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BEYOND THE ORGANIC LABEL: SEGMENTING URBAN CONSUMERS FOR INTEGRATED URBAN FOOD SYSTEM STRATEGIES USING A LATENT CLASS APPROACH

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ABSTRACT

Understanding heterogeneous consumer preferences is critical for designing effective policies, communication campaigns, and business models that support the transition towards Integrated Urban Food Systems (IUFS). Moving beyond simplistic demographic profiles, this study identifies distinct urban consumer segments based on their underlying attitudes, values, and purchasing behaviors related to novel and sustainable food attributes. We conducted a large-scale online survey (n=1,512) with a representative sample of adults in Los Angeles, USA, measuring preferences for food attributes including "locally grown," "vertically farmed," "animal welfare," "low price," "organic," and "low carbon footprint." Data were analyzed using Latent Class Analysis (LCA), a model-based clustering technique that identifies unobserved (latent) segments within the population. The LCA identified five distinct consumer segments: *Price-Conscious Traditionalists* (28%), who prioritize low cost and are skeptical of new technologies; *Committed Locavores* (19%), who exhibit strong preferences for local, organic, and high animal welfare standards; *Urban Tech-Embracers* (15%), who are young, highly educated, and show high willingness-to-pay for vertically farmed and low-carbon footprint products; *Convenience-Seeking Ethicals* (22%), who value ethical attributes but within a framework of convenience and brand trust; and *Disengaged Skeptics* (16%), who show low involvement and trust in all food attributes. Each segment demonstrates a unique profile of motivations, media consumption habits, and socioeconomic characteristics. The findings suggest that a one-size-fits-all approach to promoting IUFS will fail. We provide targeted, evidence-based recommendations for policymakers, urban farmers, and food marketers to effectively engage and motivate each segment, thereby accelerating the adoption of sustainable and resilient urban food consumption patterns.

Keywords: consumer behavior, market segmentation, latent class analysis, urban food, local food, vertical farming, willingness-to-pay, food policy, sustainable consumption socio-economic viability

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INTRODUCTION

The transformation of urban food systems towards greater integration, sustainability, and resilience—encapsulated in the IUFS paradigm—requires Not only technological and logistical innovation but also a fundamental shift in consumer behavior. While public awareness of food system challenges is growing, consumer adoption of sustainable food choices, such as locally produced, plant-based, or novel urban-grown foods, remains variable and often limited (Grunert et al., 2014). Traditional approaches to understanding

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Consumers, which rely heavily on demographics (age, income) or simplistic binary categories (e.g., "organic" vs. "conventional" buyers), have proven inadequate for predicting complex food choices and designing effective interventions (Verain et al., 2015).

Consumer decision-making is driven by a complex interplay of values, attitudes, knowledge, and situational constraints. To effectively promote IUFS-aligned products, it is essential to understand this heterogeneity by moving beyond demographics to identify psychographic segments—groups of consumers who share similar psychological profiles, lifestyles, and worldviews (Kaiser et al., 2020). Latent Class Analysis (LCA) is a powerful statistical technique for this purpose, as it can identify unobserved, homogenous segments within a population based on their response patterns to a set of variables, such as their importance ratings of different food attributes.

This study addresses a critical gap in the IUFS literature by providing a nuanced, psychographic segmentation of urban consumers in a major metropolitan area. We focus on key attributes central to IUFS, including localness, production technology (vertical farming), and environmental footprint, alongside traditional drivers like price and organic. Our research questions are:

1. What distinct, latent segments of urban consumers can be identified based on their attitudes and preferences towards a suite of food attributes relevant to IUFS?
2. How do these segments differ in terms of their socioeconomic characteristics, food-related behaviors, and media use?
3. What are the specific implications for policymakers, urban agricultural entrepreneurs, and food marketers seeking to encourage sustainable food consumption within each segment?

MATERIALS AND METHODS

Survey Design and Data Collection

A comprehensive online survey was developed and distributed in the fall of 2023 to a representative sample of 1,512 adults residing in Los Angeles County, USA, based on quotas for age, gender, income, and ethnicity. The survey instrument included the following sections:

1. Food Attribute Importance: Respondents rated the importance of 12 food attributes when making a purchasing decision on a 7-point Likert scale (1=Not at all important, 7=Extremely important). The attributes included: Price, Taste, Freshness, Appearance, Organic, Locally Grown, Animal Welfare, Low Carbon Footprint, Vertically Farmed, Non-GMO, Brand Name, and Convenience.
2. Willingness-to-Pay (WTP): For key attributes (Local, Organic, Vertically Farmed), a payment card approach was used to elicit WTP premiums compared to a conventional alternative.
3. Behavioral and Psychographic Measures: Scales were included to measure food-related lifestyle (e.g., cooking enjoyment, novelty seeking), environmental concern, and trust in different food system actors (farmers, scientists, government).
4. Media Consumption: Respondents indicated their primary sources for information about food and nutrition.
5. Demographics: Standard demographic questions were included.

Data Analysis

The data were analyzed in a multi-step process using Stata 18.0 and R software.

1. Latent Class Analysis (LCA): The core of the analysis was an LCA performed on the 12 food attribute importance ratings. Models with 2 to 6 segments were estimated, and the optimal number of segments was determined based on statistical fit indices (Akaike Information Criterion - AIC, Bayesian Information Criterion - BIC), interpretability, and parsimony.
2. Segment Profiling: Once the segments were identified, we used chi-square tests and analysis of variance (ANOVA) to profile them based on the other variables collected: demographics, WTP, behavioral scales, and media use. This step is crucial for understanding the character of each segment and how to reach them.

RESULTS

Identification of Consumer Segments

The model fit indices indicated that the 5-segment solution provided the best balance of fit and interpretability. The segments, their size, and their defining characteristics are summarized in Table 1.

TABLE 1: PROFILE OF THE FIVE CONSUMER SEGMENTS: SIZE, KEY CHARACTERISTICS, AND WILLINGNESS-TO-PAY

Segment Name & Size	Defining Characteristics & Motivation	Willingness-to-Pay (Premium)		
1. Price-Conscious Traditionalists (28%)	Highest importance on **Low Price** and **Convenience**. Low importance on sustainability and technology attributes. Driven by budget and habit. Trust in traditional brands.	Local: +0%	Organic: +5%	Vertical: +0%
2. Committed Locavores (19%)	Extremely high importance on **Locally Grown, Organic, Animal Welfare**. Reject large brands and show skepticism toward high-tech solutions like vertical farming. Motivated by ethics, community support, and transparency.	Local: +25%	Organic: +20%	Vertical: -10% (aversion)
3. Urban Tech-Embracers (15%)	High importance on **Vertically Farmed, Low Carbon Footprint, Locally Grown**. Value innovation, science, and environmental efficiency. Demographically: youngest segment, highest education and income.	Local: +15%	Organic: +10%	Vertical: +20%
4. Convenience-Seeking Ethicals (22%)	High importance on **Convenience, Brand Name**, but also **Animal Welfare** and **Organic**. Seek to make ethical choices within a busy lifestyle. Trust supermarkets and branded products to deliver on these values.	Local: +10%	Organic: +15%	Vertical: +5%
5. Disengaged Skeptics (16%)	Low importance ratings across *all* attributes, indicating general disinterest or cynicism about food claims. Lowest levels of food-related knowledge and involvement.	Local: +0%	Organic: +0%	Vertical: +0%

Segment Profiles and Behaviors

The profiling revealed stark differences between the segments. The Urban Tech-Embracers were the most likely to be male, have a postgraduate degree, and have a household income over $150,000. The Committed Locavores were more likely to shop at farmers' markets and belong to a CSA, while Convenience-Seeking Ethicals were the primary grocery shoppers for their households and relied heavily on supermarket weekly ads. Disengaged Skeptics had the lowest overall grocery expenditure.

Media consumption patterns also varied significantly (Figure 1). Urban Tech-Embracers get their food information from podcasts, tech blogs, and social media (Instagram, TikTok). Committed Locavores rely on farmers, specialty food blogs, and word-of-mouth. Convenience-Seeking Ethicals are best reached through mainstream television and supermarket circulars. Price-Conscious Traditionalists are heavy users of television and coupon apps.

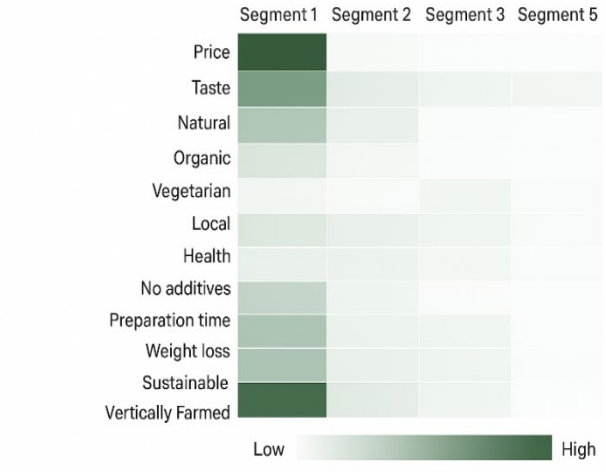

Figure 2: Recommended Communication Channels and Policy Levers by Segment

*(A table-like figure with 5 columns, one for each segment. Each column has two sections: *

- **Top:** "**Marketing & Communication**" with icons and text (e.g., for Tech-Embracers: "Social Media Influencers", "Data-driven branding"; for Locavores: "Farmers' Markets", "Storytelling").*
- **Bottom:** "**Policy & Intervention**" with icons and text (e.g., for Price-Conscious: "Price subsidies on healthy food", "SNAP incentives"; for Disengaged Skeptics: "Simple, clear default options", "Point-of-sale education").)*

DISCUSSION

The identification of five distinct segments underscores the profound heterogeneity of the urban food consumer base. The most significant finding for IUFS development is the clear emergence of the *Urban Tech-Embracers*. This segment represents a ready market for products from vertical farms and other high-tech CEA, and their high WTP and influence make them crucial early adopters. Conversely, the strong aversion to vertical farming among *Committed Locavores* highlights a critical tension within the sustainable food movement between a "return to nature" paradigm and a "tech-optimism" paradigm (Kneafsey et al., 2021). This suggests that marketing high-tech urban agriculture as "local" may not be effective for this group; instead, emphasizing its benefits (water savings, pesticide-free) is key.

The large *Convenience-Seeking Ethicals* segment presents a major opportunity. They are not ideologically opposed to IUFS products but will not go out of their way to find them. Making these products available, visible, and trusted in mainstream supermarkets is essential for scaling up their consumption. The *Price-Conscious Traditionalists*, the largest segment, will likely be the last to adopt IUFS products without significant price parity or targeted subsidies, pointing to the limitations of market-based solutions alone for achieving equitable food system change.

For policymakers, this segmentation argues for a multi-pronged strategy. Tech-Embracers can be engaged through innovation grants and public-private partnerships. Locavores are natural allies for land-use policies that protect peri-urban farms. Interventions for the Convenience-Seeking and Price-Conscious segments must focus on making the sustainable choice the easy and affordable choice through procurement policies for public institutions and fiscal incentives for retailers.

CONCLUSION

This study demonstrates that the success of Integrated Urban Food Systems is inextricably linked to a deep understanding of consumer diversity. By moving beyond demographics to a values-based segmentation, we have provided a actionable roadmap for stakeholders. The key takeaway is that there is no single "urban consumer." The future of urban food will be shaped by strategies that are as segmented and targeted as the consumer base itself. We recommend that:

1. **Urban food entrepreneurs** clearly define their target segment and tailor their product, place, and promotion strategies accordingly.

2. **Policymakers** use segmentation to design more effective and efficient public information campaigns and food policy interventions.

3. **Retailers** leverage this segmentation to optimize their product assortments and in-store marketing in different neighborhood contexts.

Future research should track the evolution of these segments over time and replicate this study in different cultural and geographic contexts to assess the transferability of the segments.

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