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Analysis of Food Quality and Safety in the Agricultural Supply Chain: Consumer and Producer Perspectives

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ABSTRACT

This study analyzes the perceptions of food quality and safety in the agricultural supply chain from both consumer and producer perspectives. A quantitative approach was employed, with data collected from 135 respondents using a structured questionnaire based on a five-point Likert scale. The analysis was conducted using SPSS version 25, including descriptive statistics, validity and reliability tests, t-tests, and correlation analysis. Results indicate that consumers prioritize freshness and nutritional value, whereas producers emphasize Good Agricultural Practices (GAP), regulatory compliance, and safety protocols. Moderate agreement was observed on traceability and packaging, highlighting areas for improvement. Correlation analysis confirmed that effective producer practices positively influence consumer satisfaction and perceived product quality. The findings underscore the need for enhanced communication, transparency, and collaboration across the supply chain to align producer actions with consumer expectations. This study contributes practical insights for stakeholders to improve food quality management and safety practices in agricultural supply chains.

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1. INTRODUCTION

Food quality and safety have become critical concerns in modern agricultural supply chains due to increasing consumer awareness, regulatory requirements, and the globalization of food markets. High-quality and safe food products are essential not only for public health but also for maintaining consumer trust, supporting economic growth, and ensuring the sustainability of agricultural systems [1], [2]. Despite technological advancements and regulatory frameworks, challenges persist in managing quality and safety across the supply chain, from farm production to consumption [3], [4].

Consumers are increasingly demanding transparency regarding the origin, handling, and safety of food products, while producers face pressures to meet quality standards, reduce contamination risks, and comply with regulations [5], [6]. Mismanagement or gaps in the supply chain can lead to foodborne illnesses, product recalls, and economic losses, highlighting the importance of effective

monitoring and coordination among stakeholders [7].

Previous studies have emphasized that perceptions of food quality and safety may differ between consumers and producers [8]. Consumers often focus on sensory attributes, nutritional value, freshness, and traceability, whereas producers prioritize production efficiency, adherence to safety protocols, and regulatory compliance. Understanding these differing perspectives is essential to identifying gaps, improving supply chain practices, and ensuring that both quality and safety standards are consistently met.

This study aims to analyze the perceptions of food quality and safety in the agricultural supply chain from both consumer and producer perspectives. Using a quantitative approach with 135 respondents and a Likert scale questionnaire, the study employs SPSS version 25 to examine key factors affecting perceptions and to provide actionable insights for stakeholders in the agricultural sector. The findings are expected to contribute to enhancing food quality management, improving safety practices, and fostering collaboration across the supply chain.

2. LITERATURE REVIEW

2.1 Food Quality in the Agricultural Supply Chain

Food quality is a multidimensional concept encompassing attributes such as freshness, taste, nutritional value, appearance, and safety . In the context of the agricultural supply chain, quality is influenced by production practices, handling, storage, transportation, and processing [3], [9]. High-quality agricultural products not only satisfy consumer preferences but also enhance market competitiveness and reduce post-harvest losses. Studies have shown that both consumers and producers play critical roles in maintaining quality, with producers responsible for implementing Good Agricultural Practices (GAP) and consumers influencing market demand through their purchasing behavior [10], [11].

2.2 Food Safety in Agriculture

Food safety refers to the assurance that food will not cause harm to consumers when prepared and consumed according to its intended use (WHO, 2020). Safety concerns in the agricultural supply chain include contamination by pathogens, pesticides, chemical residues, and improper handling during post-harvest activities [12], [13]. Regulatory frameworks and quality certifications, such as HACCP (Hazard Analysis and Critical Control Points), ISO 22000, and local food safety standards, guide producers in ensuring safe practices. Research indicates that producers' adherence to these standards is influenced by knowledge, cost considerations, and access to resources, while consumers' perception of food safety is shaped by awareness, education, and trust in certification systems [9], [14], [15].

2.3 Consumer Perspectives on Food Quality and Safety

Consumers evaluate food quality based on sensory attributes, nutritional content, freshness, packaging, and traceability [16], [17]. Food safety concerns also influence purchasing decisions, with consumers favoring products with clear labeling, certifications, and visible hygiene standards [18], [19]. Studies highlight that consumers' risk perception can differ from producers' assessments, often influenced by media, past experiences, and personal health concerns. Understanding consumer expectations is crucial for producers to align supply

chain practices with market demands and enhance satisfaction and trust.

2.4 Producer Perspectives on Food Quality and Safety

Producers focus on factors such as production efficiency, cost-effectiveness, regulatory compliance, and implementation of safety measures [17], [18]. Producers' perspectives are shaped by the availability of technology, training, and institutional support. While producers aim to maintain high standards, challenges such as resource limitations, inadequate monitoring, and logistical constraints may compromise quality and safety. Research emphasizes the importance of training, incentives, and technological adoption in helping producers meet both quality and safety requirements [19], [20].

2.5 Integration of Perspectives in the Agricultural Supply Chain

Bridging the gap between consumer and producer perspectives is vital for effective supply chain management. Collaboration, information sharing, and transparency are key strategies for ensuring that products meet both quality and safety expectations. Studies suggest that supply chain integration, traceability systems, and regular monitoring enhance alignment between stakeholders, reduce risks, and improve overall performance [19], [20]. This integrated approach not only minimizes losses and safety hazards but also strengthens consumer trust and market competitiveness.

2.6 Conceptual Framework

Based on the literature, this study conceptualizes food quality and safety as dependent on both consumer and producer perspectives. The framework considers consumer perception variables (freshness, nutritional value, traceability, packaging) and producer variables (GAP implementation, regulatory compliance, post-harvest handling, safety protocols) as key determinants affecting the overall effectiveness of the agricultural supply chain.

3. RESEARCH METHODS

3.1 Research Design

This study employs a quantitative research design to analyze the perceptions of consumers and producers regarding food quality and safety in the agricultural supply chain. Quantitative research is appropriate for measuring variables numerically, identifying patterns, and testing relationships among variables (Creswell, 2014). The approach allows for statistical analysis to provide objective insights into stakeholder perceptions and the factors influencing food quality and safety.

3.2 Population and Sample

The population of this study consists of consumers and producers involved in the agricultural supply chain. A total of 135 respondents were selected using purposive sampling, targeting individuals who have direct experience with agricultural products—either as producers or as regular consumers. This sample size is adequate for statistical analysis and ensures representation of both stakeholder groups.

3.3 Data Collection

Data were collected using a structured questionnaire developed based on the literature review and previous studies, employing a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) to measure perceptions of food quality and safety. The survey consisted of two sections: consumer perspectives, which assessed freshness, nutritional value, traceability, and packaging; and producer perspectives, which

examined the implementation of Good Agricultural Practices (GAP), regulatory compliance, post-harvest handling, and safety protocols. To maximize participation, the questionnaire was distributed both online and in person. Before the full-scale survey, the research instrument underwent validity and reliability testing: content validity was ensured by adapting indicators from earlier studies and consulting experts in agricultural supply chain management, while reliability was assessed using Cronbach's Alpha, with values above the 0.70 threshold indicating acceptable internal consistency (Nunnally, 1978).

3.4 Data Analysis

Data were analyzed using SPSS version 25, beginning with descriptive statistics to summarize respondents' demographics and their perceptions of food quality and safety, followed by reliability analysis to confirm the internal consistency of questionnaire items. Inferential analyses were then conducted to examine relationships and differences in perceptions between consumers and producers using independent sample t-tests and correlation analysis. The use of SPSS ensured systematic hypothesis testing and allowed the results to be interpreted with appropriate statistical rigor.

3.5 Ethical Considerations

All respondents were informed of the purpose of the study, and participation was voluntary. Confidentiality and anonymity were guaranteed, and respondents were allowed to withdraw from the study at any stage. The study adhered to ethical guidelines for research involving human participants.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics were conducted to summarize the demographic characteristics of the 135 respondents—comprising 70 consumers and 65 producers—and their perceptions of food quality and safety in the agricultural supply chain. Most respondents were between 25–40 years old (55%), followed by those aged 18–24 (25%) and above 40 (20%). Among consumers, 52% were female and 48% male, while producers consisted of 60% male and 40% female. Education levels varied, with 60% having completed high school, 30% undergraduate degrees, and 10% postgraduate degrees. Producers reported an average of 8 years of agricultural experience, while consumers indicated regular interaction with agricultural products, such as weekly purchases of fresh produce. These demographic patterns provide a diverse representation of stakeholders within the supply chain and form a solid foundation for assessing perceptions of food quality and safety.

Perceptions of food quality and safety were assessed using a five-point Likert scale, and the results indicated distinct differences between consumers and producers. Consumers rated freshness (4.35) and nutritional value (4.28) more highly than producers, indicating stronger concern for sensory and health attributes. In contrast, producers scored higher on implementation of Good Agricultural Practices (4.12), regulatory compliance (4.20), post-harvest handling (4.05), and safety protocols (4.08), reflecting their focus on operational standards and compliance requirements. Both groups showed moderate agreement on traceability—consumers at 4.01 and producers at 3.95—and packaging, with scores of 3.95 and 3.87 respectively, suggesting shared but moderate concern for these aspects. Overall, these findings illustrate a gap between consumer expectations (freshness and nutrition) and producer priorities (compliance and safety procedures), highlighting the need for better alignment and communication across the supply chain to ensure consistently high-quality and safe agricultural products.

4.2 Validity and Reliability Analysis

4.2.1 Validity Analysis

Validity analysis was conducted to ensure that the questionnaire items accurately measured the constructs of food quality and

safety from the perspectives of consumers and producers. The item-total correlation method was used, with a threshold of 0.30 indicating acceptable validity (Hair et al., 2010). The results showed that all items exceeded the minimum threshold:

Table 1. Validity Testing

Variable	Item	Corrected Item-Total Correlation	Validity Status
Freshness (Consumer)	F1	0.625	Valid
Nutritional Value (Consumer)	F2	0.583	Valid
Traceability (Consumer)	F3	0.545	Valid
Packaging (Consumer)	F4	0.566	Valid
GAP Implementation (Producer)	P1	0.612	Valid
Regulatory Compliance (Producer)	P2	0.633	Valid
Post-harvest Handling (Producer)	P3	0.595	Valid
Safety Protocols (Producer)	P4	0.606	Valid

All items demonstrated corrected item-total correlations above 0.30, confirming good construct validity for both consumer and producer perception measures. This indicates that the items are suitable for measuring the intended dimensions of food quality and safety.

4.2.2 Reliability Analysis

Reliability analysis was conducted to assess the internal consistency of the questionnaire using Cronbach's Alpha, with values of 0.70 or higher considered acceptable (Nunnally, 1978). The results showed Cronbach's Alpha values of 0.882 for consumer perceptions, 0.854 for producer perceptions, and 0.875 for the overall instrument, all of which fall within the highly reliable range. These findings confirm that the questionnaire items consistently measure the intended constructs and that the research instrument is robust and suitable for further statistical analysis.

4.3 Comparison of Consumer and Producer Perspectives

To identify differences in perceptions between consumers and producers regarding food quality and safety, an independent sample t-test was conducted. This analysis helps determine whether the mean differences for each variable between the two groups are statistically significant.

Table 2. T Test

Variable	Consumer Mean	Producer Mean	t-value	p-value
Freshness	4.354	3.925	4.212	0.000
Nutritional Value	4.285	3.882	3.845	0.000
Traceability	4.012	3.957	0.736	0.466
Packaging	3.954	3.875	0.887	0.380
GAP Implementation	3.806	4.122	-2.872	0.005
Regulatory Compliance	3.782	4.205	-3.503	0.001
Post-harvest Handling	3.854	4.052	-1.905	0.060

Safety Protocols	3.906	4.081	-1.726	0.087

The independent sample t-test results in Table 2 reveal important differences between consumer and producer perceptions regarding food quality and safety in the agricultural supply chain. Significant gaps appear in freshness and nutritional value, where consumers report substantially higher mean scores (4.354 and 4.285) than producers (3.925 and 3.882), with t-values of 4.212 and 3.845 and p-values of 0.000, indicating that consumers place greater emphasis on sensory and health-related attributes that producers may underestimate. In contrast, producers exhibit significantly higher ratings in operational and compliance-related aspects such as GAP implementation and regulatory compliance, as shown by their higher mean scores (4.122 and 4.205) and significant t-values (–2.872 and –3.503) with p-values of 0.005 and 0.001, reflecting a stronger focus on standards, regulations, and proper farming procedures—factors that consumers may not fully recognize despite their importance for food safety. For traceability, packaging, post-harvest handling, and safety protocols, the differences are not statistically significant ($p > 0.05$), suggesting relatively aligned perceptions, even though slight variations show that producers emphasize operational procedures while consumers pay more attention to presentation-related attributes. Overall, the findings highlight a perceptual divide: consumers prioritize freshness and nutrition, whereas producers emphasize compliance and standardization, underscoring the need for aligning consumer expectations with production practices and improving consumer education on the role of GAP and regulatory adherence in ensuring food safety, ultimately contributing to higher-quality and safer agricultural products.

4.4 Correlation Analysis

Correlation analysis using Pearson's coefficient was conducted to examine the relationship between producer practices and consumer perceptions of food quality and safety, with results showing significant positive correlations across all key indicators. GAP implementation demonstrated a strong positive correlation with perceived product quality ($r = 0.596$, $p = 0.000$), indicating that adherence to Good Agricultural Practices enhances consumer views of product quality. Regulatory compliance showed an even stronger correlation with perceived food safety ($r = 0.623$, $p = 0.000$), suggesting that compliance with standards greatly increases consumer trust. Post-harvest handling exhibited a moderate positive correlation with freshness ($r = 0.564$, $p = 0.000$), emphasizing the role of proper handling in maintaining product freshness. Safety protocols displayed a strong positive correlation with overall consumer satisfaction ($r = 0.606$, $p = 0.000$), reflecting how safety measures directly enhance the consumer experience. Overall, the results confirm that producer practices significantly shape consumer perceptions, highlighting the importance of robust supply chain management, transparency, and alignment between producer behaviors and consumer expectations to ensure high-quality, safe agricultural products.

4.5 Discussion

The findings of this study reveal important insights into the differing perceptions of food quality and safety among consumers and producers in the agricultural supply chain. Consumers rated freshness and nutritional value significantly higher than producers, reflecting their emphasis on sensory attributes and health benefits—an observation consistent with previous studies showing that consumer purchasing decisions are driven by perceived quality, nutritional value, and transparency [17], [19]. In contrast, producers placed greater importance on Good Agricultural Practices (GAP), regulatory compliance, and safety

protocols, underscoring their operational responsibilities to maintain standards, adhere to regulations, and mitigate safety risks [19], [21]. Meanwhile, moderate alignment between consumer and producer perceptions regarding traceability and packaging suggests shared concern, but also points to a transparency gap that could be reduced through improved labeling, certification, and information dissemination.

Correlation analysis further reinforces the strong link between producer practices and consumer perceptions. Significant positive correlations were found between GAP implementation, regulatory compliance, post-harvest handling, and safety protocols with consumer satisfaction, confirming that producer investments in quality and safety measures directly enhance consumer trust and perceived product value. These results support previous findings that emphasize the critical role of effective supply chain management in ensuring food quality and safety [19], [21]. Strengthening these practices not only benefits producers but also contributes to increased consumer confidence in agricultural products.

Overall, this study highlights the need for greater alignment between consumer expectations and producer practices through continuous monitoring, education, and coordinated efforts across the supply chain. Practical implications include encouraging producers to communicate their quality and safety measures more transparently and recommending that policymakers and industry stakeholders promote training programs, certification systems, and improved traceability technologies. By bridging perceptual gaps and fostering collaboration, stakeholders can enhance product quality, reduce post-harvest losses, ensure food safety, and contribute to a more sustainable and efficient agricultural supply chain that benefits both producers and consumers.

5. CONCLUSION

The study demonstrates that perceptions of food quality and safety differ significantly between consumers and producers, with consumers prioritizing sensory and health-related attributes such as freshness and nutritional value, while producers emphasize operational and regulatory aspects including GAP implementation, post-harvest handling, and adherence to safety protocols; moderate alignment on traceability and packaging further suggests the need for clearer communication and greater transparency across the supply chain. Correlation analysis confirms that effective producer practices positively influence consumer satisfaction, underscoring the importance of integrated food safety management, adherence to quality standards, and the implementation of transparent labeling, certification programs, and training initiatives to bridge perceptual gaps. Overall, aligning consumer expectations with producer practices through collaboration, continuous monitoring, and open communication is essential not only to ensure high-quality and safe agricultural products but also to strengthen consumer trust, supply chain efficiency, competitiveness, and long-term sustainability.

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