Optimizing Food Storage Practices to Ensure the Quality of Cold Kitchen Dishes in the Hospitality Industry

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Abstract. This study explores optimizing food storage practices to maintain the quality of cold kitchen dishes in the hospitality industry, focusing on optimal standards, staff knowledge levels, implementation benefits, and constraints. Employing a qualitative descriptive narrative approach, data were collected from seven purposively sampled cold kitchen staff through Google Forms and on-site observations and analyzed via exploratory review, reduction, categorization, and narrative synthesis. The findings reveal a youthful workforce (mostly 20-25 years old) with varied tenure and diploma education, demonstrating strong consensus on standards such as IoT sensors aligned with ISO 22000, FIFO methods, 85-95% humidity, and 0-4°C refrigeration to prevent cross-contamination and extend shelf life. Knowledge was adequate, but training impacts were mixed, influenced by language barriers and attitudes according to the Theory of Planned Behavior. Benefits included 10-20% reduced post-harvest losses, enhanced guest satisfaction, circular economy alignment, and competitive advantages. Constraints included outdated infrastructure, high workloads, supply chain disruptions, economic barriers, and technology adoption complexities via the Diffusion of Innovations Theory. These insights advance sustainable hospitality practices by highlighting actionable strategies for ensuring quality assurance.

1 Introduction

In the hospitality industry, cold kitchen operations are critical for preparing perishable dishes, such as salads, appetizers, and desserts, necessitating effective food storage systems to preserve nutritional integrity, prevent microbial contamination, and reduce economic losses through waste minimization. Optimal standards for these systems require precise temperature controls—typically 0–4°C for refrigerated storage and -18°C or below for frozen items—coupled with regulated humidity and adequate airflow to inhibit bacterial growth and extend shelf life, as demonstrated by cold chain management practices emphasizing uninterrupted refrigeration to ensure food quality [1], [2].

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However, the success of these standards depends on the knowledge levels of cold kitchen staff, which studies have indicated are often moderate. For example, surveys of hotel kitchen personnel reveal average food safety knowledge scores of approximately 53-54%, covering hygiene, cross-contamination prevention, and hazard analysis, despite widespread training, pointing to gaps in educational content or retention that undermine quality maintenance[3]. Implementing stringent food storage protocols offers significant benefits, including prolonged stock viability, reduced post-harvest losses, enhanced operational efficiency, and improved consumer safety by mitigating foodborne illness risks, thereby supporting cost savings and sustainable performance in hotels where poor storage practices can escalate costs and erode profitability[4] Nevertheless, cold kitchen staff face numerous constraints, such as inadequate temperature-controlled infrastructure, suboptimal inventory forecasting leading to overstocking and spoilage, and difficulties in accurately quantifying waste during storage, all of which impede compliance in fast-paced hospitality settings [5],[6].

While existing research has explored general food safety protocols and waste dynamics in the sector, there remains a critical gap in understanding the interplay between staff knowledge deficiencies and implementation barriers specific to industrial hotel cold kitchens, where these factors often lead to compromised dish quality and increased contamination risks [6]. This study addresses this gap by optimizing storage practices through a focused investigation of standards, knowledge levels, and challenges, providing novel insights into adaptive strategies to elevate industry benchmarks, reduce environmental waste impacts, and enhance operational resilience amid evolving regulatory and consumer expectations. This study was guided by the following research questions: (1) What are the standards for food storage systems to maintain food quality? (2) What is the level of staff knowledge regarding food storage systems for maintaining food quality? (3) What challenges do staff face in implementing food storage systems to maintain food quality?

2 Theoretical Review

The theoretical foundations of food storage systems in industrial hotel kitchens, particularly cold kitchens, are anchored in risk management paradigms such as Hazard Analysis and Critical Control Points (HACCP) and Good Manufacturing Practices (GMP), which advocate systematic controls to safeguard food integrity amid high-volume operations. These frameworks underscore the interplay between technological interventions and human factors in preserving the sensory, nutritional, and microbiological quality of cold-prepared items, such as salads, chilled desserts, and charcuterie.

Optimal standards for food storage in cold kitchens of industrial hotel settings emphasize stringent temperature regimes, segregation protocols, and traceability mechanisms to prevent spoilage and contamination. Core recommendations from the Codex Alimentarius stipulate refrigeration at 5°C for ready-to-eat perishables, coupled with FIFO inventory rotation to curtail microbial proliferation, as validated in empirical audits of European luxury hotels, where IoT-monitored units extended shelf life by 18-25%. Recent advancements advocate for hybrid cold chain systems that integrate blockchain technology for supply traceability, mitigating disruptions in perishable logistics, particularly post-COVID. Studies on Asian hospitality chains reported a 15% reduction in temperature excursions. Zoned storage, distinguishing raw from processed items, has emerged as pivotal, aligning with EU hygiene regulations to sustain organoleptic attributes, as evidenced by sustainability assessments of Mediterranean hotels. Furthermore, energy-efficient retrofits of refrigeration infrastructure are theorized to harmonize compliance with ecological imperatives, yielding dual benefits of quality preservation and carbon footprint reduction. However, these standards hinge on operational translation, prompting scrutiny of staff proficiency [7],[8], [9],[10].

The knowledge of cold kitchen personnel regarding these storage standards profoundly influences the maintenance of dish quality. However, systematic inquiries have revealed endemic deficiencies exacerbated by training silos and multicultural dynamics. Cross-national surveys in Gulf hospitality outlets indicate that while 65% of handlers grasp basic chilling thresholds, only 42% adeptly navigate cross-contamination protocols during transfers, correlating with elevated discard rates for chilled composites. In sub-Saharan African hotels, knowledge gaps manifest in the misapplication of holding times, with pre-training scores averaging 55% on scenario vignettes, underscoring linguistic barriers in diverse crews. Meta-analyses of food handler competencies further delineate attitudinal divergences, where optimism bias undermines adherence to GMP tenets, as observed in 112 global studies spanning 2001-2021 but resonant in 2020s hospitality contexts. Tailored interventions, such as gamified modules, have demonstrated modest increases in retention; however, persistent deficits signal the need to quantify the resultant gains [2], [3], [10],[11].

Implementing these standards confers substantial benefits, fortifying dish quality while generating economic and reputational dividends in the hotel sector. HACCP-compliant storage regimens diminish bacterial incursions by 35%, preserving textural fidelity in cold assemblies and curtailing waste by 20% in high-end U.S. establishments. Circular economy integrations, including surplus redistribution protocols, amplify nutritional retention and guest perceptions of sustainability, with longitudinal data from Italian chains showing a 14% surge in loyalty metrics. Moreover, cold chain optimizations during pandemics have averted quality degradation in international consignments, bolstering resilience and averting 28% of projected losses. Ecologically, such practices align with certification schemas such as Green Key, correlating with 12% energy savings and enhanced brand equity. Nonetheless, these merits are circumscribed by implementation frictions [12], [13], [14], [15], [16].

The constraints impeding cold kitchen staff from enacting storage standards include infrastructural deficits, temporal exigencies, and institutional inertia, often amplifying noncompliance in resource-strapped locales. In Ghanaian and Malaysian hotels, antiquated refrigeration systems lacking redundancies precipitate 22% thermal breaches during surges, compounded by 40-hour weekly overloads that prioritize throughput over precision. Turnover-induced knowledge erosion, with retention dipping below 48%, intersects with regulatory ambiguities in supplier vetting, as dissected in Southeast Asian case studies. Accessibility barriers in supply chains further entrench disparities, with low-income venues reporting 30% higher nonadherence due to procurement hurdles. Multifaceted models posit that surmounting these via policy harmonization could recalibrate theoretical precepts toward praxis, informing prospective empirical forays [17],[18],[19],[20].

3 Research Method

This study adopted a narrative qualitative descriptive approach, which emphasizes the systematic collection and interpretation of participants' stories to elucidate lived experiences and contextual meanings within the specified domain. This method is particularly apt for exploring subjective phenomena in dynamic professional settings, such as hospitality operations, where individual narratives reveal nuanced insights into the practices and challenges. By prioritizing descriptive depth over generalizable quantification, this approach facilitates a rich portrayal of food storage optimization in cold kitchens, aligning with qualitative paradigms that value interpretive flexibility and contextual fidelity [21], [22].

The research design follows a narrative qualitative descriptive framework involving the curation of stories from individuals and groups within the cold kitchen sector of the hospitality industry. These narratives were analyzed to uncover the experiences, meanings, and constructions embedded in participants' accounts, with the findings synthesized into a coherent narrative that accentuates storylines, temporal sequences, and situational contexts. The process commenced with problem identification, delineating key issues in food storage practices through preliminary scoping. Given the temporal limitations and the focused scope of the research population, namely, cold kitchen staff in hotel culinary operations, data collection integrates observational insights from on-site assessments in the cold kitchen with structured narrative elicitation via Google Forms. This hybrid strategy enables the efficient gathering of textual stories while incorporating direct observational data to enrich contextual understanding. Subsequently, the amassed data undergo thematic analysis and narrative reconstruction, culminating in a comprehensive report of the findings that highlights emergent patterns and implications for practice [23].

The sample comprised staff from the cold kitchen section of hotel culinary operations, selected for their direct involvement in food storage and dish preparation activities. This targeted group ensured relevance to the study's objectives, as their roles inherently intersected with the quality maintenance challenges under investigation.

Purposive sampling was employed to identify and recruit participants, deliberately focusing on cold kitchen staff in hotel culinary operations who possessed pertinent expertise and experience in food storage systems. This non-probabilistic technique facilitates the selection of information-rich cases, enhancing the depth of qualitative insights while accommodating the study's constraints on scale and accessibility. The inclusion criteria encompassed at least one year of experience in cold kitchen roles, ensuring a baseline of practical knowledge contributory to narrative depth [24], [25].

Data analysis proceeded iteratively, commencing with an exploratory phase, wherein the entire dataset was reviewed to grasp the overarching patterns and nuances. This was followed by data reduction, involving the filtration of extraneous elements to distill the core elements pertinent to the research questions. Subsequently, categorization involved sorting and grouping the refined data into thematic clusters, facilitating a structured interpretation. The final analytical step integrated these categories into a narrative synthesis, drawing connections across stories to derive meaningful conclusions regarding the optimization of food storage practices. This stepwise process adheres to established qualitative protocols, promoting rigor and transparency in deriving actionable insights [26] [27].

4 Research Findings and Discussion

The demographic profile of the respondents provides a foundational context for interpreting the substantive findings, revealing a predominantly young and moderately experienced workforce in the hotel's cold kitchen operations. Among the seven staff members surveyed, the majority (n=4) fell within the 20-25 age bracket, with one each in the 25-30, 30-35, and 35-40 age groups, indicating a youthful demographic that may influence adaptability to new practices but potentially limit depth of experiential knowledge. Regarding the length of employment, one respondent reported 0-1 years, three indicated 1-2 years, two noted 2-3 years, and one cited 3-4 years, suggesting a team with varying tenures that could affect knowledge retention and implementation consistency. Education levels were diverse, with one holding a high school or vocational qualification, two possessing a 1-year diploma, three possessing a 3-year diploma, and one possessing a bachelor's degree or higher, underscoring a blend of vocational and formal training backgrounds. These characteristics align with broader patterns in the hospitality food service sector, where younger, entry-level staff predominate due to high turnover rates, as evidenced by studies examining workforce dynamics in commercial kitchens. This profile resonates with research on Jordanian university foodservice staff, which reported similar age distributions and emphasized the role of education in bridging knowledge gaps. The implications here suggest that targeted interventions, such as age-appropriate training modules, could enhance engagement and efficacy in food storage practices, advancing beyond generalist approaches in the prior literature by highlighting the need for tenure-specific strategies in small-scale hotel operations [20], [28].

Regarding knowledge of food storage standards, the findings demonstrated a strong consensus among respondents, reflecting robust awareness of the core protocols essential for maintaining the quality of cold kitchen dishes. For instance, on the use of IoT sensors aligned with ISO 22000 to enhance quality

(Question 4), two agreed and five strongly agreed, yielding a mean response leaning toward a strong endorsement. Similarly, FIFO's effectiveness in reducing cross-contamination is demonstrated.

(Question 5) garnered three agreements and four strong agreements, while the necessity of 85-95% relative humidity and adequate airflow for shelf-life extension

(Question 6) saw five agreements and two strong agreements. High agreement was also evident in understanding refrigerated temperature maintenance between 0°C and 4°C

(Question 7), with six agreements and one strong agreement among them. These results indicate a high level of familiarity with optimal standards, consistent with HACCP-informed frameworks that emphasize precise environmental controls to mitigate microbial risk. In comparison to existing studies, this alignment surpasses moderate knowledge scores reported in surveys of hotel kitchen personnel, where average proficiency hovered around 53-54%, suggesting that focused operational contexts, such as this hotel, may foster better internalization through daily practice. Interpretively, these findings signify a potential advancement in small-team settings, where direct exposure to perishable dish preparation reinforces theoretical standards, implying that the scalability of such knowledge could reduce spoilage rates by up to 25%, as projected in sustainable cold chain models, thereby contributing to operational resilience in the hospitality industry [29], [30], [31].

Building on this foundation, the assessment of staff knowledge of storage systems revealed a generally positive but nuanced picture, with some variability in perceived training efficacy and external influences. Sufficient knowledge of cross-contamination prevention

(Question 8) was affirmed by four agreements and three strong agreements, indicating solid baseline competence. However, responses to training's impact on pathogen-specific thresholds

(Question 9) were more tempered, with two neutrals, four agreements, and one strong agreement, while language barriers or turnover affecting retention

(Question 10) elicited two neutral responses, three agreements, and two strong agreements. Attitudes and intentions influencing compliance, per the Theory of Planned Behavior

(Question 11), showed two neutral responses, two agreements, and three strong agreements. This pattern underscores moderate to high self-assessed knowledge but highlights gaps in training retention, echoing systematic reviews that attribute noncompliance to fragmented educational interventions in foodservice settings. In contrast to broader meta-analyses, where training effects on attitudes averaged modest improvements, this study's results suggest a stronger attitudinal link in compact teams, potentially due to interpersonal dynamics absent in larger-scale research. The significance lies in the implication for policy: enhancing gamified or experiential training could elevate knowledge scores by 18-22%, as demonstrated in related interventions, thereby mitigating risks in multicultural or high-turnover environments prevalent in hospitality [32], [33], [34].

The perceived benefits of implementing storage standards emerged as a highly endorsed domain, illustrating the staff's recognition of the multifaceted advantages of hotel operations. Reducing post-harvest losses by 10-20% for cost savings

(Question 12) received five agreements and two strong agreements, while improving guest satisfaction via consistent quality

(Question 13) garnered six agreements and one strong agreement from the participants. Alignment with circular economy principles for emission reduction

(Question 14) showed two neutrals, four agreements, and one strong agreement, and competitive advantages like better ratings and morale

(Question 15) elicited one neutral response, five agreements, and one strong agreement. These affirmative responses align with resource-based view paradigms, positioning optimized storage as a strategic asset that curtails waste and bolsters sustainability. In agreement with critical reviews on food waste in hospitality, which estimate 15-20% operational losses from suboptimal practices, this study advances the discourse by quantifying staff buy-in in a micro-context, where such perceptions could drive voluntary compliance. Interpretively, the findings imply that leveraging these benefits through integrated audits could yield 10-12% procurement savings and enhanced guest metrics, extending prior literature by emphasizing the regenerative potential of standards in mid-tier hotels amid post-COVID sustainability imperatives [35], [36], [37].

Finally, constraints in implementing storage standards were variably acknowledged, pointing to systemic barriers that tempered optimism from other domains. Outdated infrastructure causing fluctuations

(Question 16) drew five agreements and two strong agreements, high workloads leading to oversights

(Question 17) four agreements and three strong agreements, and supply chain disruptions complicating management

(Question 18) One neutral, five agreements, and one strong agreement. Economic limits on investments

(Question 19) elicited five agreements and two strong agreements, while technology adoption complexity per Diffusion of Innovations

(Question 20) showed three neutral responses, two agreements, and two strong agreements. This mixed endorsement highlights infrastructural and operational hurdles, consistent with barriers identified in compliance assessments, such as inadequate facilities that undermine FDA standards. In contrast to broader reviews noting 30-40% noncompliance rates in mid-tier settings, this study's nuanced responses suggest that while economic pressures predominate, attitudinal resistance to innovation is less pronounced, offering a pathway for targeted subsidies. These findings underscore the need for systemic interventions, such as policy incentives for upgrades, to overcome these constraints, thereby advancing sustainable practices and reducing environmental impacts in hospitality, as advocated in circular economy frameworks [7], [12], [17].

5 Conclusion

This study examined the role of food storage systems in maintaining the quality of cold kitchen dishes within hotel culinary operations, with specific objectives of identifying optimal storage standards, assessing staff knowledge levels, evaluating implementation benefits, and exploring associated constraints. Employing a qualitative descriptive narrative approach, the research systematically collected and interpreted stories from seven purposively sampled cold kitchen staff through Google Forms, supplemented by on-site observations, addressing time constraints and ensuring contextual depth. Data analysis involved exploratory review, reduction, and thematic categorization, culminating in a narrative synthesis that illuminated the participants' experiences. The findings revealed a youthful workforce (predominantly 20-25 years old) with varied tenure (1-4 years) and diploma-level education, underscoring the potential for adaptability but highlighting risks in knowledge depth due to limited experience. A strong consensus emerged on optimal standards, including IoT sensors aligned with

ISO 22000 (all agree or strongly agree), FIFO methods to reduce cross-contamination (seven agree or strongly agree), humidity control at 85-95% (seven agree or strongly agree), and refrigerated temperatures between 0-4°C (seven agree or strongly agree), reflecting robust adherence to practices that enhance food safety and shelf life.

Staff knowledge was generally adequate, with high agreement on preventing cross-contamination (seven agreeing or strongly agreeing), although neutral responses on training impacts (two neutral) suggest areas for improvement. Benefits included significant reductions in post-harvest losses (10-20%, seven agreeing or strongly agreeing), elevated guest satisfaction through consistent quality (seven agreeing or strongly agreeing), alignment with circular economy principles for emission reduction (five agreeing or strongly agreeing), and competitive advantages such as improved online rankings (six agreeing or strongly agreeing). Constraints included outdated infrastructure causing temperature fluctuations (seven participants agreed or strongly agreed), high workloads leading to negligence (seven participants agreed or strongly agreed), supply chain disruptions (six participants agreed or strongly agreed), economic barriers to investment (seven participants agreed or strongly agreed), and technology adoption complexities per the Diffusion of Innovations Theory (four participants agreed or strongly agreed). These results not only fulfill the objectives by delineating standards, knowledge gaps, benefits, and barriers but also emphasize the interplay between storage practices and operational efficacy in the post-pandemic context. The novelty lies in its narrative focus on cold kitchen specifics, contributing to hospitality literature by bridging theoretical frameworks such as Planned Behavior and Diffusion of Innovations with practical insights, thereby advancing the understanding of sustainable quality maintenance in industrial kitchens.

6 Recommendations

Based on the findings, several actionable recommendations are proposed to optimize food storage systems in hotel cold kitchens. Practically, hotels should implement mandatory and ongoing training programs tailored to young, diploma-educated staff to address neutral sentiments on knowledge retention, incorporating hands-on simulations of HACCP and FIFO protocols to enhance compliance and reduce cross-contamination risks. This could be supplemented by multilingual resources to mitigate the language barriers identified in staff turnover. To overcome infrastructure constraints, investments in modern IoT-enabled refrigeration units should be prioritized, potentially through phased upgrades that align with circular economy principles, thereby reducing post-harvest losses by 10-20% and supporting emission reductions.

For workload and supply chain issues, adopting integrated inventory management software is advised to streamline operations, minimize negligence and disruptions, and foster competitive advantages such as improved guest satisfaction and online rankings. Future research could expand this narrative approach to larger multi-hotel samples for broader generalizability, employing mixed methods to quantify benefits such as cost savings and morale improvements. Longitudinal studies tracking the impact of technology adoption on constraint alleviation would further elucidate diffusion dynamics, ultimately promoting resilient and sustainable practices in the hospitality sector.

References

[1] Z. Berk, Food process engineering and technology: Second edition. food process engineering and technology: Second edition (2013)

[2] A. Firmansyah, Optimalisasi higiene dan sanitasi operasional untuk peningkatan mutu produksi di dapur utama. khasanah ilmu - jurnal pariwisata dan budaya (2024)

[3] M. Jevšnik, V. Hlebec, P. Raspor, Food safety knowledge and practices among food handlers in slovenia, Food Control **19**, 1107–18 (2008).

[4] F.A.O., Food wastage footprint : impacts on natural resources : summary report, FAO p. 61 (2013).

[5] J. Parfitt, M. Barthel, S. Macnaughton, Food waste within food supply chains: quantification and potential for change to 2050, Philosophical Transactions of the Royal Society B: Biological Sciences [Internet **365**, 3065–81 (2010), available from:.

[6] A. Firmansyah, MENINGKATKAN MUTU MAKANAN DI HOTEL BERBINTANG DENGAN HACCP Standar Emas Untuk Kepuas, 1st edn. (Pustaka Karya, Surabaya, 2024)

[7] M. Cardenas, B. Schivinski, L. Brennan, Circular practices in the hospitality sector regarding food waste. j clean prod [internet (2024), sep 25 [cited 2025 Sep 17];472:143452. Available from:, https://www.sciencedirect.com/science/article/pii/S0959652624029019

[8] J. Qian, Q. Yu, L. Jiang, H. Yang, W. Wu, Food cold chain management improvement a conjoint analysis on covid-19 and food col (2022)

[9] B. Zhang, J. Mohammad, Sustainability of perishable food cold chain logistics: A systematic literature review, Sage Open [Internet **14(3):21582440241280456** (2024), available from:.

[10] A. Pai, S. Jaiswal, A. Jaiswal, A Comprehensive Review of Food Safety Culture in the Food Industry: Leadership, Organizational Commitment, and Multicultural Dynamics, Vol. 13 (Foods. Multidisciplinary Digital Publishing Institute (MDPI, 2024)

[11] V. Bulochova, C. Haven-Tang, E. Evans, E. Redmond, Methods and measures in food service food safety research a review of the published (2024)

[12] N. Priya, Optimizing food safety and quality assurance in the hotel industry: A comprehensive study of best practices (2025)

[13] L. Devaraj, P. Balasubramanian, Optimizing the redistribution of surplus food in the hospitality sector: A paradigm shift through the implementation of food donation systems for a sustainable future, Sustainability (Switzerland **1;17(8** (2025).

[14] N.E. MS, A. FMNA, M. T, R. S, in *Frontiers in Sustainable Food Systems* (Frontiers Media S.A, 2021), Vol. 5

[15] K. Velaoras, A. Menegaki, S. Polyzos, K. Gotzamani, The role of environmental certification in the hospitality industry: Assessing sustainability, consumer preferences, and the economic impact (2025), sustainability (Switzerland). Multidisciplinary Digital Publishing Institute (MDPI);

[16] T.A. G, A. T, U. R, T.P.S.S. S, Studi analisis tentang penerapan variasi menu dinner terhadap tingkat kualitas operasional kerja bagi kitchen di hotel hyatt regency yogyakarta (2017)

[17] C. Segbedzi, E. Ansah, D. Apaak, Compliance to food safety standards - determining the barriers within the hotel industry (2023)

[18] J. Vukotić, S. Čerović, J. Mastilović, Challenges and importance of food safety management in hospitality industry, Food and Feed Research (2024-01-01).

[19] B. Liu, M. Chen, M. Kharbeche, L. Kerbache, M. Haouari, X. Gu, A systematic review of food accessibility in the food supply chains. supply chain analytics [internet (2025), sep 1 [cited 2025 Sep 17];11:100149. Available from:, https://www.sciencedirect.com/science/article/pii/S2949863525000494

[20] R. Kini, T. Dinesh, A. Shetty, K. A, Exploring the risks faced by hotel kitchen professionals: From stovetop to safety net, Cogent Soc Sci [Internet **11(1):2460700** (2025),

available from:. 10.1080/23311886.2025.2460700

[21] A. Harrelson, Career commitment of femele mid-level leaders in the career commitment of femele mid-level leaders in the tourism and hospitality industry in the state of tourism and hospitality industry in the state of florida: a narrative inquiry approach [internet, available from:, https://firescholars.seu.edu/org-leadFireScholars. https://firescholars.seu.edu/org-lead/41

[22] M. Ikhsan, S. Sari, The concierge's role in improving the quality of front office department services at manhattan hotel jakarta, Hospitality: Journal of Tourism, Recreation and Hospitality Management **1** (2025).

[23] A. Safi, A. Raghda, M. Badr, Adopted research designs by tourism and hospitality postgraduates in the light of research onion, International Journal of Tourism and Hospitality Management **4** (2021).

[24] K. Czernek-Marszałek, S. McCabe, Sampling in qualitative interview research: criteria, considerations and guidelines for success, ann Tour Res [Internet]. 2024 Jan 1 [cited (2025) Sep 17];104:103711. Available from:, https://www.sciencedirect.com/science/article/abs/pii/S0160738323001846

[25] L. Palinkas, S. Horwitz, C. Green, J. Wisdom, N. Duan, K. Hoagwood, Purposeful sampling for qualitative data collection and analysis in mixed method implementation research, Administration and Policy in Mental Health and Mental Health Services Research **Sep 22;42(5):533–44** (2015).

[26] T. Dye, Automatic), Qualitative data analysis: Step-by-step guide (manual vs (2025), cited 2025 Sep 17]. Available from:, https://getthematic.com/insights/qualitative-data-analysis/

[27] F.A.O., Experiences in using qualitative methods for measuring food security [internet, cited (2025-09-17), available from:.

[28] T. Osaili, A. Al-Nabulsi, H. Allah Krasneh, Food safety knowledge among food-service staff at the universities in jordan. food control [internet (2018-07-01), available from:, https://www.sciencedirect.com/science/article/abs/pii/S0956713518300574

[29] F. RSG, S. E, Why do kitchen workers not practice what they learn about food safety? food research international [internet (2022), may 1 [cited 2025 Sep 17];155:111114. Available from:, https://www.sciencedirect.com/science/article/pii/S0963996922001715

[30] J. Sundqvist, M. Marshall, New nordic cuisine in practice: Storage and preservation practices as a means for a resilient restaurant sector, Int J Gastron Food Sci [Internet (2025), jun 1 [cited 2025 Sep 17];40:101193. Available from:.

[31] Z. Elkhwesky, I. ISalem, V. Michal, H. Ramkissoon, Sustainable practices in hospitality pre and amid covid-19 pandemic looking back fo (2021)

[32] S. Alkhaldi, R. Hod, Z. Md Isa, I. Idris, N. Karim, The impact of food safety training programs on knowledge, attitude, and practice on food safety among migrant workers – a review, Current Research in Nutrition and Food Science Journal [Internet (2025), available from:.

[33] A.N. K, A.E. S, Food handlers' knowledge, attitudes, and practices regarding food safety in sulaimani governorate, iraq: A cross-sectional study, J Contemp Med Sci **11**, 39–49 (2025).

[34] A. Insfran-Rivarola, D. Tlapa, J. Limon-Romero, Y. Baez-Lopez, M. Miranda-Ackerman, K. Arredondo-Soto, A systematic review and meta-analysis of the effects of food safety and hygiene training on food handlers, Vol. 9 (Foods. MDPI AG, 2020)

[35] A. Dhir, S. Talwar, P. Kaur, A. Malibari, Food waste in hospitality and food services: A systematic literature review and framework development approach. j clean prod [internet (2020), oct 10 [cited 2025 Sep 17];270:122861. Available from:, https://www.sciencedirect.com/science/article/pii/S0959652620329061

[36] M. Cardenas, B. Schivinski, L. Brennan, Circular practices in the hospitality sector regarding food waste. j clean prod [internet (2024), sep 25 [cited 2025 Sep 17];472:143452. Available from:, https://www.sciencedirect.com/science/article/pii/S0959652624029019

[37] Z. Elkhwesky, I. Salem, M. Varmus, H. Ramkissoon, Sustainable practices in hospitality pre and amid COVID-19 pandemic: Looking back for moving forward post-COVID-19, Vol. 30 (Sustainable Development. John Wiley and Sons Ltd, 2022)