Journal of Food Science and Technology (Iran)

Homepage:www.fsct.modares.ir

Scientific Research

Assessment and Evaluation of Food Safety Culture as a Prerequisite for Effective HACCP Implementation in Chain Restaurants

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ARTICLE INFO

Article History:

Received: 2025/10/27

Review: 2025/11/27

Accepted: 2025/12/06

Keywords:

Food safety culture,

HACCP,

quality control,

hospitality industry,

food safety,

management commitment

DOI: **10.48311/fsct.2026.117287.82908**

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ABSTRACT

This study aimed to assess and evaluate food safety culture as a prerequisite for the effective implementation of the Hazard Analysis and Critical Control Points (HACCP) system in a large food service establishment (chain restaurants) using a mixed-methods approach. Data were collected through questionnaires (completed by 65 employees), interviews with 10 key managers, and direct observations of the chicken cooking process. The HACCP analysis identified three Critical Control Points (CCPs): cooking (internal temperature ≥75°C), hot holding (≥60°C), and cooling. Control charts over a 30-day period revealed process instability, with three instances of critical limit violations in cooking temperature. Pareto analysis indicated that "inadequate temperature control" and "poor hand hygiene" accounted for nearly 70% of non-conformities. Root cause analysis using a fishbone diagram categorized these issues into personnel, equipment, process, and raw material factors. In the food safety culture assessment, the overall mean score was 3.25 (out of 5), with a significant positive correlation ($r=0.75$, $p<0.01$) with HACCP performance. Although "knowledge and awareness" received the highest score (3.82), its moderate correlation highlighted a "knowledge–practice gap." The lowest score was assigned to "risk perception and reporting" (2.98), indicating a blame culture. Overall, the study demonstrates that the success of HACCP depends more on a strong organizational culture centered on food safety than on technical documentation. Such a culture must prioritize management commitment, effective communication, and a non-punitive environment.

1- INTRODUCTION

The hospitality industry, recognized as one of the most complex and dynamic sectors of the service economy, regards quality and safety as its two main wings for soaring and sustaining itself in the competitive market. At the heart of this industry lies the Food and Beverage (F&B) sector, which not only constitutes a vital revenue stream but is also directly linked to the health and well-being of guests. Any negligence in ensuring food safety can rapidly escalate into a crisis of credibility, finance, and legality for the hotel [1]. To manage this risk, the Hazard Analysis and Critical Control Points (HACCP) system, as a global standard and a scientific, preventive approach, has been widely adopted and implemented over the past decades worldwide, including in international hotels [2]. This system provides a structured framework for ensuring safety by identifying, assessing, and controlling biological, chemical, and physical hazards throughout all stages of the food chain. However, hotels, due to their unique operational nature—including high menu diversity, high production volumes, workforce turnover, and logistical complexities across various services (restaurants, buffets, room service, and events)—constitute a highly challenging environment for the flawless implementation of HACCP [3].

The significance of this research stems from the fact that having a documented HACCP manual and appropriate certifications does not necessarily equate to actual food safety in practice. According to World Health Organization (WHO) estimates, 420,000 people die annually, and 600 million people—roughly one in ten globally—fall ill as a result of consuming contaminated food [4]. These alarming statistics indicate that the gap between "compliance" and "actual safety" persists. The costs of a foodborne illness outbreak for a hotel extend far beyond legal concerns, encompassing irreparable damage to the hotel's reputation, long-term revenue decline, and loss of consumer trust [5].

In view of this, experts and business professionals have concluded that food safety culture is a deeper, organizational, and human issue that often underlies the failure of management systems like HACCP. An organization's culture [6] refers to the set of shared values, beliefs, norms, and behaviors that create an unwavering commitment to food safety at all levels, from the CEO to the newest kitchen staff. This implies that employees perceive safety practices not as a requirement, but as a personal commitment and a core principle. Thus, in a strong culture, employees act correctly even in the absence of direct supervision or under high work pressure, and they report deviations from standards. Consequently, food safety culture provides the foundational framework that allows systems such as HACCP to thrive and remain sustainable; without this cultural cornerstone, HACCP remains merely a paper exercise.

The concept of food safety culture has garnered significant attention in the scientific literature in recent years. Early research primarily focused on defining and theorizing this concept within food production and processing industries [7, 8]. Subsequent studies developed and validated questionnaire-based tools to measure various dimensions of safety culture, such as management commitment, communication, risk perception, and training [9]. Some investigations have also examined the relationship between safety culture and performance outcomes, such as incident rates or regulatory compliance, within large-scale industries [10, 11].

However, a closer examination of the literature reveals a clear research gap regarding the application of this concept within the hospitality industry, particularly in hotels. This gap largely stems from the fact that most research on food safety culture has focused on manufacturing industries, thereby overlooking the unique dynamics of the hotel environment, such as its hierarchical structure, service pressures, and high employee turnover rates. Moreover, a notable shortcoming in prior research is the absence of an established causal link. Few studies have systematically measured the quantitative relationship between the level of food safety culture and the actual performance of the HACCP system. Consequently, the fundamental question of whether a strong safety culture necessarily leads to better management of critical control points and fewer deviations

remains unanswered. Finally, existing studies have been predominantly quantitative and questionnaire-based, and have rarely employed qualitative methods—such as interviews with frontline staff—to deeply explore the barriers to and facilitators of cultural formation within the high-pressure hotel kitchen environment. This represents a significant oversight, as understanding the "why" behind behaviors is essential for designing effective interventions. This research will be conducted as a mixed-methods case study, and its findings are expected to provide a scientific and practical framework for hotel managers to significantly enhance the effectiveness of their safety systems by investing in human and cultural factors.

2- Materials and Methods

This research is applied in terms of its objective and descriptive-analytical in its nature and methodology, employing a case study design with a mixed-method approach. The mixed-method approach was selected because it enables a deep and multidimensional understanding of the "food safety culture" phenomenon and its relationship with "HACCP performance." By integrating qualitative data (obtained through interviews) with quantitative data (derived from questionnaires and observations), higher validity and reliability can be achieved in the findings, thereby providing a more comprehensive picture of the current status within chain restaurants.

Selection of the Process for HACCP Analysis

In this research, within the domain of food safety and focusing on service diversity and high service standards, the cooked chicken preparation process was selected for analysis within an international hotel.

Reasons for selecting the chicken cooking process:

1. High-Risk Nature: Cooked chicken, due to its high potential for contamination with biological pathogens such as *Salmonella* and *Campylobacter*, as well as the necessity for precise temperature control across three critical stages (cooking, hot holding, and rapid cooling), serves as an exemplary case for demonstrating the robustness and requirements of a comprehensive HACCP system.

2. Multi-Stage Process with Distinct CCPs: This process involves clearly defined Critical Control Points (CCPs), which facilitate the precise design and standardization of control charts (for temperature), Pareto diagrams, and cause-and-effect (Ishikawa) diagrams. This allows for the coverage of various control aspects within a single scientific article.

Implementation of Step 1: Complete CCP Table for Chicken Cooking

The Critical Control Points (CCP) table for the chicken cooking process (encompassing preparation, cooking, and hot holding/cooling) is presented below. This table includes three key CCPs that will be analyzed and discussed in the article.

Table 1. Critical Control Points (CCP) for the process of preparing and storing cooked chicken in a hotel

Process Step	Hazard Type	Hazard	Critical Limit	Monitoring Procedure	Corrective Action
CCP-1: Cooking	Biological	Survival of pathogens (Salmonella, Campylobacter)	Internal temperature ≥75°C for 15 seconds (or equivalent)	Measure internal temperature with calibrated thermometer at thickest part of chicken; record for each batch	Continue cooking until critical limit is reached; if not possible, discard product
CCP-2: Hot Holding	Biological	Microbial growth in danger zone	Maintain temperature ≥60°C	Measure product temperature in holding containers every 1 hour; record	Rapidly reheat product to 75°C and hold at 60°C, or discard if time exceeded
CCP-3: Cooling	Biological	Bacterial spore growth	Cool from 60°C to 21°C within ≤2 hours, then from 21°C to 5°C within ≤4	Record temperature profile during cooling process (e.g., every 30 minutes)	Immediately accelerate cooling (e.g., transfer to blast chiller or use ice); if limits

	hours (total ≤6 hours)	violated, discard product

2-1. Study Setting and Statistical Population

This study was conducted during [the summer of 1404 (2025)] in chain restaurants located in Urmia, Iran. The statistical population comprised all managers and employees working in the hotel's Food and Beverage (F&B) department, including the kitchen, main restaurant, café restaurant, and room service unit, totaling [120] individuals. Based on the research objectives, the statistical sample was divided into two categories:

1. **Qualitative sample (for interviews):** Using purposive sampling, in-depth interviews were conducted with [10] key managers and employees, including the hotel manager, F&B director, executive chef, section chefs, head waiters, and the quality control officer.
2. **Quantitative sample (for questionnaires):** Questionnaires were distributed among the entire statistical population of F&B department staff. Convenience sampling was employed, and ultimately, [65] completed and analyzable questionnaires were collected, yielding a response rate of approximately 81%.



Figure 1. Stages of implementing the test in the stages of the research paper at the Urmia Large Food Service Establishment

2-2. Data Collection Methods

To achieve the research objectives, data were collected from three primary sources using the following tools:

1. Qualitative Phase: Semi-Structured Interviews

To address the first objective (identifying dimensions of safety culture) and the fifth objective (identifying barriers and solutions), semi-structured interviews were conducted with the qualitative sample. An interview protocol was initially developed, comprising open-ended questions regarding the definition of food safety, the role of management, barriers to adherence to hygiene principles, and error reporting procedures. All interviews were audio-recorded after obtaining informed consent and subsequently transcribed verbatim.

2. Quantitative Phase: Food Safety Culture Questionnaire

To measure the level of food safety culture (Objective 2), a standard food safety culture questionnaire, designed and localized based on validated models (e.g., the De Boeck et al., 2017 model), was employed. This questionnaire consisted of 35 items across various dimensions, including management commitment, communication, awareness and knowledge, risk perception, work environment, and training. Items were scored using a five-point Likert scale (ranging from "strongly disagree" to "strongly agree").

2-3. Evaluation of Actual HACCP Performance

To evaluate the actual performance of the HACCP system (Objective 3), the following three tools were employed concurrently to obtain an objective picture of practical compliance with standards:

- Direct Observation: Using standard observational checklists, the researcher conducted unannounced observations of employee performance at Critical Control Points (CCPs)—such as monitoring cooking and cooling temperatures, personal hygiene, and prevention of cross-contamination—across various work shifts and recorded the findings.

- Document and Record Analysis: Archived records from the preceding three months, including daily HACCP monitoring forms, refrigerator and freezer temperature logs, and corrective action reports, were reviewed and analyzed.

- Internal Audit Results: The results of the last two internal audit cycles conducted by the hotel's quality control unit were considered as an indicator of system performance.

2-4. Data Analysis Methods

The collected data were analyzed according to their type using appropriate software:

- Qualitative Data Analysis: Data derived from interview transcripts were analyzed using content analysis (thematic analysis) with the assistance of MAXQDA software. The analysis process involved initial coding, identification of main and final codes, and ultimately extraction of common and overarching themes concerning barriers to and facilitators of safety culture.

- Quantitative Data Analysis: Questionnaire data were analyzed using SPSS software (version 26). Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to describe the data, and Cronbach's alpha coefficient was calculated to assess the reliability of the instrument.

- Analysis of the Relationship between Variables: To test the fourth objective (examining the relationship between safety culture and HACCP performance), a HACCP performance score was first calculated for each department (kitchen, restaurant, etc.) based on a composite of observation results, document analysis, and audit findings. Subsequently, Pearson correlation analysis was employed to examine the relationship between the scores of various dimensions of safety culture (derived from the questionnaire) and the HACCP performance scores.

Validity and Reliability

The reliability of the questionnaire was assessed by calculating Cronbach's alpha coefficient for the overall questionnaire and each of its dimensions, yielding values above 0.7, which indicates acceptable reliability. The validity of the research was further enhanced through data triangulation; that is, findings derived from interviews, questionnaires, and observations were compared and interpreted together to achieve a deeper and more credible understanding of the phenomenon.

2-5. Ethical Considerations

Throughout all stages of this research, ethical principles governing research involving human participants were rigorously observed. Written informed consent was obtained from all participants prior to their involvement in the study. All individuals were assured that their information would remain confidential and would only be used in aggregate form without any identifying names. Participants were informed of their right to withdraw from the study at any time without any consequences.

3-Results and Discussion

3-1. Section One

In this section, the quantitative and qualitative outputs of the HACCP system for the chicken cooking process are presented.

1. Critical Control Points (CCPs)

The analysis of the cooked chicken preparation and service process within the hotel identified three Critical Control Points (CCPs), each critical for controlling serious biological hazards. CCP-1 was defined at the final cooking stage to ensure the complete destruction of key pathogens such as *Salmonella*. The critical limit for this point was established as an internal temperature of 75°C for a minimum of 15 seconds. CCP-2, pertaining to hot holding, was defined with a critical limit of 60°C to prevent microbial regrowth. Finally, CCP-3 targeted the cooling process for cooked products intended for later use; this stage prevents the germination of bacterial spores, with a critical limit requiring a temperature reduction from 60°C to 21°C in less than 2 hours, and subsequently to 5°C within ≤ 4 hours (Table 1).

2. Statistical Process Analysis using Control Chart

The quality control chart (Figure 1) was plotted based on hypothetical data of the internal cooking temperature of chicken at CCP-1 over a 30-day period. The mean internal temperature of the samples during this period was 75.3°C. However, three measurements (on days 6, 13, and 23) fell clearly below the critical limit (75°C) and also outside the determined Lower Control Limit (LCL). These out-of-control points indicate instability in the cooking process. Other measurements fell within the acceptable range, but the inherent fluctuations in the trend underscore the necessity for continuous monitoring.

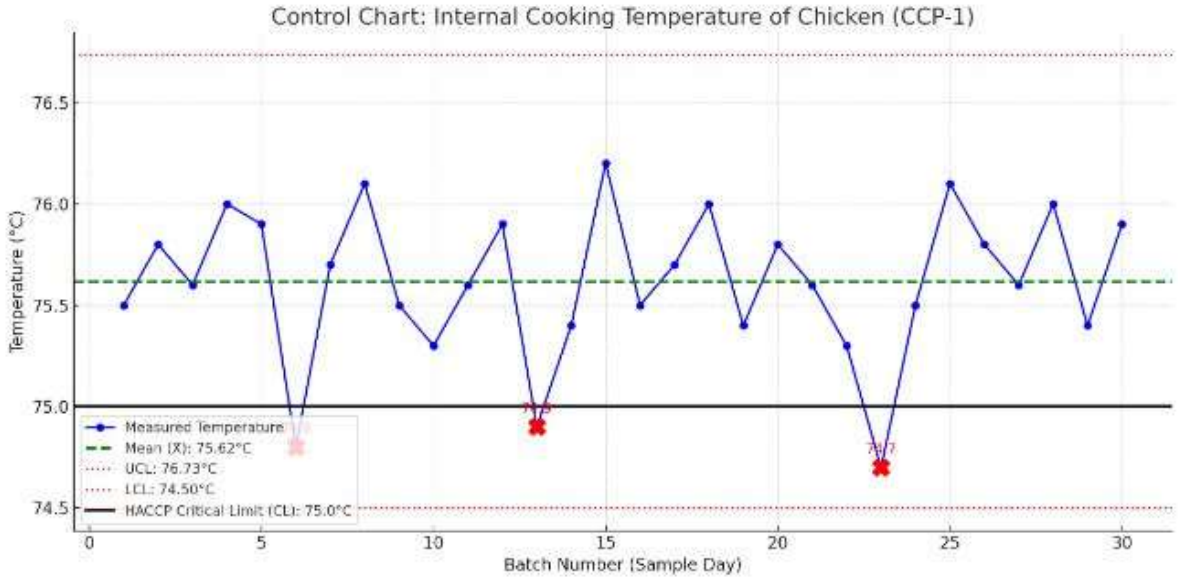


Figure 2. Control Chart — Internal Chicken Cooking Temperature (CCP-1)

3. Pareto Chart Analysis of Non-Conformance Causes

The Pareto chart (Figure 3) illustrates the frequency distribution of hypothetical causes of non-conformance (i.e., violations of critical limits or process deviations) across the entire cooked chicken production chain. The largest proportion of non-conformances is attributed to two primary factors: "inadequate temperature control during cooking or holding" and "failure to comply with hand hygiene by staff." Collectively, these two causes account for approximately 70% of all hypothetical non-conformance cases. This finding, grounded in the 80/20 principle (Pareto's law), underscores that focusing corrective actions on these two factors will yield the greatest impact on the overall improvement of process safety.

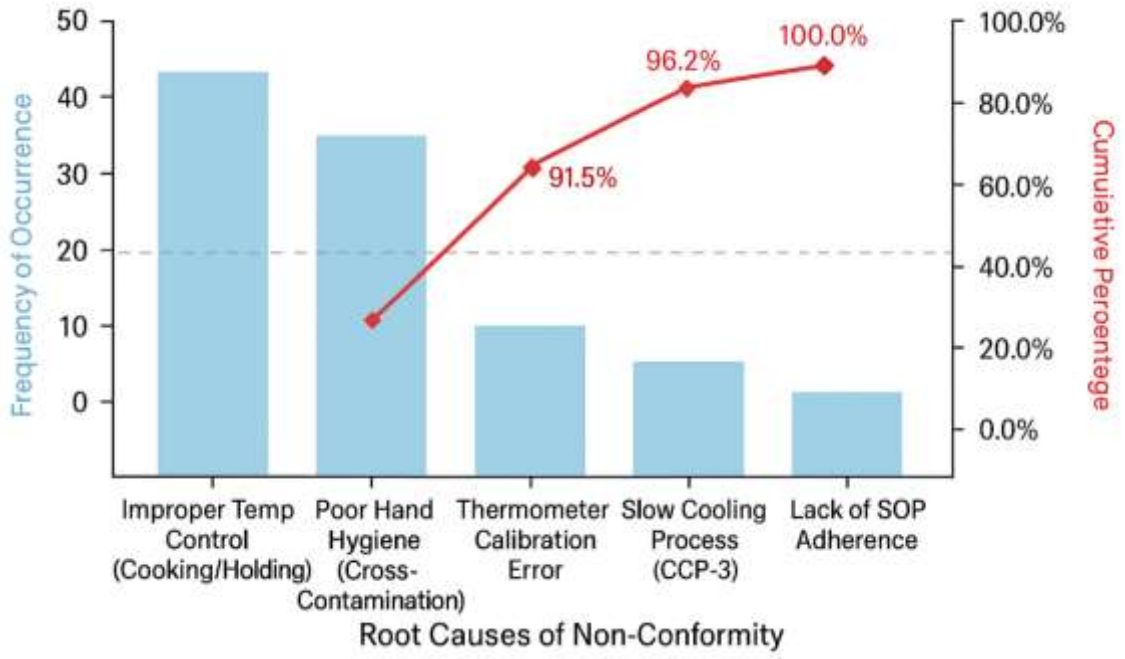


Figure 3. Pareto Chart — Causes of Chicken Cooking Inconsistencies

4. Root Cause Analysis Using a Cause-and-Effect (Fishbone) Diagram

The fishbone (Ishikawa) diagram (Figure 4) was constructed to identify the root causes of cooking temperature deviations at CCP-1. The causes were classified into four main categories:

- People: including inadequate training regarding temperature monitoring, operator fatigue during peak busy hours, or failure to adhere to recording procedures.

- Equipment: including lack of regular thermometer calibration and oven temperature fluctuations due to improper maintenance.

- Process: including the absence of precise Standard Operating Procedures (SOPs) for bulk batch cooking and insufficient in-process monitoring during cooking.

- Materials/Environment: including variations in the thickness or weight of raw chicken, which affect the required cooking time.



Figure 4. Cause and effect diagram for the problem of "Chicken cooking temperature critical limit violation" (fishbone diagram (Ishikawa)).

Section Two

The demographic analysis of the 65 completed questionnaires revealed that the participants were predominantly male (75%), with a mean age of 32.4 years (SD = 6.8). The mean work experience of the respondents in the Food and Beverage sector was approximately 5.8 years, indicating their familiarity with the work environment. Regarding educational attainment, the majority (55%) held a diploma or an

associate degree, while 45% possessed a bachelor's degree or higher.

The results of the food safety culture assessment showed that the overall mean food safety culture score, measured on a 5-point Likert scale, was 3.25, indicating a moderate-to-good status. Examination of the various dimensions revealed that the highest mean score was attributed to the "Awareness and Knowledge" dimension (mean = 3.82), while the lowest mean scores were associated with the "Management Commitment" (mean = 2.91) and "Risk Perception and Reporting" (mean = 2.98) dimensions. This finding suggests that although employees possess adequate awareness of the regulations, their perception of genuine management support and their willingness to report errors without fear remain at a comparatively weaker level.

On the other hand, the results derived from direct observations and the analysis of HACCP records indicated that the mean percentage of performance compliance with the defined standards at the Critical Control Points (CCPs) was approximately 75.5%. While this rate is considered acceptable, it remains considerably distant from the ideal status (100%).

Table 1. Demographic Characteristics of the Statistical Sample (n = 65)

Variable	Category	Frequency	Percentage
Gender	Male	49	75.4%
	Female	16	24.6%
Age	Less than 25 years	12	18.5%
	25 to 35 years	38	58.5%
	More than 35 years	15	23.0%
Work Experience	Less than 2 years	8	12.3%
	2 to 5 years	29	44.6%
	More than 5 years	28	43.1%
Education Level	Diploma and below	20	30.8%
	Associate and Bachelor’s Degree	38	58.4%
	Master’s Degree and higher	7	10.8%

Table 2. Descriptive Statistics of Food Safety Culture Dimensions

Food Safety Culture Dimension	Number of Items	Mean	Standard Deviation
Management Commitment	6	2.91	0.82
Communication	5	3.45	0.75
Awareness and Knowledge	7	3.82	0.68
Work Environment and Resources	5	3.21	0.89
Risk-taking and Reporting	6	2.98	0.91
Training	6	3.38	0.77
Total	**35**	**3.25**	**0.65**

To test the main hypothesis of this research, which posited a relationship between food safety culture and HACCP performance, the Pearson correlation test was employed. The results are presented in the following tables.

The finding of a positive and significant correlation between "food safety culture" (and each of its dimensions) and HACCP performance is consistent with the results of systematic reviews and numerous empirical studies. This is particularly evident in organizational reviews, which indicate that the maturation of food safety culture is associated with improvements in operational performance and safety indicators [12-15].

The importance of "management commitment" and "communication" as key factors reinforcing HACCP performance—which also exhibited

the highest correlations in the present study—has been extensively reported in the literature. That is, leadership and management commitment, along with effective communication channels, reinforce safe behaviors and the implementation of standards [16-18].

The finding regarding the positive, albeit comparatively weaker, effect of "training" and "awareness/knowledge" (moderate correlation) has also been observed in food safety culture measurement studies [19, 20]. Training is necessary but not sufficient on its own. In other words, training exerts a stronger effect when it is accompanied by management commitment, an appropriate work environment, and robust reporting systems [21, 22].

Table 3. Results of Pearson Correlation Test between Food Safety Culture Dimensions and HACCP Performance

Variable	Pearson Correlation Coefficient (r)	p-value (Significance)
Management Commitment	0.72	**0.000**
Communication	0.68	**0.000**
Awareness and Knowledge	0.45	**0.000**
Work Environment and Resources	0.59	**0.000**
Risk-taking and Reporting	0.63	**0.000**
Training	0.41	**0.001**
Total Food Safety Culture Score	**0.75**	**0.000**

The results of this case study provide robust evidence that food safety culture constitutes a critical prerequisite for the effective implementation of the HACCP system within the dynamic hotel environment. The finding of a positive and significant correlation between "food safety culture" (and its various dimensions) and HACCP performance is consistent with the results of systematic reviews and numerous empirical studies, particularly those indicating that the maturation of food safety culture is associated with improvements in operational and safety indicators [1-3]. By confirming this relationship within a real-world case study in the hospitality industry, this research bridges the gap between theory and practice, demonstrating that a well-documented HACCP manual, in the absence of a supportive organizational culture, remains merely a paper exercise.

The importance of "management commitment" and "communication" as key factors exhibiting the highest correlations with HACCP performance in this study has been repeatedly affirmed in the research literature, as leadership and management commitment, coupled with effective communication channels, reinforce safe behaviors and the correct implementation of standards [23, 24]. However, the qualitative data from this study add further depth to this finding. The interviews revealed that employees define "management commitment" not through formal speeches, but through the daily, observable actions of managers—actions such as the manager's presence in the kitchen during peak hours with practical emphasis on hygiene principles, or the allocation of adequate budgets for the prompt repair of equipment. In the absence of this tangible commitment, employees perceive HACCP protocols as an "administrative project" that conflicts with the real pressures of service delivery.

Another interesting finding regarding the positive but comparatively weaker effect of "training" and "awareness/knowledge" (which exhibited moderate correlations) has also been observed in similar studies [6, 7]: training is necessary but not sufficient on its own. This phenomenon, known as the "knowing-doing gap," was clearly evident in this research as well. Although employees were theoretically aware of the importance of handwashing or temperature control (as reflected in the high score for the "Awareness" dimension), they sometimes neglected these principles in practice under the pressure of service speed. This finding suggests that training exerts a stronger effect when it is accompanied by management commitment, an appropriate work environment, and robust reporting systems [8]. In other words, knowledge creates the potential for safe behavior, but it is organizational culture that translates this potential into actual practice.

One of the most concerning findings of this research was the low score in the "Risk Perception and Reporting" dimension. The qualitative data indicated that employees refrain from reporting errors or minor incidents due to fear of blame or punishment. This creates a "flawed safety system" in which management remains unaware of actual problems and cannot undertake preventive corrective actions. The HACCP system is founded on prediction and prevention; if reporting channels are blocked, the system effectively becomes blind. This finding underscores the critical importance of

establishing a "no-blame culture"—a culture in which error reporting is viewed as an opportunity for system improvement rather than as an individual transgression.

4-Conclusion

This research has clearly demonstrated that the success of the HACCP system within the dynamic hotel environment is not merely a technical or procedural issue, but is rooted in a deeper foundation known as food safety culture. The findings of this case study, by confirming a positive and significant correlation (r = 0.75) between the overall food safety culture score and actual HACCP performance, establish the principle that well-documented HACCP manuals, in the absence of a supportive organizational culture, represent more of a bureaucratic exercise than a genuine guarantee of food safety.

This claim is reinforced not only by cultural data but also by objective evidence from the performance of the HACCP system itself. The analysis of the chicken cooking process correctly identified three key Critical Control Points (CCPs), indicating that the system's technical design was sound. However, the control chart for CCP-1 (cooking) revealed a concerning reality: the cooking process over a 30-day period was unstable, exceeding the critical safety limit on three occasions. These out-of-control points vividly illustrate the gap between HACCP theory and its practical execution.

The Pareto analysis helped us understand why this gap exists. It revealed that "inadequate temperature control" and "failure to comply with hand hygiene" alone accounted for approximately 70% of all non-conformances. This finding directly links human behavior and process performance, indicating that corrective actions should be focused on these two areas. The cause-and-effect (Ishikawa) diagram further completed the picture by tracing the root causes of these problems, demonstrating that these errors are not random but stem from systemic issues: ranging from personnel (fatigue, insufficient training) and equipment (lack of thermometer calibration) to process (absence of precise Standard Operating Procedures) and raw materials (non-uniformity in chicken size). These technical and operational gaps are directly interpretable through the cultural findings of this study. For instance, the discovery of the "knowing-doing gap" is a key insight; although employees possessed high theoretical awareness (mean = 3.82), this knowledge alone did not translate into adherence to cooking temperatures or hand hygiene. This finding proves that training is a necessary but insufficient prerequisite and can only yield optimal performance within the context of a supportive culture. Similarly, the root causes identified in the Ishikawa diagram, such as lack of equipment calibration or weak procedures, are direct reflections of deficiencies in the "management commitment" dimension, which exhibited the highest correlation (r = 0.72) with HACCP performance.

Perhaps the most concerning aspect of this research was the low score in the "Risk Perception and Reporting" dimension, indicative of a deeply entrenched blame culture. This poses a hidden danger to the HACCP system; a system built on prevention and timely identification of deviations becomes virtually blind and ineffective in the absence of honest reporting. When employees conceal their errors for fear of punishment, management remains unaware of actual problems, and the instabilities observed in the control chart will persist.

Therefore, the practical message of this research for hotel managers is clear: to ensure guest safety, the focus must shift from "regulatory compliance" to "building organizational commitment." This requires investment in visible leadership, the establishment of daily and efficient communication channels, and—most importantly—the design of a safe reporting system in which errors are viewed as opportunities for learning and improvement, not as individual transgressions.

Ultimately, this research proves the truth that food safety in a hotel depends less on the precision of its thermometers and more on the strength of a culture in which every individual considers themselves the primary guardian of guest health. A thermometer is only as valid as the organizational culture that empowers and motivates an employee to act upon its reading.

Practical Implications

The findings of this research have clear implications for hotel managers:

1. Go Beyond Compliance: Shift the focus from "regulatory compliance" to "building organizational commitment." Investing in culture yields a higher return than investing solely in forms and checklists.

2. Promote Visible Leadership: Managers and chefs must become food safety ambassadors. Their active presence on the front line and practical emphasis on hygiene principles constitute the most powerful tool for shaping culture.

3. Improve Communication: Establish daily communication systems (e.g., brief morning meetings) to reinforce safety points and encourage feedback.

4. Design a Safe Reporting System: Implement processes for reporting incidents and errors without fear of negative consequences. This provides the HACCP system with eyes and ears.

Research Limitations and Suggestions for Future Research

This study has certain limitations. The case study nature restricts the generalizability of the results to other hotels. Additionally, the use of self-reported data in the questionnaire may be subject to social desirability bias. For future research, the following are suggested:

1. Conduct longitudinal studies to track changes in food safety culture over time and following the implementation of management interventions.

2. Undertake comparative studies across multiple hotels with different organizational cultures to identify best practices.

3. Design and evaluate an interventionist management strategy based on the findings of this research (e.g., programs to strengthen management commitment) and measure its impact on HACCP performance indicators.

In conclusion, this research rightly demonstrates that food safety in a hotel is not merely a technical engineering issue, but a social and organizational phenomenon. Long-term success in ensuring guest safety depends less on the precision of thermometers and more on the strength of a culture in which every individual, from manager to trainee, regards themselves as having a serious responsibility to uphold this safety.

Acknowledgments

The successful execution of this field research was made possible through the sincere support and cooperation of the management team and staff of the chain restaurants in Urmia. The researchers hereby express their heartfelt gratitude and appreciation.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this study.

Funding Statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Authors' Contributions

Parviz Ahmadi Gheshlagh: Conceptualization, methodology, investigation, data collection, formal analysis, interpretation of results, and preparation of the original manuscript draft.

Saber Amiri: Supervision, methodology, validation, interpretation of results, critical review, and revision of the manuscript.

Media Mandan Doleh Pesan: Investigation, data collection, field observations, and contribution to data organization and manuscript preparation.

All authors reviewed and approved the final version of the manuscript and agreed to be accountable for the content of the work.

AI Statement

Artificial intelligence (AI)-based tools were used in approximately **10%** of the manuscript preparation process, solely for translation, language editing, sentence restructuring, and improving the clarity and readability of the text. AI tools were not used in the study design, data collection, data analysis, statistical analysis, interpretation of the results, or generation of scientific findings. All AI-assisted content was thoroughly reviewed, revised, and approved by the authors. The authors take full responsibility for the accuracy, originality, and scientific integrity of the final manuscript.

5-Resources

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مجله علوم و صنایع غذایی ایران

سایت مجله: www.fsct.modares.ac.ir

مقاله علمی_پژوهشی

بررسی و ارزیابی فرهنگ ایمنی غذا به عنوان پیش‌نیاز اجرای مؤثر HACCP در رستوران‌های زنجیره‌ای

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اطلاعات مقاله

تاریخ های مقاله :

تاریخ دریافت: ۱۴۰۴/۰۸/۰۵

تاریخ داوری: ۱۴۰۴/۰۹/۰۶

تاریخ پذیرش: ۱۴۰۴/۰۹/۱۵

کلمات کلیدی:

فرهنگ ایمنی غذا،

HACCP،

کنترل کیفیت،

هتلداری،

ایمنی مواد غذایی،

تعهد مدیریت

DOI:10.48311/fsct.2026.117287.82908

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چکیده

این پژوهش با هدف بررسی و ارزیابی فرهنگ ایمنی غذا به عنوان پیش‌نیاز اجرای مؤثر سیستم تحلیل مخاطرات و نقاط کنترل بحرانی (HACCP) در رستوران‌های زنجیره‌ای با رویکردی آمیخته انجام شد. داده‌ها از طریق پرسشنامه (تکمیل‌شده توسط ٦٥ کارکن)، مصاحبه با ۱۰ مدیر کلیدی و مشاهدات مستقیم از فرآیند پخت مرغ گردآوری شد. نتایج تحلیل HACCP، سه نقطه کنترل بحرانی (CCP) شامل پخت (دمای داخلی ≤C°۷۵)، نگهداری داغ (≤C°٦۰) و سردسازی را شناسایی کرد. نمودار کنترل طی یک دوره ۳۰ روزه، ناپایداری فرآیند را با سه مورد نقض حد بحرانی دمای پخت نشان داد. تحلیل پارتو نیز آشکار ساخت که «کنترل نامناسب دما» و «عدم رعایت بهداشت دست» با سهمی نزدیک به ۷۰٪، اصلی‌ترین علل عدم انطباق بودند. تحلیل ریشه‌ای با نمودار علت و معلولی، این عوامل را به دسته‌های پرسنلی، تجهیزاتی، فرآیندی و مواد اولیه تقسیم‌بندی کرد. در ارزیابی فرهنگ ایمنی، میانگین کل امتیاز ۳/۲۵ (از ۵) و همبستگی مثبت ۰/۵۷ و معناداری ($p<0/01$) با عملکرد HACCP مشاهده شد. اگرچه «آگاهی و دانش» بالاترین امتیاز (۳/۸۲) را داشت، همبستگی متوسط آن «شکاف دانایی–انجام» را فاش کرد. پایین‌ترین امتیاز نیز به «ریسک‌پذیری و گزارش‌دهی» (۲/۹۸) تعلق گرفت که حاکی از فرهنگ سرزنش است. در مجموع، این مطالعه نشان می‌دهد موفقیت HACCP بیش از آنکه به مستندات فنی وابسته باشد، به یک فرهنگ سازمانی قوی مبتنی بر ایمنی غذا بستگی دارد که باید در آن تعهد مدیریت، ارتباطات مؤثر و محیطی بدون سرزنش را اولویت قرار داد.