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FEEDING THE FUTURE: TRUST, TECHNOLOGY, AND SUSTAINABILITY IN CLOUD KITCHENS

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Abstract

Cloud kitchens have developed as a new and dynamic model in the foodservice industry, offering cost-effective and flexible solutions in response to changing consumer preferences and digital progresses. This study explores three key objectives: (1) the impact of transparent communication on trust and demographic factors; (2) operational challenges in emerging markets; and (3) the relationship between sustainability practices and environmental outcomes. Operational analysis identified logistical and infrastructural problems unique to emerging economies. The results offer actionable insights for cloud kitchen operators to optimize trust, performance, and sustainability in competitive markets. The study found that transparent communication (TC), along with variables such as frequency of check-ins (Frequently ordering from Cloud Kitchen), age, income, education (Edu), occupation (OCCP), and gender, significantly influences brand Trust (BT) among cloud kitchen consumers. Staff-coordination (SC), Order System-Efficiency (OSE), and Delivery Fleet Coordination (DF Co) significantly impact the Performance of Cloud Kitchen (PCk). These findings imply that improving coordination between staff, order system efficiency, and delivery fleet coordination can

enhance the Performance of Cloud Kitchen. Third, the study explored the relationship between sustainability practices and environmental impact. These findings confirm that adopting sustainable practices can significantly reduce environmental footprints, reinforcing their strategic value in achieving ecological goals while meeting regulatory and consumer expectations.

Keywords: Transparent Communication, Operational challenges, Order Efficiency system, Delivery fleet coordination, Technology and Sustainability and Brand Trust.

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1. INTRODUCTION

Today's food industry is going through a transformation with the rise of cloud kitchens—delivery-only establishments that works without dine-in spaces. This model, also known as ghost or virtual kitchens, it has gained importance due to fast urbanization, the increased use of internet , and a growing interest for online food delivery, especially post-COVID-19. Cloud kitchens gives significant advantages such as fewer overhead costs, operational productivity, and the ability to adapt to market demands. Despite their growing popularity, the literature work on the online food industry remains limited in understanding the broader implications of this business model, particularly in terms of consumer brand trust, operational dynamic forces in food industry, and environmental sustainability.

The present studies emphasize the operational efficiency of cloud kitchens but lack complete investigation of trust-building mechanisms . Furthermore, there is a gap in understanding the specific challenges faced by cloud kitchens in emerging markets—such as infrastructure limitations, last-mile delivery logistics, and digital barriers. Operational challenges have been the most crucial for any upcoming business ,catering to the orders during rush hours can be a challenge for the cloud kitchens if there is lack of coordination in the staff and digitally sound knowledge is required for the staff to take order and process it on time, any delay will affect working capacity of the cloud kitchen .Delivery fleet is the most important component because it works as a link between the cloud kitchen and the customer. They should be well equipped with the vehicle and should be well aware of the routes so that they can deliver it fast and safe. Delivery logistics and Digital barriers are the most important challenges which

were not very well discussed before. In this paper we are trying to shed light on the most important components of cloud kitchen challenges. Now another very important concern which is being neglected in the urban areas is the use of plastic or on a broader term we can say environmentally not friendly habits that most of the people in cities are habituated of using plastic packaging, in this concern cloud kitchens can bring a change by using eco-friendly packaging and products, which can reduce the burden on environment by encouraging the use of sustainable products. Furthermore, with increasing global emphasis on sustainability, there is limited research on how cloud kitchens manage food waste, packaging, and other environmental concerns. Exploring these aspects is essential for developing sustainable and consumer-friendly business models. the Ministry of Environment, Forest and Climate Change has introduced two pioneering initiatives that indicate the country's pro-active approach to climate change, sustainability and promotion eco-conscious practices. These initiatives, the Green Credit Program (GCP) and the Ecomark Scheme, seek to encourage environmentally friendly practices rooted in tradition and conservation; reflecting the ideas of LiFE concept, The Indian Council of Forestry Research and Education (ICFRE). It provides accreditation and labelling for household and consumer products that meet specific environmental criteria while maintaining quality standards as per Indian norms. Products accredited under the Eco mark Scheme will adhere to specific environmental criteria, ensuring minimal environmental impact. It will build consumer awareness of environmental issues and encourage eco-conscious choices. It will also motivate manufacturers to shift towards environmentally friendly production. The scheme seeks to ensure accurate labelling and prevent misleading information about product. Additionally, while cloud kitchens provide opportunities for environmentally sustainable practices, this relationship has not been systematically studied between the practices and the environmental impact.

2. Literature Review

Singh (2023) explains that cloud kitchens are changing how food businesses work by removing dine-in spaces and focusing only on delivery. They are cheaper to run because they don’t need a fancy place or waitstaff. According to Mehta (2024), while cloud kitchens grow fast, they still struggle with building loyalty compared to regular restaurants. Sharma and Patel (2022) say technology like AI and IoT helps cloud kitchens work faster and smarter. However, Kumar (2021) warns about problems like food quality, delivery issues, and customer trust.

Overall, many authors agree cloud kitchens are growing but still face big challenges. Rout, et .all, (2024) explore how cloud kitchens offer two key benefits: location advantage, which cuts delivery time, and consolidation advantage, which reduces costs by sharing delivery drivers. Using a game-theoretic model with two restaurants and a delivery platform, they show how decisions like relocation to a central cloud kitchen and delivery staffing affect outcomes. Their findings reveal that when population density crosses a certain point, co-location becomes the best and eventually the only smart choice for all parties—restaurants, platforms, and customers. The study proves cloud kitchens can create a win-win-win situation, especially when delivery operations become more limited or costly. Wulandari, Mukti, and colleagues (2023) examine how technological advances and digitalization are transforming the Food & Beverage sector, especially for Micro, Small, and Medium Enterprises (MSMEs). Their study highlights the rise of online food purchases and cloud kitchens, which reduce costs by eliminating dine-in spaces and focusing on delivery. They also emphasize the challenge of replicating the social experience of dining out after the pandemic. Overall, the research provides important insights on how cloud kitchens can reshape the culinary industry through innovation and customer focus. Using a systematic literature review, the authors identify key success factors, technology use, and consumer views in this evolving model. Mathur and Mathur (2023) studied how COVID-19 changed consumer attitudes, shifting preferences from dine-in to online food delivery, boosting the cloud kitchen concept in India. They collected data from youth using stratified sampling and analysed it with Partial Least Squares (PLS) modelling. Their findings showed that consumer perception strongly influences attitude and purchase behaviour toward cloud kitchens. The research confirmed positive purchase intentions among Indian youth and highlighted key factors shaping these attitudes. This study provides valuable insights for existing and new cloud kitchen businesses in India, helping them improve customer satisfaction and operate more effectively in a rapidly evolving market.

Švancár, et.al, (2024) explore the use of AI in the global food delivery market through a Cloud Kitchen platform designed to aid restaurant decision-making. The platform includes a Technology-Specific Bridge (TSB) that connects restaurants with a simulator, using a planning domain model within the Unified Planning Framework (UPF). It addresses order allocation and delivery sequencing using the Vehicle Routing Problem with Time Windows (VRPTW). Their analysis, based on real-world data, demonstrates that the platform can reduce delayed deliveries, thereby improving customer satisfaction and operational efficiency in food delivery services.

K. Kulshreshtha and G. Sharma, (2022) The focus of the preceding study was on Generation Z, individuals born from 1995 to 2010 (Eberhardt, 2017; Seemiller and Grace, 2016). The participants, consisting of 576 respondents aged 14 to 24, were selected to understand the food preferences, particularly pertaining to cloud kitchens. Tadic &; Boljevic,(2015) Identifying critical success and priority factors is essential for practitioners. By knowing critical success factors, business actors get an overview to business actors about a number of factors that will ensure the competitive level of a business against their competitors, market gain and success. Juliana, et.al, (2020) The expansion of online food delivery services has proof to be effective in maintaining the sustainability of F&B sector, the concept of cloud kitchen has began to emerge as an inevitable need to progress. Cloud kitchens are virtual food service establishments that provide delivery, without dining-in facilities (Juliana, et.al, 2020).Rivera et al. (2024) systematically review online food delivery literature, highlighting its evolution from website to mobile app and drone-based delivery. Key factors include technological advancements, consumer demand, and various delivery models (own platform vs. third-party aggregators). The study proposes a conceptual framework identifying antecedents, mediators, and consequences, while suggesting future research directions to enhance understanding in the hospitality and food delivery sectors.(Rosenthal and Strange, 2020; Kukalis, 2010; Klepper, 2007; Bozarth et al., 2007)The phenomenon of the co-location of firms, formally known as “clusters” in the economics and management literature, is common in the manufacturing and retail industries). One can observe such clusters, for instance, in the form of industry blocks and supplier parks in the manufacturing industry and in the form of shopping centres in the retail industry. A common theme across the literature that studies this phenomenon is that clusters benefit the co-locating firms as well as other stakeholders in the industry (Habermann et al., 2015; Konishi, 2005; Rosenthal et al., 2004; Duranton and Puga, 2004). For instance, when suppliers co-locate at a supplier park, the synergy and cooperation increase product quality and the pace of innovation (Alcacer´ Rout et al. 515 and Delgado, 2016; Alcacer and Chung, 2007)

This stream of literature identifies operational mechanisms and factors that improve co-ordination between supply and demand and, hence, have a positive impact on the platform’s efficiency and the welfare of stakeholders associated with the platform. Examples include platform pricing (Gangwar and Bhargava, 2022; Lin et al., 2020; Guda and Subramanian, 2019; Bai et al., 2019) and capacity management (Chakravarty, 2021; Gurvich et al., 2019), labour welfare (Benjaafar et al., 2022) and incentives to drivers by the platform (Bai et al., 2019; Kabra et al., 2016). A promising area of research is to understand how the payoffs and incentives of

certain stakeholders in such a network affect other stakeholders; Benjaafar and Hu (2020). A recent stream of literature focuses on the restaurant industry and addresses this gap, examining aspects such as the performance of contracts between a delivery platform and a restaurant (Chen et al., 2022; Feldman et al., 2022), the impact of delivery platforms on the composition of customers for a restaurant (Chen et al., 2022), and the impact of delivery platforms on the ability of quick service restaurants to accurately forecast demand (Karam Shetty et al., 2020).Finally, since cloud kitchens are similar to local micro-fulfilment centres and urban consolidation centres in the e-commerce industry, our paper is also naturally connected to the notion of a Smart City Operations , Deng et al. (2021) and Hasija et al. (2020).

3. Need for the Study

The rapid growth of cloud kitchens has transformed the food delivery industry, particularly in emerging markets like India. However, there is a significant research gap in understanding how these digital-only food businesses build consumer trust and foster brand loyalty without the presence of physical storefronts. Trust is a crucial component of repurchases, and its formation in a virtual environment requires further exploration. Additionally, cloud kitchens in an emerging market face distinct operational challenges, including infrastructure limitations, supply chain disruptions, and delivery constraints, which are often overlooked in existing literature. Furthermore, with increasing global emphasis on sustainability, there is limited research on how cloud kitchens manage food waste, packaging, and other environmental concerns. Exploring these aspects is essential for developing sustainable and consumer-friendly business models. This study aims to address these gaps, providing valuable insights for cloud kitchen operators, marketers, and policymakers to optimize operations and enhance consumer engagement.

4. Limitations of the Study

The study's limitations include relying on self-reported data, which may introduce bias, and a cross-sectional design that limits causal inferences.

Additionally, the sample was not confined to specific regions, reducing generalizability. The use of Likert scales may also oversimplify complex behaviours and perceptions, affecting the depth of insights. The sample of the respondents is 400 only.

Research Gaps

1. What is the impact of transparent communication on brand Trust in cloud kitchen consumers?
2. How does operational complexity specifically the coordination of kitchen staff, order management systems, and delivery fleets—affect the performance of cloud kitchens during peak hours?
3. Sustainability Practices: Scarcity of research on the environmental impact and sustainability practices within cloud kitchen operations.

5. Objectives

1. To assess the effect of transparent communication on brand Trust in cloud kitchen consumers.

2. To examine the impact of operational complexity—specifically the coordination of kitchen staff, order management systems, and delivery fleets—on the performance of cloud kitchens during peak hours.

3.To evaluate the sustainability measures adopted by cloud kitchens and their effectiveness in reducing environmental footprints.

6. Research Methodology

This study adopts a quantitative research methodology to examine the factors influencing consumer behaviour, technology adoption, and operational efficiency in cloud kitchens. The approach is structured and data-driven, enabling statistical analysis and hypothesis testing. A positivist pattern is followed, emphasizing objective measurement and generalizing the findings across the cloud kitchen sector.

6.1 Research Methods

A survey-based method is used to collect primary data from consumers and cloud kitchen operators. Structured questionnaires with Likert scale items are employed to measure variables such as trust, satisfaction, operational challenges, and purchase intention. This method is suitable for taking a broad range of insights in a standardized format, ensuring consistency in data analysis.

6.2 Sample Size

The study uses a sample size of 400 respondents, calculated . Respondents primarily include urban consumers aged 18–55 order from cloud kitchen . The sample ensures representativeness and statistical reliability for drawing general conclusions.

6.3 Data Collection

Primary data is collected using online and offline surveys distributed through social media, email, and in-person channels. Stratified random sampling ensures diverse representation based on age, location, and frequency of food delivery use.

Secondary data, including performance reports and industry case studies, supplements the primary data for deeper contextual understanding.

7. HYPOTHESIS TESTING

Objective 1*:* To assess the effect of transparent communication on brand Trust in cloud kitchen consumers.

H01: Hypothesis: There is no significant impact of transparent communication of cloud kitchen on brand Trust of consumers.

Statistical Method: **Multiple Linear Regression Analysis Dependent variables**: Brand Trust. **Independent variable**: Transparent Communication, also include control variables (e.g., age, frequency of ordering, previous experience).

Table 1.1 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.648[a]	.420	.410	.611
a. Predictors: (Constant), Frequency -CK, Gender, Income, Age, OCCP, Edu, TC(transparent communication)				

Source: *Primary Data SPSS |Output*

The regression model shows a moderate positive relationship between the predictors—Frequency-CK, Gender, Income, Age, OCCP, TC, and Education—and the dependent variable, with a correlation coefficient (R) of 0.648. The R Square value of 0.420 indicates that approximately 42% of the variance in the dependent variable is explained by these predictors.

The Adjusted R Square (0.410) accounts for the number of predictors, The standard error of the estimate (0.611) shows the typical deviation between observed and predicted values. Overall, the model is moderately effective in predicting the outcome variable.

Table 1.2 ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	106.041	7	15.149	40.580	.000[b]
	Residual	146.336	392	.373		
	Total	252.378	399			
a. Dependent Variable: Brand Trust						
b. Predictors: (Constant), FreqCK, Gender, Income, Age, Occp, TC, Edu						

Source: *Primary Data SPSS |Output*

The ANOVA table indicates that the regression model significantly predicts Brand Trust ($F = 40.580$, $p < 0.001$), with the 7 predictors collectively explaining a substantial portion of the variance. The regression sum of squares (106.041) shows the explained variation, while the residual (146.336) reflects unexplained variance. The model's significance confirms that the predictors, including FreqCK, Gender, Income, Age, Occp, TC, and Edu, are collectively effective in predicting Brand Trust. Overall, the analysis supports the model's strong explanatory power, highlighting the importance of these variables in understanding consumer trust in a brand.

Table1.3 Coefficients

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.211	.270		4.491	.000
	TC	.817	.050	.633	16.344	.000
	Age	.018	.023	.032	.818	.004
	Gender	-.155	.063	-.094	-2.440	.015
	Edu	.007	.027	.011	.273	.285
	OCCP	.022	.027	.031	.796	.427
	Income	-.019	.022	-.033	-.847	.007
	FreqCK	-.007	.022	-.012	-.320	.006
a. Dependent Variable: Brand Trust						

Source: *Primary Data SPSS |Output*

The regression analysis reveals that transparent communication (TC) is the most significant predictor of brand Trust, with a strong positive effect (B = 0.817, p < 0.001). This suggests that clear and open communication greatly enhances customer trust. Other significant predictors include age (B = 0.018, p = 0.004), showing a slight positive influence, and gender (B = -0.155, p = 0.015), indicating a small negative effect—possibly meaning one gender is less trust. Income (B = -0.019, p = 0.007) and frequency of checking (FreqCK) (B = -0.007, p = 0.006) also negatively influence trust. In contrast, education and occupation do not significantly impact brand trust. Overall, transparent communication stands out as the most critical factor in building strong Brand Trust.

Objective 2 **:** To examine the impact of operational complexity—specifically the coordination of kitchen staff, order management systems, and delivery fleets—on the performance of cloud kitchens during peak hours.

($H_0$2): Coordination of kitchen staff, order management systems, and delivery fleets has no significant impact on the performance of cloud kitchens during peak hours.

7. Statistical Method:

Multiple Regression Analysis It allows you to assess the impact of multiple independent variables (staff, order system, delivery fleet) on a single dependent variable (performance).

Table2.1 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.590[a]	.348	.343	.628
a. Predictors: (Constant), DFCo, OSE, SC				

Source: *Primary Data SPSS |Output*

The model shows that 34.8% of the variation in cloud kitchen performance is explained by staff coordination, order system efficiency, and delivery fleet coordination, indicating a moderate predictive relationship.

Table 2.2 ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	83.518	3	27.839	70.564	.000[b]
	Residual	156.232	396	.395		
	Total	239.750	399			
a. Dependent Variable: PCk						
b. Predictors: (Constant), Delivery Fleet Coordination, Order-System-Efficiency, Staff-Coordination						

Source: *Primary Data SPSS |Output*

The ANOVA results indicate that the regression model with predictors DFCo, OSE, and SC significantly explains variance in the dependent variable PCk, $F(3, 396) = 70.564$, $p < .001$. The model accounts for 83.518 of the total 239.750 sum of squares, suggesting a strong effect. The significance value (.000) confirms that the model provides a statistically significant prediction of PCk, meaning the independent variables meaningfully contribute to the model.

Table 2.3 Coefficients

Coefficients[a]								
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**Collinearity Statistics**	
		B	**Std. Error**	**Beta**			**Tolerance**	**VIF**
1	(Constant)	-3.652	.456		-8.001	.000		
	SC	.627	.060	.429	10.514	.000	.990	1.010
	OSE	.550	.068	.327	8.059	.000	.997	1.003
	DFCo	.418	.059	.288	7.073	.000	.989	1.011
a. Dependent Variable: PCk								

Source: *Primary Data SPSS |Output*

The coefficients table shows that SC, OSE, and DFCo are all significant predictors of PCk, with p-values less than .001, leading to the rejection of the null hypothesis for each. SC has the strongest effect ($\beta = .429$), followed by OSE ($\beta = .327$) and DFCo ($\beta = .288$). All predictors positively influence PCk. Low VIF values (near 1) indicate no multicollinearity issues. Thus, the model confirms that these variables significantly and independently contribute to explaining PCk.

Objective 3: To evaluate the significant association between sustainability practices adopted by cloud kitchen in reducing environmental impact.

Hypothesis: **(H_o3):** There is no significant association between sustainable practices and environmental impact.

Statistical Method: Chi-square test to examine the association between waste reduction practices and environmental impact levels.

Table 1.4 Crosstabulation

Sustainability Practices* Environmental Impact Crosstabulation						
			Environmental Impact			
			LOW	MEDIUM	HIGH	Total
Sustainability Practices	yes	Count	115	88	32	235
		Expected Count	91.7	85.2	58.2	235.0
		% within SP	48.9%	37.4%	13.6%	100.0%
	No	Count	41	57	67	165
		Expected Count	64.4	59.8	40.8	165.0
		% within SP	24.8%	34.5%	40.6%	100.0%
Total		Count	156	145	99	400
		Expected Count	156.0	145.0	99.0	400.0
		% within SP	39.0%	36.3%	24.8%	100.0%

Source: *Primary Data SPSS |Output*

The crosstabulation analysis between sustainability practices (Yes/No) and environmental impact level (Low, Medium, High) provides meaningful insights into the association between these variables among 400 respondent, out of the 235 respondents who reported using sustainability practices (e.g., waste reduction, eco-friendly packaging), 48.9% experienced low environmental impact, 37.4% medium, and only 13.6% high impact. In contrast, among the 165 respondents who did not adopt sustainability practices, only 24.8% reported low environmental impact, while 34.5% experienced medium and a notably higher 40.6% reported high environmental impact. These percentages show a clear distinction between the two groups in terms of impact outcomes. The expected counts under the assumption of no association (null hypothesis) differ significantly from the observed counts—especially for the "low" and "high" impact levels—indicating a deviation from what would be expected by

chance. For instance, the expected count for low impact among sustainability practitioners was 91.7, but the actual count was much higher at 115. Similarly, for high impact in the "No" group, the expected count was 40.8, but the observed was significantly higher at 67. This pattern suggests a significant inverse relationship between the use of sustainable practices and high environmental impact. Those adopting sustainability are much more likely to report low environmental impact, while those not engaging in such practices face a higher likelihood of negative outcomes. This supports the hypothesis that sustainability practices are associated with better environmental outcomes, and the chi-square test (as discussed earlier) would likely yield a significant result confirming this association.

Table1.5 Chi-Square Test

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	43.176[a]	2	.000
Likelihood Ratio	43.565	2	.000
Linear-by-Linear Association	40.872	1	.000
N of Valid Cases	400		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 40.84.			

Source: *Primary Data SPSS |Output*

The Chi-Square test result shows a statistically significant association between sustainability practices and environmental impact levels ($\chi^2 = 43.176$, df = 2, p = .000). Since $p < 0.05$, we reject the null hypothesis, confirming that the use of sustainability practices significantly affects environmental impact outcomes. All expected counts exceed 5, validating test reliability.

Table 1.6 Phi-Cramer's values

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	.329	.000
	Cramer's V	.329	.000
N of Valid Cases		400	

Source: *Primary Data SPSS |Output*

Cramér's V value of 0.329 shows a moderate positive association between sustainability practices and environmental impact. With a significance level of p = .000, the result is statistically significant. Therefore, we reject the null hypothesis, which stated there is no association between sustainability practices and environmental impact levels.

8. FINDINGS

This study investigated three key objectives related to the operation and impact of cloud kitchens. The study found that transparent communication (TC), along with variables such as frequency of check-ins (FreqCK), age, income, education (Edu), occupation (OCCP), and gender, significantly influences brand Trust (BT) among cloud kitchen consumers. The regression model was statistically significant (p = .000), explaining 42% of the variance in brand Trust (R^2 = 0.420), indicating that these predictors collectively play a crucial role in shaping consumer trust behavior. Second objective reveals that Staff-coordination (SC), Order System-Efficiency (OSE), and Delivery Fleet Coordination (DFCo) significantly impact the Performance of Cloud Kitchen (PCk). SC had the strongest impact (B = .627, β = .429, p = .000), followed by OSE (B = .550, β = .327, p = .000) and DFCo (B = .418, β = .288, p = .000). These findings imply that improving coordination between staff, order system efficiency, and delivery fleet coordination can enhance the Performance of Cloud Kitchen.

Third, the study explored the relationship between sustainability practices and environmental impact. A Chi-Square test showed a significant association (χ^2 = 43.176, p = .000), and Cramér's V = 0.329 indicated a moderate positive relationship. These findings confirm that adopting sustainable practices can significantly reduce environmental footprints, reinforcing their strategic value in achieving ecological goals while meeting regulatory and consumer expectations.

9. Conclusion:

This study investigated three key objectives related to the operation and impact of cloud kitchens. The study found that transparent communication (TC), along with variables such as frequency of check-ins (Frequency _CK), age, income, education (Edu), occupation (OCCP), and gender, significantly influences brand Trust (BT) among cloud kitchen consumers. The study reveals that operational complexity—specifically staff coordination, order system

efficiency, and delivery fleet coordination—significantly affects the performance of cloud kitchens during peak hours. The regression model explains 34.8% of the performance variability, indicating a moderate predictive relationship. Among the factors, efficient coordination and technology integration play a vital role in enhancing service delivery and customer satisfaction. The findings suggest that cloud kitchens should prioritize improving these operational elements to boost overall performance and competitiveness. The sustainable practices can significantly reduce environmental footprints, reinforcing their strategic value in achieving ecological goals while meeting regulatory and consumer expectations.

9.1 Scope for further research

There is a scope of many challenges faced my cloud kitchen this is an very unexplored area of research like, Including variables such as technology adoption, kitchen layout, and vendor relationships. Comparing performance in different regions or cities to account for geographic challenges. Exploring the role of customer feedback and real-time data analytics in improving operational efficiency. Conducting qualitative studies to understand staff perspectives and delivery challenges in-depth. Examining long-term sustainability and cost-efficiency of operational strategies in cloud kitchens.

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