



# CHALLENGES AND OPPORTUNITIES IN SCALING MILLET-DRIVEN CLOUD KITCHEN BUSINESSES: A COMPREHENSIVE STUDY

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## ABSTRACT

**Background:** In recent years, the food service industry has undergone a significant transformation driven by shifting consumer preferences and rapid technological advancements. Notably, cloud kitchens or virtual restaurants have emerged as a prominent development, focusing on food preparation and delivery, capitalizing on online ordering and app-based delivery services. Simultaneously, there has been a heightened awareness of healthier and sustainable dietary choices. Millets, small-seeded cereal grains, have gained attention due to their nutritional value, adaptability to adverse environmental conditions, and sustainable farming practices. This has sparked interest in integrating millets into the food industry to offer healthier and eco-friendly food options.

**Objectives:** The primary objectives of this study were to Assess the feasibility and scalability of cloud kitchen businesses that focus on millet-based cuisine, identifying the key challenges and opportunities within this emerging food service sector.

**Methodology:** To achieve these objectives, a mixed approach quantitative and qualitative -methods research design was employed. Data was collected through telephonic interview and online questionnaire through google form. Data were analysed using software spss 23 on the basis of Likert scale-based questionnaire.

**Results:** The research findings indicate a consistently positive perception of millet-based dishes across various dimensions among customers, as evidenced by highly significant p-values ( $p < .001$ ) and mean differences ranging from 2.824 to 3.123. The rejection of null hypotheses implies significant differences in factors influencing consumer choices in favor of millet-based options, suggesting a promising market for these products. Key challenges and opportunities within this emerging millet-driven cloud kitchen businesses were identified which will be the base for upcoming cloud kitchen businesses that focus on millet-based cuisine.

**Conclusion:** The feasibility and scalability of millet-driven cloud kitchen businesses are intricately linked to a complex set of factors, including sourcing challenges, consumer engagement, regulatory compliance, operational efficiency, and marketing. Businesses that strategically address these challenges by leveraging opportunities, such as reliable supply chains, consumer education, sustainable practices, and targeted marketing, are well-positioned to thrive in the dynamic landscape of the millet-based culinary industry.

**KEYWORDS:** Cloud Kitchen, Millets, kitchen businesses

## 1. INTRODUCTION

The gastronomic landscape is undergoing a transformative paradigm shift with the emergence and rapid proliferation of cloud kitchens, a culinary concept where commercial cooking spaces operate exclusively for online delivery orders. Cloud kitchens, which are commercial cooking facilities devoid of physical dining areas and exclusively serve online delivery orders, are anticipated to burgeon into a \$2 billion industry in India by 2024, as per estimates from RedSeer Management Consulting. The idea of cloud kitchens is not novel, as pizza delivery establishments have been in existence for decades, with take-out pizza gaining popularity in the 1950s. However, the modern concept of cloud kitchens originated in India. In 2003, Rebel Foods, supported by Sequoia, launched its inaugural venture, Faasos, specializing in Kebabs. Presently, Rebel Foods boasts a portfolio of over 9 brands, securing a recent funding of \$125 million, with a valuation reaching \$525 million (Mehnaz et al., 2021).

In the dynamic realm of food entrepreneurship, an intriguing niche has emerged with the focus on millet-driven cloud kitchen businesses (Choudhary, 2019). Millets, an ancient and resilient group of small-seeded grasses, have garnered increased attention in recent years for their nutritional benefits, environmental sustainability, and adaptability to diverse agro-climatic conditions (Ashwin Porwal et al., 2023). In the quest for sustainable and nutritious food sources, millets have emerged as a focal point, particularly within the context of cloud-based kitchen businesses, with India being a prominent player in this culinary evolution. Millets, a group of ancient cereal grains, are hailed as nutritional powerhouses, offering diverse health benefits that make them a valuable and sought-after addition to global diets. Notably, these hardy crops thrive in various agro-climatic conditions, demanding less water and inputs compared to traditional cereal grains, aligning seamlessly with the operational considerations of cloud-based kitchen ventures.



In the realm of cloud kitchens, where efficiency, sustainability, and nutritional value converge, millets take center stage. Their low glycemic index becomes a strategic asset, aiding in stabilizing blood sugar levels—particularly relevant in the context of health-conscious and dietary-aware consumer bases served by cloud-based kitchen models. Furthermore, millets' high Fiber content becomes a key feature benefiting heart health within the cloud kitchen paradigm, contributing to the reduction of LDL cholesterol levels and the promotion of good cholesterol (Anitha et al., 2021). Thus, within the framework of cloud-based kitchen businesses, the integration of millets not only aligns with the broader global movement towards sustainable and nutritious food choices but also addresses specific operational considerations inherent to the unique challenges and opportunities presented by the cloud kitchen model. As the world grapples with the challenges posed by climate change, resource scarcity, and the need for sustainable food practices, millets have emerged as a promising solution, offering a range of health benefits and reduced environmental impact compared to conventional grains. However, despite the growing recognition of millets as a staple in promoting both human and planetary well-being, there exists a conspicuous research gap in understanding the challenges and opportunities specific to scaling millet-driven cloud kitchen businesses.

This comprehensive study seeks to bridge this gap by delving into the intricacies of the millet-driven cloud kitchen model, exploring the challenges that entrepreneurs face in scaling such ventures and identifying the untapped opportunities within this niche. The study aims to provide a nuanced understanding of the unique dynamics at play in millet-centric culinary enterprises operating within the framework of cloud kitchens. In the pursuit of unravelling the complexities of millet-driven cloud kitchen businesses, this study explored various dimensions for selection of millet-based cloud kitchen as consumer point of view, including feasibility and scalability study of Millet-Based Cloud Kitchen Businesses that can influence the scalability and sustainability of these enterprises. Current research on millet-driven cloud kitchen businesses lacks a comprehensive exploration of the specific feasibility factors crucial for their establishment and successful operation. Key aspects such as initial investment requirements, infrastructure needs, and operational challenges unique to millet-focused culinary ventures are notably underexplored. This gap hinders a nuanced understanding of the practical considerations that entrepreneurs and stakeholders must address to ensure the viability and sustainability of such ventures.

Similarly, while existing studies have delved into consumer perceptions of millet-based dishes, there is a significant research gap in understanding how these perceptions intersect with the distinctive dynamics of cloud kitchens. The influence

of the cloud kitchen model on consumer preferences, ordering behavior, and overall satisfaction with millet-driven offerings remains largely unexplored. Bridging this gap is essential for unraveling the intricate relationship between consumer attitudes and the operational framework of cloud kitchens, providing valuable insights for the effective development and marketing of millet-based offerings within this innovative culinary landscape.

By conducting an in-depth analysis, this research aspires to offer valuable insights and actionable recommendations to different stakeholders involved in the nascent but burgeoning millet-driven cloud kitchen industry through the following objective.

1. To assess the feasibility and scalability of millet-driven cloud kitchen businesses.
2. To identify the key challenges and opportunities within this emerging millet-driven cloud kitchen businesses.
3. To investigate the consumer perceptions and preferences regarding millet-driven cloud kitchen businesses.

## 2.LITERATURE REVIEW

Gaining insight into consumer perceptions and the motivations behind millet consumption is pivotal, especially considering the rising popularity of millets as a healthier dietary choice (Shah et al., 2023). Millets exhibit nutritional equivalence or superiority compared to primary cereal grains. Their gluten-free proteins, elevated fiber content, low glycemic index, and abundance of bioactive compounds make them an ideal choice for promoting health (Kumar et al., 2018). Millets, belonging to the Poaceae family, are small-seeded cereals cultivated extensively in arid and tropical regions of Eurasia and Africa. These grains, among the earliest crops to be domesticated, have a rich historical presence, with evidence of millet consumption dating back to the Indus Valley Civilization around 3000 BC (Kheya et al., 2023). Globally, millets are recognized as a highly consequential group of cereal grains, ranking just after wheat, rice, maize, and barley in agricultural significance (Eugenia Ramashia et al., 2021).

Global food security has emerged as a significant concern, with widespread accessibility challenges persisting. Despite the United Nations aiming for universal access to food by 2030, the goal remains distant. Millets, versatile crops cultivated throughout the year, have witnessed a decline in cultivation since the post-green revolution era. This decline is attributed to a greater emphasis on rice, wheat, and maize. The main sources of carbohydrates, which humanity heavily relies upon, lack crucial amino acids and minerals essential for proper nutrition (Priya et al., 2023).



**Table 1: Types of Millet and their description(The Story of Millets,2018)**

Millet	Scientific name	Common names	Major areas of production for grains	Use
Sorghum	<i>Sorghum bicolor</i>	Great millet, jowar, cholam, jola, jonna, durra, Egyptian millet, feterita, Guinea corn, jwari, juwar, milo, shallu, gaoliang, kaoliang, kafir corn, dura, dari, mtama, solam.	USA, Nigeria, Sudan, Mexico, Ethiopia, India, Argentina, China, Niger, Australia	Grown for food grain in Asia and Africa, for fodder in Americas
Pearl millet	<i>Pennisetum glaucum</i>	Bajra, cattail, bulrush, candlestick, sanyo, munga, seno	India, Western & Central Africa, Eastern & Southern Africa	Grown for food grain in Asia and Africa, for fodder in Americas
Finger millet	<i>Eleusine coracana</i>	Ragi, African, bird's foot, rapoko, Hunsu, wimbi, bulo, telebun, koracan, kurakkan	India, Ethiopia, Nepal, Uganda, Malawi, Burundi, Sri Lanka, Rwanda	Grown for food grain and beer making in Asia and Africa
Foxtail millet	<i>Setaria italica</i>	Italian, German, Hungarian, Siberian, kangani, navane, thanahal	China, Myanmar, India, Eastern Europe	Grown for food grain and fodder
Proso millet	<i>Panicum milliaceum</i>	Common, hog, broom, samai, Russian, panivarigu, panic, maha meneri	Russia, USA, Ukraine, South Korea, Kazakhstan, France, Poland, Belarus, India, Iran	Grown for food grain and bird seed
Little millet	<i>Panicum sumatrense</i>	Blue panic, heen meneri	India	Grown for food grain
Kodo millet	<i>Paspalum scrobiculatum</i>	Varagu, bastard, Indian paspalum, creeping paspalum, amu	India	Grown for food grain
Barnyard millet	<i>Echinochloa crus-galli</i>	Japanese, sanwa, sawan, Korean, kweichou	India, Japan, China, Malaysia	Grown for food grain
Tef	<i>Eragrostis tef</i>	Abyssinian lovegrass	Ethiopia, Eritrea, Australia	Grown for food grain, and fodder
Fonio	<i>Digitaria exilis</i>	Fundi, hungry rice, acha	West Africa, Sudan, Ethiopia, Nigeria, Niger, Togo, Senegal, Mali	Grown for food grain in Africa

The examination of feasibility and scalability factors in cloud kitchen businesses is a critical area of study (Kulshreshtha & Sharma, 2022a) discussed the general feasibility challenges in cloud kitchens, emphasizing the importance of efficient logistics and technology infrastructure. However, the literature lacks a specific focus on millet-driven cloud kitchens. Research by (Kulshreshtha & Sharma, 2022a; Safuan & Latip, n.d.) highlighted the role of innovative menu offerings and strategic partnerships in enhancing the scalability of cloud kitchen models. Yet, the unique challenges and opportunities associated with scaling millet-focused ventures within the cloud kitchen framework remain unexplored.

Identifying key challenges and opportunities is imperative for steering the growth of millet-driven cloud kitchen enterprises. Recent studies by (Moyeenudin\* et al., 2020) delve into challenges faced by sustainable food businesses, emphasizing

consumer education and market positioning. However, a gap exists in understanding the specific challenges and opportunities within millet-focused cloud kitchens. (Ayofemi et al., n.d.; Moyeenudin\* et al., 2020) explored the potential of millets as a sustainable food source but do not address the operational intricacies within cloud kitchen models. Further research is needed to bridge this gap and provide a holistic understanding of the factors influencing the success of millet-driven cloud kitchen businesses.

Consumer attitudes play a pivotal role in the success of any culinary venture. Studies by (Kuchinka et al., 2018) explored consumer perceptions of sustainable and healthy food choices. However, there is a notable gap in understanding how consumers perceive and prefer millet-based dishes within the context of cloud kitchens. Exploring the impact of convenience, pricing, and menu variety on consumer choices in millet-driven



cloud kitchen businesses will contribute to filling this research void.

Providing actionable recommendations for stakeholders is crucial for translating research findings into practical strategies. (Kulshreshtha & Sharma, 2022b) offer strategic insights for cloud kitchen entrepreneurs, focusing on digital marketing and data analytics. However, there is a lack of tailored recommendations for stakeholders involved specifically in millet-driven cloud kitchen businesses. Drawing on the insights from feasibility, scalability, and consumer perception studies, this research aims to fill this gap by offering actionable recommendations for entrepreneurs, policymakers, and investors navigating the unique challenges and opportunities presented by millet-focused cloud kitchen enterprises.

### 3. RESEARCH METHODOLOGY

**Research design:** This present study entailed a mixed approach both quantitative and qualitative research design

**Locale:** The samples for this study were selected from within the Delhi National Capital Region (NCR) who was directly or indirectly associated with millet-driven cloud kitchen businesses.

**Sampling:** The current study employed a convenience sampling method to gather data. A sample size of 95 was chosen to achieve the objectives 1 and 2. The demographic profile of respondents included considerations of gender and stakeholders, such as App Developers and IT Teams, Chefs and Culinary Teams, as well as Cloud Kitchen Owners/Entrepreneurs and Delivery partners. These stakeholders were selected based on their direct and indirect associations with millet-driven cloud kitchen businesses. To meet the requirements of objective 3, a larger sample size of 301 was utilized.

**Tools and Techniques:** For this research, data was gathered through telephonic interviews to identify the key challenges and opportunities within this emerging millet-driven cloud kitchen businesses and the distribution of a self-administered questionnaire via an online Google Form. The respondents, who were affiliated with cloud kitchen businesses, were requested to provide their feedback by rating their agreement or

disagreement with each item on a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) to assess the feasibility and scalability of millet-driven cloud kitchen businesses and to investigate the consumer perceptions and preferences regarding millet-driven cloud kitchen businesses. Before implementation, the questionnaire underwent a rigorous review to ensure its appropriateness and relevance within the specific context of this study.

**Data and statistical Analysis:** The analysis of data was carried out utilizing SPSS version 23 as the primary analytical tool. The collected data underwent rigorous statistical examination, specifically employing the Descriptive statistics, Content analysis, One-Sample t-test and frequency. This statistical approach was selected due to its integration within the research (Anand & Chaudhary, 2023; Chaudhary & Sharma, 2023; Kumar & Chaudhary, 2023).

### 4. RESULTS AND DISCUSSION

In the context of assessing the feasibility and scalability of cloud kitchen businesses that focus on millet-based cuisine, the survey sample encompassed respondents from various professional backgrounds. The distribution of respondents among these professional groups was as follows: App Developers and IT Teams accounted for 11.6% of the respondents, highlighting the role of technology and digital solutions in cloud kitchen operations. Chefs and Culinary Teams constituted a substantial portion at 71.6%, emphasizing the importance of menu development and culinary expertise in millet-based cuisine. Cloud Kitchen Owners/Entrepreneurs, although a smaller segment at 6.3%, offered insights into decision-making and entrepreneurship within the industry. Delivery Partners represented 10.5% of the respondents, providing perspectives on logistics and last-mile delivery challenges. This diverse representation provides a well-rounded perspective on the industry. Chefs and culinary teams play a central role in menu development and food quality, while app developers and IT teams contribute insights on technology integration. Cloud kitchen owners and entrepreneurs offer insights into decision-making and business aspects, and delivery partners shed light on logistics and last-mile delivery. Together, these professional backgrounds contribute to a comprehensive evaluation of the feasibility and scalability of millet-based cloud kitchen businesses.

**Table 2: Distribution of Respondents by Stakeholder Category**

	Frequency	Percent	Cumulative Percent
App Developers and IT Teams	11	11.6	11.6
Chefs and Culinary Teams	68	71.6	83.2
Cloud Kitchen Owners/Entrepreneurs	6	6.3	89.5
Delivery Partners	10	10.5	100.0

In the analysis of responses to a Likert scale-based questionnaire assessing the feasibility factors for millet-based cloud kitchen businesses, several key insights emerge. Respondents appear to hold a moderately positive outlook

regarding the market demand for millet-based cuisine, with an average score of 2.84. While there is consensus among a significant portion of the respondents, the standard deviation of 1.394 suggests that there is a range of perspectives. This





variation in opinions highlights the dynamic nature of the market demand, with some respondents likely seeing substantial potential while others might be more cautious. Similarly, the establishment of a feasible supply chain for millet sourcing is seen as essential, as reflected in the mean score of

2.85. However, the standard deviation of 1.429 indicates that opinions vary regarding the importance of a reliable supply chain. It suggests that while there is general agreement on the significance of this factor, the specific approach to achieving it may differ among respondents.

**Table 3: Descriptive Statistics (Feasibility of Millet-Based Cloud Kitchen Businesses)**

	N	Minimum	Maximum	Mean	Std. Deviation
I believe there is substantial market demand for millet-based cuisine.	95	1	5	2.84	1.394
The establishment of a feasible supply chain for millet sourcing is essential for the success of millet-based cloud kitchens.	95	1	5	2.85	1.429
The development of appealing and diverse millet-based recipes is crucial to attract a wide range of consumers.	95	1	5	3.15	1.436
Effective cost management is vital to ensure that millet-based dishes can remain competitively priced.	95	1	5	3.02	1.502
Meeting regulatory requirements and obtaining necessary certifications for millet food products is a challenging yet necessary aspect of feasibility.	95	1	5	2.97	1.440
Efficient cooking processes to handle millet-based dishes and manage order volumes are vital for operational feasibility.	95	1	5	2.95	1.560

In the analysis of responses to a Likert scale-based questionnaire assessing the feasibility factors for millet-based cloud kitchen businesses, several key insights emerge. Respondents appear to hold a moderately positive outlook regarding the market demand for millet-based cuisine, with an average score of 2.84. While there is consensus among a significant portion of the respondents, the standard deviation of 1.394 suggests that there is a range of perspectives. This variation in opinions highlights the dynamic nature of the market demand, with some respondents likely seeing substantial potential while others might be more cautious. Similarly, the establishment of a feasible supply chain for millet sourcing is seen as essential, as reflected in the mean score of 2.85. However, the standard deviation of 1.429 indicates that opinions vary regarding the importance of a reliable supply chain. It suggests that while there is general agreement on the significance of this factor, the specific approach to achieving it may differ among respondents.

but the relatively high standard deviation of 1.502 suggests a broader range of opinions. The same pattern is observed for operational efficiency, with a mean score of 2.95 and a standard deviation of 1.560. These findings underscore the complexity of managing costs and operations in the dynamic context of millet-based cloud kitchens.

Menu development is a clear point of consensus among respondents, with a mean score of 3.15, indicating strong agreement on the importance of developing appealing and diverse millet-based recipes. This aligns with the broader trend of consumer preferences for innovative and diverse culinary offerings. Cost management and operational efficiency, while vital for success, show more varied responses. Effective cost management, with a mean score of 3.02, is perceived as crucial,

The descriptive statistics analysis of responses from a Likert scale-based questionnaire on the feasibility factors of millet-based cloud kitchen businesses provides significant insights. Respondents generally express a moderately positive outlook regarding market demand for millet-based cuisine and the importance of establishing a feasible supply chain. They strongly agree on the crucial role of menu development in attracting a wide range of consumers. However, opinions vary regarding cost management and operational efficiency, with some expressing concerns in these areas. Despite the challenges and necessity of meeting regulatory requirements, respondents generally recognize their importance. These results guide businesses in the millet-based cloud kitchen industry to emphasize menu innovation and address concerns related to supply chain and cost management to enhance overall feasibility. The findings offer a valuable foundation for understanding industry priorities and can inform strategic decision-making in this evolving sector.



**Table 4: Descriptive Statistics (Scalability of Millet-Based Cloud Kitchen Businesses)**

	N	Minimum	Maximum	Mean	Std. Deviation
Expanding the supply chain to source millets efficiently is a key factor for scalability.	95	1	5	3.07	1.446
Continual innovation and diversification of millet-based menu offerings are crucial for attracting a broader customer base.	95	1	5	2.86	1.357
Expanding to new geographical areas or cities to tap into a larger customer market is an important aspect of scalability.	95	1	5	3.21	1.413
Consideration of franchising or adopting a chain model to duplicate the concept across multiple locations is a viable approach for scalability.	95	1	5	3.05	1.439
Scalability necessitates robust technology systems for order management, delivery logistics, and customer management.	95	1	5	2.81	1.424
Investment in marketing strategies and promotions that reach a wider audience is essential for successful scalability.	95	1	5	2.78	1.322
Optimization and streamlining of operations to efficiently manage increased orders and maintain consistency in quality are critical for scalability.	95	1	5	2.96	1.279
A commitment to eco-friendly and sustainable practices aligns with consumer and industry trends and is important for scalability.	95	1	5	2.96	1.522
Building and maintaining a base of loyal customers through quality, service, and loyalty programs is essential for long-term scalability.	95	1	5	3.23	1.425
Collaboration with millet advocacy organizations, food startups, or government initiatives can facilitate scalability by accessing resources and support.	95	1	5	3.08	1.492

Respondents recognize the significance of efficiently expanding the supply chain, with a mean score of 3.07. This acknowledges the fundamental role of a well-established and responsive supply chain in scalability. While there is general agreement, the standard deviation of 1.446 highlights varying opinions on its exact importance, possibly due to differences in business models and approaches. Menu diversification, essential for attracting a broader customer base, receives a mean score of 2.86. The moderate level of agreement underlines the importance of continually innovating and offering diverse millet-based dishes. The standard deviation of 1.357 reflects the dynamic nature of consumer preferences, suggesting that businesses must remain adaptable.

Expanding to new geographical areas or cities, as indicated by a mean score of 3.21, is deemed crucial for scalability. Respondents generally agree on its significance, recognizing the potential in tapping into larger customer markets. Although opinions vary to some extent (standard deviation of 1.413), geographic expansion remains a key growth strategy. Consideration of franchising or adopting a chain model is perceived favorably, with a mean score of 3.05. While there is

general agreement on its potential for scalability, the standard deviation of 1.439 suggests varying perspectives on the precise approach. This factor presents an opportunity for businesses to explore different models while leveraging scalability.

Scalability necessitates robust technology systems, with a mean score of 2.81. The standard deviation of 1.424 reflects differing views on the role of technology in scalability. This highlights that technology is a critical enabler but may be perceived differently by respondents based on their experiences and technology readiness. Investment in marketing strategies is considered essential, with a mean score of 2.78. The standard deviation of 1.322 indicates variability in responses, suggesting that while marketing is crucial, there may be differing opinions on its exact impact. Effective marketing can be a powerful tool for reaching a wider audience and driving scalability.

Optimization and streamlining of operations are seen as critical for scalability, with a mean score of 2.96. The standard deviation of 1.279 indicates a range of perspectives on operational efficiency, emphasizing that achieving operational excellence is a multifaceted challenge in the context of



scalability. Respondents view a commitment to eco-friendly and sustainable practices as important for scalability, with a mean score of 2.96. The standard deviation of 1.522 reflects differing opinions on the role of sustainability. This suggests that while sustainability aligns with industry trends, respondents may have varying levels of emphasis on these practices for scalability.

Building and maintaining a base of loyal customers is considered essential for long-term scalability, with a mean score of 3.23. Although there is a general consensus on the importance of customer loyalty, the standard deviation of 1.425 implies some variation in opinions. This highlights the multifaceted nature of loyalty-building strategies. Collaboration with millet advocacy organizations, food startups, or government initiatives is viewed as a facilitator of scalability, with a mean score of 3.08. The standard deviation of 1.492 suggests varying perspectives on the role of collaboration in scalability, underlining the potential for diverse approaches to industry collaboration.

In summary the assessment of scalability factors for millet-based cloud kitchen businesses reveals a complex landscape of opinions among respondents. Each factor plays a unique role in the industry's growth, and while there is a general consensus on the importance of these factors, varying perspectives exist. Respondents acknowledge the significance of expanding the supply chain efficiently and expanding to new geographic areas. They recognize the potential in adopting a franchise or chain model and view collaboration with external organizations as a facilitator of scalability. Menu diversification and customer loyalty building are seen as essential for attracting a broader customer base and ensuring long-term growth. The commitment to eco-friendly and sustainable practices aligns with industry trends. However, opinions vary on the roles of technology integration, marketing strategies, and operational optimization in scalability. These findings reflect the dynamic and multifaceted nature of the millet-based cloud kitchen industry, where businesses must navigate various factors to achieve sustainable expansion and customer engagement.

**Table 5: Gender Frequency table of Customer**

	Frequency	Percent	Cumulative Percent
Female	118	39.2	39.2
Male	183	60.8	100.0

The gender distribution in the survey sample reveals a majority of male respondents, constituting approximately 61% of the total sample, while female respondents make up around 39% to investigate the consumer perceptions and preferences regarding millet-driven cloud kitchen businesses. This distribution may reflect the overall gender distribution in the context of the research or the specific demographics of the survey

participants. It is important to consider the potential implications of this gender distribution when interpreting the research findings. Gender-related perspectives and preferences can sometimes influence responses to survey questions, particularly in areas related to food and dining, which may be relevant to the research on millet-based cloud kitchen businesses.

**Table 6: One sample Test result**

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Millet-based dishes are perceived as healthier	36.194	300	.000	2.997	2.83	3.16
I prefer millet-based dishes due to their nutritional value	35.065	300	.000	2.824	2.67	2.98
I find millet-based dishes appealing in terms of taste and texture.	37.960	300	.000	3.000	2.84	3.16
Millet-based dishes offer a satisfying culinary experience.	37.844	300	.000	3.007	2.85	3.16
I consider millet-based dishes as a more sustainable food choice.	37.013	300	.000	3.043	2.88	3.20
The variety of millet-based options on the menu influences my choice.	37.370	300	.000	3.040	2.88	3.20
Millet dishes are priced reasonably compared to other menu items.	35.528	300	.000	2.967	2.80	3.13
My cultural or regional dietary practices influence my choice of millet-based dishes.	36.096	300	.000	2.900	2.74	3.06
I choose millet-based dishes to accommodate specific dietary requirements (e.g., gluten-free).	36.357	300	.000	3.027	2.86	3.19



I am more likely to order millet-based dishes when they are on special promotion or have discounts.	35.506	300	.000	2.937	2.77	3.10
Recommendations from others encourage me to order millet-based dishes.	37.496	300	.000	3.040	2.88	3.20
I am influenced by current health and wellness trends promoting millets as a superfood.	37.721	300	.000	3.010	2.85	3.17
I am curious to try something new or unfamiliar, especially if millets are not commonly consumed.	34.019	300	.000	2.944	2.77	3.11
Positive past experiences with millet-based dishes encourage me to reorder them.	39.291	300	.000	3.123	2.97	3.28

The results of one-sample t-tests conducted on a dataset encompassing respondents' perceptions of millet-based dishes reveal consistently positive attitudes across various dimensions. With highly significant p-values ( $p < .001$ ) in each case, the respondents, representing diverse stakeholder groups, consistently associate millet-based dishes with health, nutritional value, appealing taste and texture, sustainability, and satisfying culinary experiences. The mean differences, ranging from 2.824 to 3.123, underscore the strength of these positive perceptions. Notably, respondents find millet dishes reasonably priced, influenced by cultural and regional dietary practices, and swayed by factors such as specific dietary requirements, promotional offers, and health trends. These findings suggest a promising market for millet-based foods, implying potential success for businesses that emphasize health benefits, diverse menu options, and strategic alignment with current wellness trends. Overall, the positive response underscores a growing interest and acceptance of millet-based dishes among consumers.

The analysis of the data indicates that the p-values for all conducted tests are below the conventional significance level ( $\alpha$

= 0.05), as evident from the "Sig. (2-tailed)" column. Traditionally, when p-values fall below the significance level, it implies the rejection of null hypotheses. In this study, the null hypotheses posit no substantial difference or effect in various facets related to factors to choose millet-based cloud kitchen business. Therefore, based on the findings, all null hypotheses are rejected, implying the existence of significant differences or effects in the examined areas.

In the journey to assess the feasibility and scalability of cloud kitchen businesses focusing on millet-based cuisine, it is crucial to recognize and address a series of challenges and opportunities. The qualitative findings through interview with different stakeholders underscore the multifaceted nature of challenges and opportunities in incorporating millet-based dishes. Addressing sourcing challenges requires strategic partnerships and supply chain development, while consumer-oriented opportunities emphasize education, recipe innovation, and highlighting health benefits. Regulatory and operational aspects necessitate navigating complexities and optimizing processes, while marketing opportunities focus on positioning millets in alignment with contemporary trends.

**Table 7: Challenges and opportunities within this emerging millet-driven cloud kitchen businesses**

Category	Challenges	Opportunities
<b>Sourcing</b>	Inconsistent or limited millet supply	Developing reliable millet supply chains
	Variability in millet quality and pricing	Collaborating with local farmers and suppliers
<b>Consumer</b>	Low consumer awareness of millets	Educating consumers about millet benefits and options
	Resistance to trying new or unfamiliar dishes	Creating appealing millet-based recipes and menus
	Competition from established nonmillet offerings	Unique selling point as a health-conscious choice
<b>Regulatory</b>	Compliance with food safety and labeling regulations	Gaining certifications for organic and sustainable
	Meeting quality standards for millet products	millet sourcing
<b>Operational</b>	Managing millet preparation and cooking processes	Streamlining millet cooking processes for efficiency
	Cost management and pricing of millet dishes	Offering competitive pricing for millet-based items
<b>Marketing</b>	Promoting millet based dishes effectively	Marketing millets as a sustainable and healthy option
	Building brand recognition for millet offerings	Leveraging ecofriendly and health-conscious trends

Overall, these insights provide a comprehensive foundation for businesses seeking to navigate the landscape of millet integration in the culinary domain. These factors span various categories, including sourcing, consumer engagement, regulatory compliance, operational efficiency, and marketing strategies. In the realm of sourcing, businesses often grapple

with inconsistent or limited millet supply, coupled with the variability in millet quality and pricing. However, opportunities abound in the form of developing reliable millet supply chains and collaborating with local farmers and suppliers. This not only ensures a steady millet source but also fosters community involvement and sustainable practices.





On the consumer front, low awareness of millets and resistance to trying new dishes can pose hurdles. Nevertheless, these challenges can be transformed into opportunities by educating consumers about the health benefits and versatility of millets and creating captivating millet-based recipes that cater to diverse tastes. Highlighting millets as a health-conscious choice can also set them apart from the competition. In the regulatory sphere, compliance with food safety and labelling regulations, along with meeting quality standards for millet products, can be demanding. However, opportunities arise in gaining certifications for organic and sustainable millet sourcing, which can enhance the credibility of the business and its commitment to quality.

Operational efficiency is another critical area, where managing millet preparation and cooking processes and ensuring cost-effective pricing are essential. Streamlining millet cooking processes for efficiency and offering competitive pricing for millet-based items can turn these operational challenges into advantages by improving resource management and customer affordability. Finally, in the realm of marketing, effectively promoting millet-based dishes and building brand recognition for millet offerings can be transformative. By marketing millets as a sustainable and healthy dining option and leveraging eco-friendly and health-conscious trends, cloud kitchen businesses can draw in a wider and more conscientious customer base. These strategies not only address challenges but also tap into the growing demand for healthier and environmentally friendly food choices, fostering the feasibility and scalability of millet-driven cloud kitchen businesses.

## 5. CONCLUSION

The comprehensive analysis of data and insights from both quantitative and qualitative research provides a nuanced understanding of the feasibility and scalability of millet-driven cloud kitchen businesses. The distribution of respondents across various professional backgrounds, such as App Developers, Chefs, Cloud Kitchen Owners, and Delivery Partners, ensures a diverse and well-rounded perspective on the industry. Stakeholders play integral roles in shaping the success of millet-based ventures, contributing insights from technology integration to culinary expertise, entrepreneurship, and logistics. The findings from Likert scale-based questionnaires shed light on key factors influencing feasibility and scalability. While there is a moderately positive outlook on market demand and the importance of a feasible supply chain, the diversity of opinions suggests a dynamic landscape with varying perceptions. Menu development emerges as a point of consensus, emphasizing its crucial role in attracting consumers. Challenges related to cost management and operational efficiency highlight the complexity of navigating business aspects in the evolving context of millet-based cloud kitchens.

The gender distribution analysis reveals a majority of male respondents, potentially influencing consumer perceptions and preferences. Understanding these nuances is vital for businesses aiming to tailor their offerings to a diverse audience. Additionally, the one-sample t-test results underscore the overwhelmingly positive perception of millet-based dishes

across various dimensions, indicating a promising market for these products. The rejection of null hypotheses implies significant differences in factors influencing consumer choices in Favor of millet-based options. The challenges and opportunities identified through qualitative research further enrich the analysis. From addressing sourcing complexities to educating consumers and navigating regulatory requirements, businesses can leverage these insights to formulate strategic approaches. Collaborations with local farmers, menu innovation, sustainable practices, and effective marketing emerge as key strategies for success.

In essence, the feasibility and scalability of millet-driven cloud kitchen businesses are intricately linked to a multi-faceted set of factors spanning sourcing, consumer engagement, regulatory compliance, operational efficiency, and marketing. Businesses that navigate these challenges with strategic initiatives, such as reliable supply chains, consumer education, sustainable practices, and targeted marketing, are well-positioned to thrive in the dynamic landscape of the millet-based culinary industry. As the demand for healthier and environmentally conscious food choices continues to grow, the positive consumer perception identified in this research suggests a promising future for millet-driven cloud kitchen ventures.

The analysis of data pertaining to millet-based cloud kitchen businesses reveals a nuanced landscape encompassing challenges, opportunities, and stakeholder perceptions. The diverse representation of respondents, including professionals from various domains, reflects a promising interest in millet-based dishes. Challenges identified in sourcing, consumer engagement, regulatory compliance, operational efficiency, and marketing suggest avenues for strategic development. Recommendations include establishing reliable supply chains through collaborations, extensive consumer education campaigns, pursuing certifications for sustainable practices, streamlining operations, and implementing effective marketing strategies. Emphasizing the unique selling points of millet-based dishes and adopting scalable models are highlighted for feasibility and scalability. Overall, these insights provide a comprehensive roadmap for businesses in the millet-based cloud kitchen industry to navigate challenges, capitalize on opportunities, and align with evolving consumer preferences.

## 6. LIMITATIONS AND FUTURE RESEARCH

In this study exploring the feasibility and scalability of millet-driven cloud kitchen businesses, valuable insights have been gleaned from a combination of quantitative and qualitative research methodologies. The diverse representation of stakeholders, including App Developers, Chefs, Cloud Kitchen Owners, and Delivery Partners, offers a nuanced perspective on the industry. Findings from Likert scale-based questionnaires reveal a moderately positive outlook on market demand and the importance of a feasible supply chain, while challenges related to cost management and operational efficiency underscore the complexities of navigating this evolving culinary landscape. The one-sample t-test results indicate overwhelmingly positive consumer perceptions of millet-based dishes across various dimensions, suggesting a promising market. The rejection of null hypotheses implies significant differences in factors influencing consumer choices in favor of millet-based options.



Gender distribution analysis and stakeholder interviews further enrich the understanding, emphasizing the need for businesses to tailor their offerings to diverse audiences and address challenges through strategic initiatives.

However, this research is not without limitations. The sample size and composition, focused geographical scope, and potential gender imbalance may impact the generalizability of findings. Additionally, the reliance on Likert scale-based questionnaires and qualitative interviews introduces inherent biases. Future research could address these limitations by employing larger and more diverse samples, exploring varied geographical contexts, ensuring balanced gender representation, and incorporating diverse research methodologies. Longitudinal studies, cross-cultural comparisons, and in-depth analyses of consumer behavior and technological integration could further contribute to our understanding of the evolving millet-based cloud kitchen industry. Moreover, assessing economic and environmental impacts, as well as experimenting with different consumer education interventions, can provide comprehensive insights for the sustainable growth of this emerging culinary sector.

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