24 years show more respondents who are "Slightly interested" in VR dining, particularly those ordering food 1-3 times per week. The 25-34 group has more "Moderately interested" respondents, especially among those who order food less than once per week. Overall, food ordering is infrequent across both groups, with very few respondents showing strong interest in VR dining.

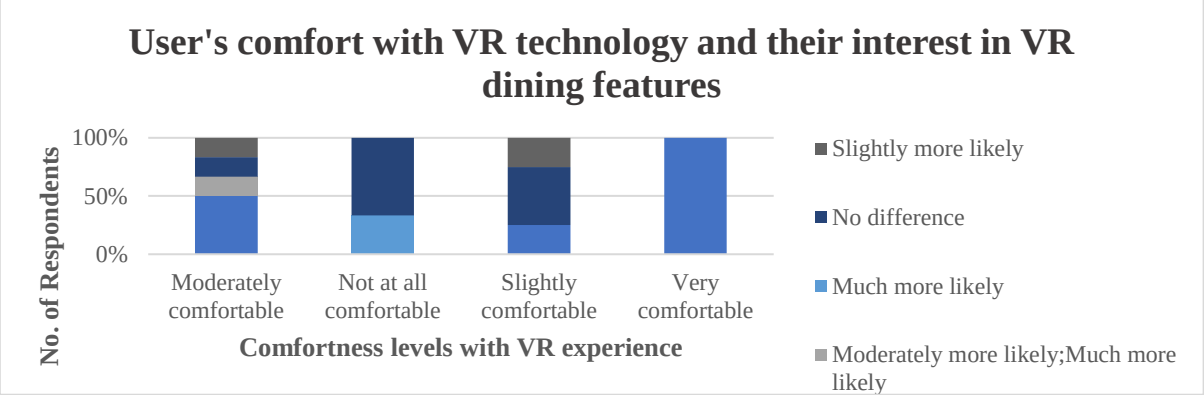

Figure 4.3 Comfort levels

From the above figures, which shows the **"VR Comfort Level vs Likelihood to Order"**, we can see that the people who are "Moderately comfortable" with VR technology show the highest engagement. There's a positive correlation between comfort level and likelihood to order. Even those who are "Slightly comfortable" show some interest in ordering "Very comfortable" users show consistent moderate interest.

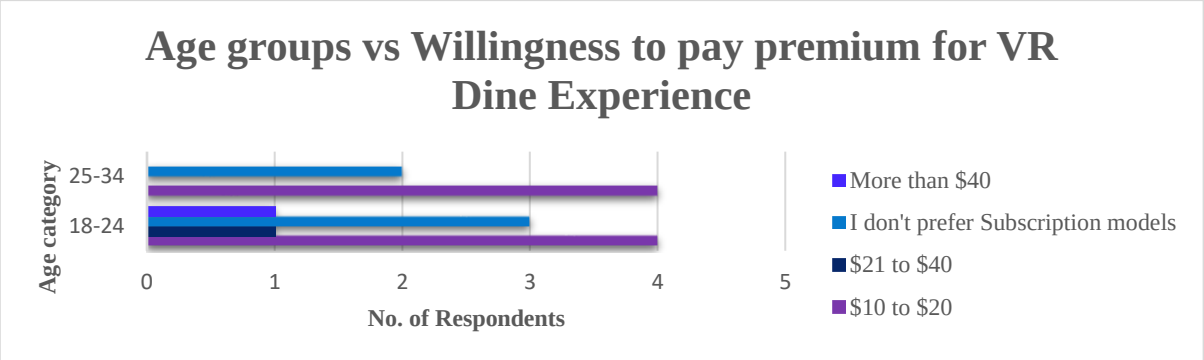

Figure 4.4 Subscription-based preferences

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From the above figures, which shows the **"Subscription-based preferences"**, we can see that about 53.3% of respondents would pay $10-$20 per month and 3.3% would not pay for a subscription. Both age groups (18-24 and 25-34) show mixed willingness to pay for the service. There is an equal distribution (6.67% each) between those willing to pay: More than $40 per month and $21-$40 per month. The 25-34 age group shows slightly more positive inclination towards being "Moderately willing" to pay some resistance to payment is seen in both age groups.

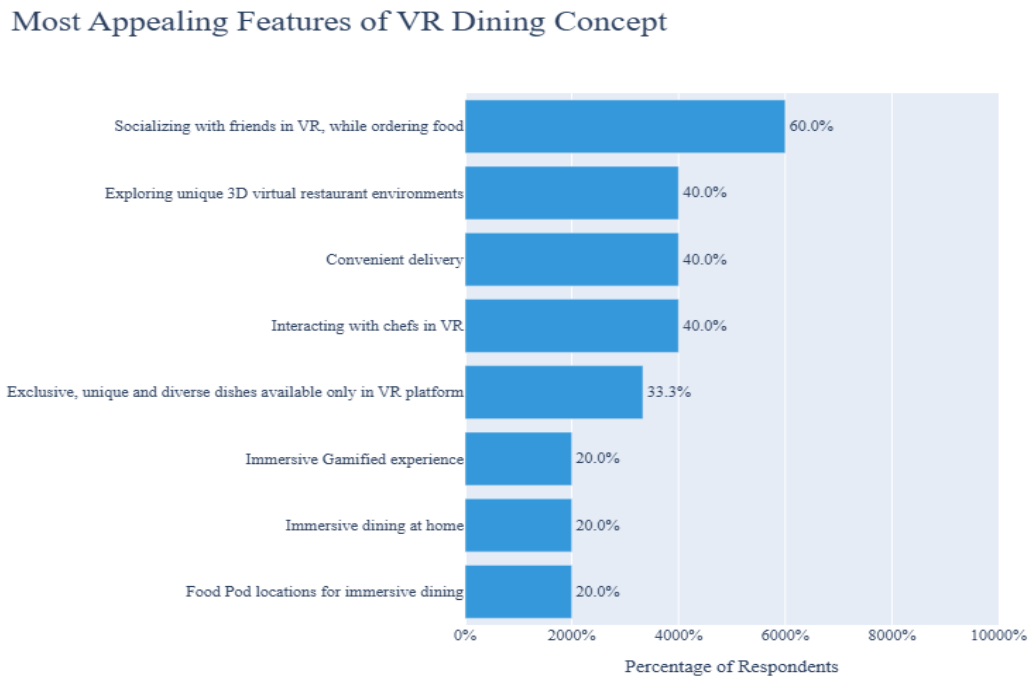

Figure 4.5 Appealing features

The above graph shows the most desirable aspects of VR dining. Ordering food while socializing with friends in VR (60%) is the highest preference, reflecting the significance of the social aspect. Other favoured features (40%) are visiting 3D virtual restaurants, ease of delivery, and communicating with chefs in VR. VR-specific menu items only (33.3%) are also of interest, followed by gamification, in-home immersive dining, and food pods (20%) as features that generate lesser interest. Overall, the immersive and social dimensions are what generate the greatest interest in VR dining.

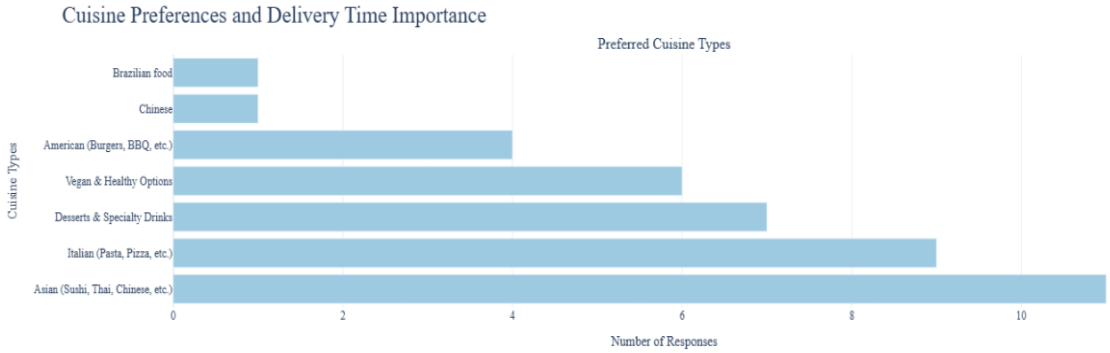

Figure 4.6 Preference of Cuisine types

This figure represents the interest shown by people on the Preference of Cuisine types. Most Preferred Cuisine is the Asian cuisine (Sushi, Thai, Chinese, etc.) is the most popular, with 10+ respondents favouring it. Other Popular Cuisines include Italian (Pasta, Pizza, etc.), Desserts & Specialty Drinks, Vegan & Healthy Options, and American (Burgers, BBQ, etc.) all have significant preference levels, each with around 6-8 responses. Least Preferred is the Brazilian food, with fewest responses, indicating lower interest.

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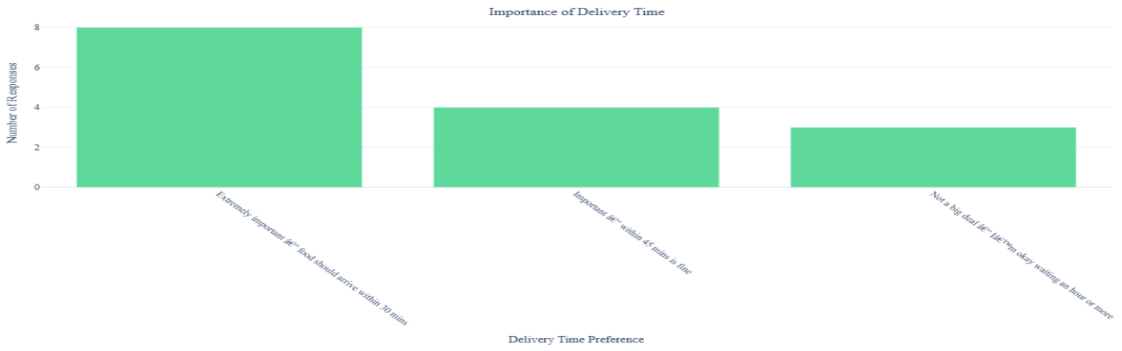

Figure 4.7 Delivery status

This indicates that the Fast delivery (in 30 minutes) is of top priority for the majority of the respondents, but there are respondents who are okay with longer times. These findings indicate that food delivery chains must give priority to Asian and Italian foods with heavy emphasis on speed in delivery to satisfy customers.

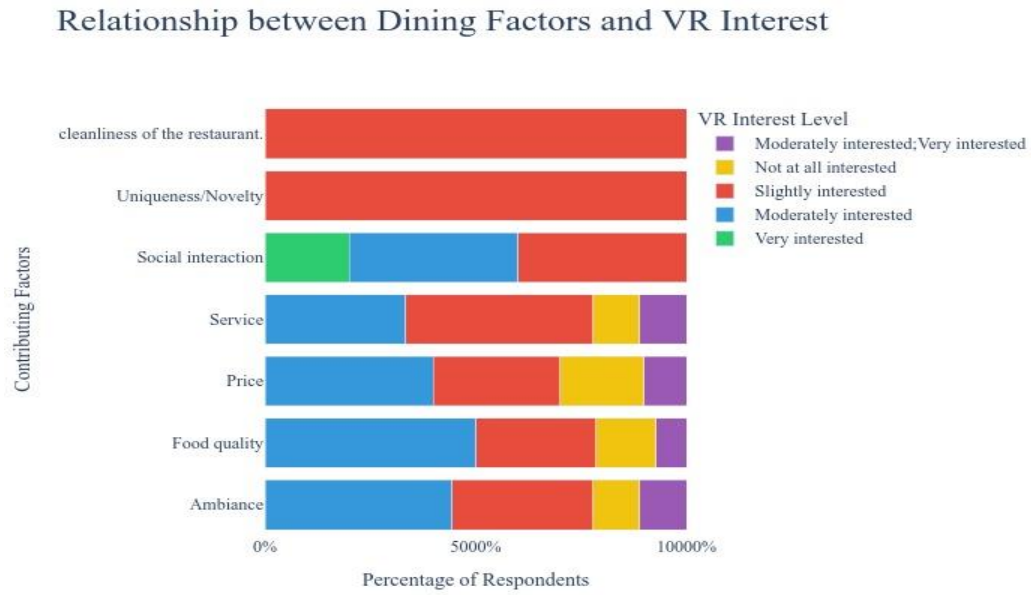

Figure 4.8 Dining factors and VR interest

This shows that the social interaction is the strongest driver of high VR interest. Cleanliness, uniqueness, service, price, food quality, and ambiance mostly correlate with slight to moderate interest. Some respondents remain uninterested, likely due to concerns about traditional dining aspects that VR may not replicate.

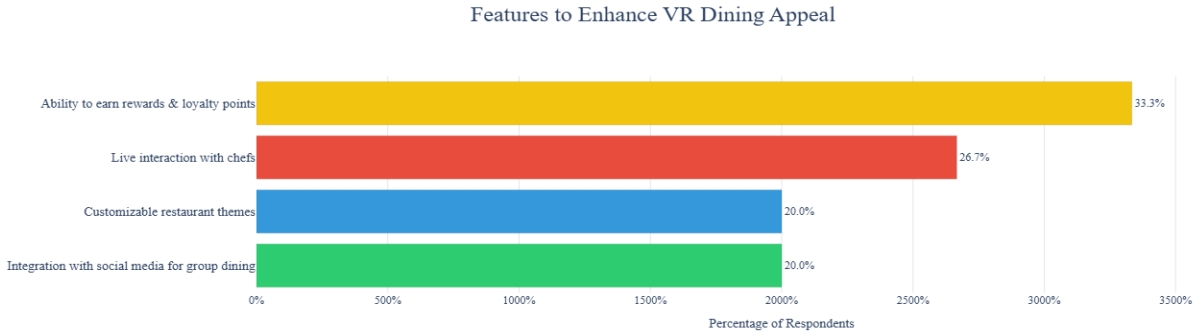

Figure 4.9 Attractiveness of VR dining

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The graph highlights important features contributing to the attractiveness of VR dining. The Top feature is the "Ability to earn rewards & loyalty points" (33.3%) is the most attractive, which shows that incentives attract the engagement of users.

Second Most Wanted is the "Live interaction with chefs" (26.7%) shows that experience and personalized experiences are important. Other Features are "Customizable restaurant themes" (20%) and "Integration with social media for group dining" (20%) show that customization and social connection are also important.

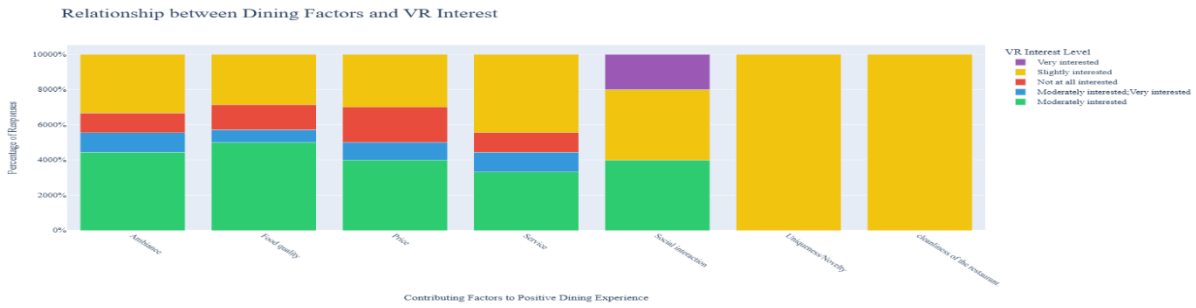

Figure 4.10 VR dining interest

The graph considers how certain factors in dining interact with VR dining interest in consumers. It states that Hygiene & uniqueness do not by themselves engender VR interest—users will be interested in social contact and service as part of a VR dining experience.

V. FINDINGS AND RECOMMENDATIONS

- There's generally positive reception to VR dining experiences, especially among those who are already comfortable with VR technology
- Price sensitivity is evident, with most people preferring lower subscription tiers
- The concept appears more appealing to the 25-34 age group
- To attract users, VR dining must enhance interaction and service elements, rather than relying solely on novelty.
- A subscription scheme is well worth exploring, looking to price sensitivity. The sweet spot is in the range $10-$20 per month to appeal to the largest number of potential users.
- Offer tiered pricing for user preference and price sensitivity.
- Prioritize social interaction elements in VR dining, e.g., "Socializing with friends in VR while ordering food," as this is the most desired option.
- Incorporate features that complement the dining experience, e.g., browsing 3D virtual restaurants, engaging with chefs via VR, and providing special VR-only dishes.
- Reward points and loyalty schemes can be executed to boost user activity and performance.
- Prioritize Asian and Italian food in terms of service because they are in greatest demand.
- Providing quick delivery (30 minutes) to meet customer needs.
- Enhance interaction and service component of the VR dining experience.
- Solve problems with replicating traditional eating aspects by focusing on giving an original and immersive experience.

VI. CONCLUSION

According to data analysis, the general perception is that there is a predominantly positive adoption of VR dining experiences, especially among current users who already have experience with VR technology. However, some issues are critical to successful adoption. The customers are sensitive to prices, and they favor lower subscription options. The idea seems more attractive to the age group of 25-34, but the interest is generated in all the age groups. In order to engage users, VR dining should focus on social interaction, extend service aspects, and present engaging features, not depending on newness of technology.

To attract users, VR dining must emphasize social interaction, broaden service features, and introduce compelling features, independent of technological novelty. Social group bonding with friends in VR, chef interaction, and rewards will best function as features. In the real world, success with VR dining depends upon keen pricing, target relevance, and emphasizing the social and experience aspects of consumption.

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