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Culinary Innovation: The Role of Pumpkin-Based Products in Enhancing Menu Diversity and Sensory Satisfaction within the Hospitality Industry

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Abstract—This study investigates the potential of pumpkin (Cucurbita pepo) as a versatile and sustainable ingredient for driving menu innovation in the hospitality sector, with a specific focus on determining its sensory acceptability. Three distinct pumpkin-based dishes, pumpkin soup (A), pumpkin stew (B), and a pumpkin side vegetable (C) were prepared using standardized recipes and culinary methods. A panel of sixty participants, comprising both professional chefs and untrained consumers, evaluated the dishes using a 5-point hedonic scale across four key sensory attributes: appearance, taste, flavour, and texture. The results demonstrated high overall acceptability for all dishes, with pumpkin stew (B) achieving the highest mean score of 4.67, followed by pumpkin soup (A) at 4.29 and the pumpkin side vegetable (C) at 4.17. These findings shows pumpkin's potential to enhance menu diversity and elevate guest satisfaction. The study concludes that the strategic integration of pumpkin into hospitality menus can address the growing demand for nutritious, locally sourced, and innovative food options. Recommendations are provided for hospitality practitioners, households, and future research directions, including exploration into pumpkin-based snacks, beverages, and seed utilization.

Keywords-Pumpkin, Culinary Innovation, Sensory Evaluation, Menu Diversity, Hospitality Industry, Sustainable Gastronomy

I. INTRODUCTION

The contemporary hospitality industry operates within a dynamic and competitive landscape where culinary excellence has become a paramount determinant of guest satisfaction, loyalty, and overall market competitiveness. In an era of discerning consumers who increasingly seek unique, health-conscious, and memorable dining experiences, menu innovation has transitioned from a peripheral activity to a core strategic imperative. This necessitates a continuous exploration of underutilized, nutrient-dense, and locally available ingredients that can serve as the foundation for creative and sustainable menu development (Hosen et al,2021; Hadidi et al,2025). The pumpkin (Cucurbita spp.), a widely cultivated horticultural crop from the Cucurbitaceae family, stands out as a prime candidate for such innovation due to its remarkable versatility, impressive nutritional profile, and economic viability.

The background of this study is rooted in the agronomic and nutritional virtues of pumpkin. Species such as Cucurbita moschata, Cucurbita maxima, and Cucurbita pepo are cultivated across subtropical and temperate regions, renowned for their high yield and relatively long shelf life in an unpeeled state (Oyeleke et al,2019 in Altaf et al,2025), Nutritionally, pumpkin pulp and seeds are a rich repository of essential compounds. They are abundant in polysaccharides, carotenoids (which are precursors to vitamin A), tocopherols, essential amino acids, and vital minerals like potassium, magnesium, and phosphorus (Papanov.,2021). Furthermore, a growing body of empirical evidence underscores its rich phytonutrient content, with studies by Batool et al. (2022) and El Khatib&Muhieddine (2020) highlighting its demonstrable health benefits, which encompass antidiabetic, anticancer, hepatoprotective, and cardioprotective effects. Its high dietary fibre content is particularly beneficial for glycemic control, as established in earlier works b (Monica et al,2020; Al-Sharqawi,2024).

Despite this impressive profile, a significant problem exists: the pumpkin remains largely underutilized within professional culinary settings, often relegated to a seasonal novelty or a humble backyard vegetable. This underutilization contributes to post-harvest losses, a critical issue particularly in regions with high production. As noted by (Hussain et al,2022; Izli et al,2021& Rasdi,2024), once peeled, the fruit becomes highly susceptible to rapid microbial spoilage and dehydration, necessitating preservation methods that are often not adopted on a small scale (Rasdi,2024). The central problem therefore, is the disconnect between the pumpkin's proven potential and its practical, widespread application in hospitality menus (Oloyede et al, 2021). This gap limits menu diversity, overlooks a sustainable and health-aligned ingredient (Amin et al, 2019; Fernandez-lopez et al, 2020), and misses a significant opportunity to enhance guest dining experiences and operational sustainability.

Three theories relate to underpin this research work: first is the Theory of Planned Behavior (Ajzen, 1991) which explains how individuals' attitudes, subjective norms, and perceived behavioral control influence their intention to perform a behavior which in this case, is the acceptance and consumption of pumpkin-based dishes. This theory is relevant because it helps to explain why and how consumers decide to accept pumpkin dishes based on their personal attitudes (e.g., perceived

healthiness or taste), social influences (e.g., peers' or cultural acceptance of pumpkin meals), and control factors (e.g., availability or affordability). In hospitality settings, understanding these components assists chefs and menu developers in predicting consumer responses to innovative dishes. The strength of TPB in this research is that it provides a structured framework which links psychological determinants to behavioral outcomes, allowing clear interpretation of consumer choice patterns. Its weakness is that it assumes rational decision-making and does not fully capture emotional or habitual eating behaviors'.

The second theory is the Expectancy-Disconfirmation Theory (EDT) postulated by Oliver in1980 which posits that customer satisfaction depends on the comparison between expectations and actual product performance. This theory is relevant in the sense that when diners taste food, i.e. pumpkin soup, stew, or side vegetables, their satisfaction and acceptability ratings reflect whether the dishes met or exceeded their sensory expectations in terms of flavor, texture, and appearance. Thus, EDT directly supports the sensory evaluation component of the research. Its Strengths is that it effectively links sensory quality with satisfaction and acceptability, a central aspect of food evaluation. But it relies heavily on prior expectations, which can vary widely across individuals and cultural contexts.

Third is the Consumer Behavior Theory (Schiffman & Wisenblit, 2019) which examines the psychological, cultural, and social influences affecting consumer choices and product adoption. In this study, it explains how cultural familiarity, health consciousness, and perception of novelty affect the willingness of consumers to adopt pumpkin-based dishes in hospitality menus. This theory bridges the gap between sensory perception and market adoption, showing how consumer perceptions extend to behavioral acceptance. This offers a holistic understanding of both internal (psychological) and external (cultural and social) factors influencing food choice but its broadness in scope does not provide specific predictive capacity without integration with other models (like TPB).

Together, these theories provide a comprehensive explanation of how psychological factors (TPB) influence consumers' intentions to try pumpkin dishes, Sensory experiences (EDT) determine their satisfaction and acceptability, and Cultural and behavioral contexts (Consumer Behavior Theory) affect the long-term adoption of such dishes in hospitality menus. This theoretical blend grounds the study in both behavioral science and sensory evaluation (Kotler et al, 2016; Law et al,2014), offering a multidimensional view of culinary innovation using pumpkin.

The above theoretical framework introduces the primary objective of this research work which sought to empirically evaluate the sensory acceptability of three distinct pumpkin-based dishes: pumpkin soup, pumpkin stew, and a pumpkin side vegetable to provide a quantitative and defensible basis for their integration into hospitality menus. It seeks to quantify panelists' responses based on key sensory attributes and to discuss the implications of these findings for menu diversification, guest satisfaction, and strategic culinary management.

The conceptual review frames pumpkin as a model of "culinary versatility," exploring its applications beyond traditional pies and purees into stews, soup, and functional food innovations. This is supported by the work of Fernández-López et al. (2020) on soup innovation and Adelerin et al. (2024) on pumpkin-based cookies Adeleke and Abiodun (2020), which illustrate the broad scope of its potential applications. The empirical review synthesizes existing sensory-specific and compositional studies on pumpkin products. For instance, research by Immaculate, et al (2020) on the physicochemical composition of different pumpkin cultivars provides a foundation for understanding their varying sensory properties and nutritional baselines. However, a discernible gap exists in the literature regarding direct, comparative sensory evaluations of multiple savory pumpkin dishes within a practical hospitality context. The theoretical review as earlier stated is anchored in sensory evaluation science and consumer behaviour theory. The hedonic scale, as extensively discussed by Lim (2011), provides the theoretical framework for measuring affective consumer responses, balancing methodological rigour with practical applicability. Furthermore, theories related to food xenophobia and the adoption of novel foods inform the understanding of how unfamiliar ingredients, like pumpkin in new forms, are accepted by consumers, justifying the need for empirical sensory data to overcome perceptual barriers and guide effective menu introduction strategies.

II. Materials and Methods

This study was conducted utilizing a structured sensory evaluation methodology to gather robust and actionable data on consumer acceptance of pumpkin-based culinary preparations. The pumpkins used as the primary raw material were procured from the Building Material market located within the Jos South Local Government Area of Plateau State, Nigeria. This sourcing strategy was implemented to ensure the use of fresh, locally available produce, thereby aligning the study with the principles of sustainable and contextually relevant gastronomy.

The sample preparation phase involved the meticulous creation of three distinct pumpkin-based dishes using standardized recipes and controlled culinary techniques to guarantee consistency, replicability, and a fair basis for comparison. Dish A was prepared as a creamy pumpkin soup, where the pumpkin was boiled, pureed to a smooth and consistent texture, and seasoned with a standard blend of onions, garlic, and mild spices. Dish B was a savoury pumpkin stew, featuring uniform chunks of pumpkin simmered in a base of fresh tomatoes, onions, peppers, and a selection of herbs, creating a rich, complex, and visually appealing profile. Dish C was prepared as a simple pumpkin side vegetable, involving uniformly cut pumpkin cubes that were lightly steamed and seasoned with a minimal amount of salt and butter to highlight the vegetable's inherent and natural flavour.

A diverse panel of sixty individuals was recruited to participate in the sensory evaluation. This cohort was strategically composed of six professional chefs, who oversaw the standardization of the preparation methods to maintain culinary integrity and authenticity, and fifty-four untrained consumers, who represented the typical demographic of hospitality guests and provided authentic, affective responses crucial for measuring market acceptance. Each panelist was presented with controlled, monadic samples of the three dishes in a randomized order to prevent sequence bias and carryover effects during the tasting session.

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The sensory evaluation was conducted using a 5-point hedonic scale, a well-established and widely validated instrument in food science for measuring subjective preference and liking. The scale was explicitly anchored with 1 representing "Very Poor" and 5 representing "Excellent." Panelists evaluated each dish based on four critical sensory attributes: Appearance (encompassing visual appeal, colour, and presentation), Taste (perception of sweet, salty, sour, and bitter notes), Flavour (overall aromatic profile and complexity), and Texture (mouthfeel, consistency, and structural properties).

Following the completion of data collection, a comprehensive statistical analysis was performed. The frequency of scores for each attribute and for each dish was meticulously tabulated. The mean score for each sensory attribute was calculated using the formula:

Mean = [(5 × Frequency of 5) + (4 × Frequency of 4) + (3 × Frequency of 3) + (2 × Frequency of 2) + (1 × Frequency of 1)] / 60.

Subsequently, the Overall Acceptability index for each dish was computed as the arithmetic mean of its four individual attribute scores (Appearance, Taste, Flavour, and Texture), providing a single, composite, and easily interpretable measure of overall consumer preference.

III. Results and Discussions

The results of the sensory evaluation provide strong evidence of the high acceptability of pumpkin-based dishes within a hospitality context. The frequency of scores, shown in **Table 1**, presents a detailed distribution of panelists' ratings across the hedonic scale for each evaluated attribute.

Table 1: Frequency of Sensory Scores by Attribute and Dish

Dish	Attribute	5	4	3	2	1
A (Soup)	Appearance	24	33	3	0	0
	Taste	21	30	9	0	0
	Flavor	24	18	18	0	0
	Texture	33	24	3	0	0
B (Stew)	Appearance	51	9	0	0	0
	Taste	39	15	6	0	0
	Flavor	39	21	0	0	0
	Texture	39	20	1	0	0
C (Side)	Appearance	21	28	10	1	0
	Taste	30	20	10	0	0
	Flavor	17	22	21	0	0
	Texture	19	35	6	1	0

The frequencies were then used to compute the mean sensory scores for each attribute. As shown in **Table 2**, Pumpkin Stew (**Dish B**) consistently achieved the highest scores across all attributes. Particularly, **Appearance (4.85)** and **Flavour (4.65)** stood out, reflecting a very strong positive response from the panelists.

Table 2: Mean Sensory Scores for Pumpkin Dishes

Dish	Appearance	Taste	Flavor	Texture
A (Soup)	4.35	4.20	4.10	4.50
B (Stew)	4.85	4.55	4.65	4.63
C (Side)	4.15	4.33	3.93	4.25

The overall acceptability indices, derived from the mean sensory scores, are presented in **Table 3**. Pumpkin Stew (**B**) emerged as the most preferred dish with a score of **4.67**, followed by Pumpkin Soup (**A**) at **4.29**, and the Pumpkin Side Vegetable (**C**) at **4.17**. Importantly, all scores were significantly above the neutral point of **3.0**, confirming a robust level of consumer acceptance.

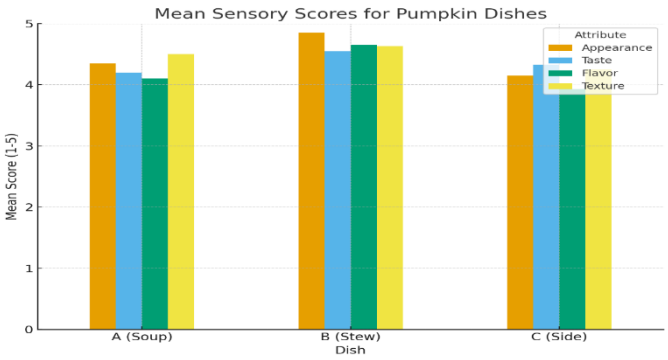

Figure 1: Mean Sensory Scores

Table 3: Overall Acceptability of Pumpkin Dishes

Dish	Overall Acceptability
A (Soup)	4.29
B (Stew)	4.67
C (Side)	4.17

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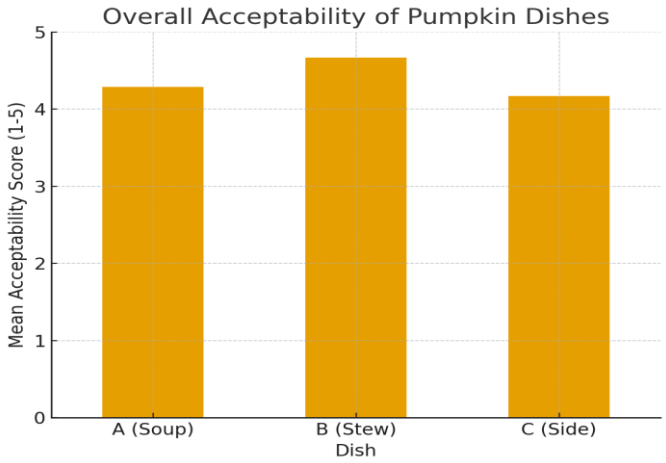

Figure 2: Overall Acceptability

The discussion of these results confirms the significant culinary potential of pumpkin within the hospitality sector. The superior performance of Pumpkin Stew can be attributed to its complex and rich flavour profile, developed through the simmering process with tomatoes, onions, and herbs, which likely created a more familiar, deeply savoury rich product that effectively complemented the pumpkin's natural sweetness. Its appealing visual presentation, with vibrant orange chunks in a richly colored, thick sauce, also contributed substantially to its high appearance score. This finding aligns with empirical research by Fernández-López et al. (2020), which emphasizes the importance of flavour complexity and visual appeal in driving consumer acceptance of vegetable-based dishes.

The strong performance of Pumpkin Soup and the Pumpkin Side Vegetable, both scoring well above 4.0 on the acceptability index, indicates a broad consumer willingness to embrace pumpkin in various culinary forms. The high texture score for the soup (4.50) suggests that its smooth, creamy, and homogeneous consistency was highly palatable to the majority of panelists. The side vegetable's respectable score, despite its simpler preparation, underscores the inherent pleasant and mildly sweet taste of pumpkin itself, corroborating the findings of Amin et al. (2019) on the appealing flavour compounds present in different pumpkin varieties. It is pertinent to acknowledge the methodological choice of the 5-point hedonic scale. While highly effective for rapid assessment and easily understood by untrained panelists, its limited discrimination power compared to a 9-point scale, as discussed by Lim (2011) and Addo-Preko et al. (2023), means that subtle differences between the dishes may not have been fully captured. Nevertheless, the clear and statistically significant preference hierarchy established validates the tool's utility for this applied purpose and provides a confident basis for managerial decision-making.

IV. Conclusion and Recommendations

This study conclusively establishes that pumpkin-based dishes possess strong sensory appeal and are highly acceptable to a diverse panel representing both culinary professionals and consumers. Pumpkin Stew, in particular, demonstrates exceptional potential for immediate and successful integration into hospitality menus. The research successfully bridges the gap between the theoretical nutritional benefits of pumpkin and its practical, sensory-driven application in a commercial food service context. By leveraging a versatile, locally sourced, and highly nutritious vegetable, the hospitality industry can directly address several contemporary challenges, including the growing consumer demand for sustainable and health-conscious gastronomy, the strategic need for continuous menu diversification to enhance competitive advantage, and the contribution to the reduction of post-harvest losses for abundant local produce.

The findings contribute to the scholarship in hospitality and culinary management by providing empirical evidence and a practical framework for menu innovation. The study demonstrates how strategic product development using indigenous and underutilized ingredients can broaden a restaurant's culinary identity, improve guest satisfaction, and reduce over-reliance on imported staples, thereby strengthening both the economic and environmental sustainability of the industry.

Based on the findings of this research, the following recommendations are proposed. Hospitality managers and executive chefs are strongly encouraged to initiate the gradual introduction of pumpkin-based dishes, particularly stews and richly flavoured soups, into their regular and specials menus. This strategic inclusion will add novel and nutritious variety to menu offerings, catering to adventurous diners and health-conscious patrons alike, while simultaneously supporting the use of local agricultural products and promoting a narrative of sustainability. For households and clinical dieticians, integrating pumpkin into regular meal planning is highly advocated. Its dual benefits of sensory pleasure and significant nutritional value make it an ideal component for everyday diets and therapeutic nutrition plans. Promoting the widespread consumption of pumpkin can play a crucial role in ensuring that the annual harvest is utilized effectively, thereby mitigating post-harvest loss and improving food security and income for growers. The trajectory for future academic inquiry should be expanded. Subsequent research should explore the untapped potential of pumpkin in product development beyond main dishes, specifically investigating its application in snacks, baked goods, beverages, and the culinary use of its highly nutritious seeds. Furthermore, replicating this sensory evaluation across broader demographic groups and geographic locations would enhance the generalizability of the findings and provide deeper insights into cross-cultural acceptance patterns, paving the way for global culinary innovation centred on this humble yet powerful vegetable.

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