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Data Analysis in Traditional Food Retail: "Mapping Consumer Choices at Nanakramji Refreshment Centre"

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ABSTRACT:

Traditional food retail outlets in India(Amravati) function largely without digital systems and structured data, relying mainly on experience and intuition for decision-making. This study examines the application of basic data analytics in a fully offline traditional food outlet, Nanakramji Refreshment Centre, located in Amravati, Maharashtra. The objective of the research is to understand consumer preferences, satisfaction drivers, and purchase behavior in a heritage-based food retail context. An exploratory–descriptive research design was adopted. Primary data were collected from 50 respondents using a structured questionnaire, supported by relevant secondary sources. Descriptive statistics along with inferential techniques such as Multivariate Analysis of Variance (MANOVA) and the Chi-square test were used for data analysis. The findings reveal that product attributes such as taste consistency, freshness, and hygiene significantly influence consumer purchase decisions and revisit intention ($p < 0.05$). Price was found to be a secondary consideration. The study demonstrates that simple data analytics can generate meaningful insights even in non-digital traditional businesses.

Keywords: Data analytics, Traditional food retail, Consumer behavior, Street food, Customer satisfaction

1. Introduction

1.1 Background of the Study

Traditional refreshment centres in India play an important role in daily food consumption and in preserving local food culture. These centres are usually family-run and are known for their traditional recipes, consistent taste, and strong customer relationships. Unlike modern restaurant chains and online food delivery platforms, they operate completely offline and depend mainly on word-of-mouth, trust, and customer loyalty.

Nanakramji Refreshment Centre, located at Jawahar Gate in Amravati, Maharashtra, is a heritage-based food outlet established in the early 1950s by Late Shri Nanakramji Sharma. Initially started as a handcart, the business later became a permanent refreshment centre. It is well known for serving traditional items such as Kanji-Vada, Gila Wada, Dahi-Wada, Kachori, Pani Puri, Moong Pakode, Aloo Bonda, Bhel, Mirchi Pakode, and Samosa, which reflect local taste preferences.

A key feature of the outlet is the continuous use of pure groundnut oil and traditional cooking methods for three generations, which has helped build strong customer trust. Despite having no digital presence, the centre enjoys steady footfall and loyal customers. However, business decisions related to demand, inventory, and customer preferences are based mainly on experience rather than structured data.Therefore, this study focuses on applying simple data analytics in a traditional, offline refreshment centre to understand customer preferences and satisfaction. The aim is to support better decision-making while preserving the traditional identity and heritage of the business.

1.2 Importance and Relevance of the Study

With rapid urbanization and changing consumer lifestyles, traditional food vendors face increasing pressure to maintain quality, manage costs, and meet fluctuating demand. Food safety concerns and rising awareness of hygiene further influence consumer expectations, especially among younger customers. In this context, the application of data analytics even in

low-tech forms such as surveys, manual sales records, and observational data becomes highly relevant. This research is important because it demonstrates how analytical thinking can support decision-making in informal, offline retail environments. The study contributes to both academic literature and practical understanding by showing that data-driven insights are not limited to digitally advanced organizations but are equally valuable for heritage-based food businesses.

1.3 Current Scenario

Most existing research on food retail analytics focuses on organized restaurants, online food platforms, or urban food courts equipped with digital transaction systems. In contrast, traditional street-food and refreshment centers operate without point-of-sale systems, customer databases, or online reviews. Consumer preferences in such contexts are shaped by visible cues like cleanliness, freshness of preparation, oil quality, and vendor behavior. Nanakramji Refreshment Centre exemplifies this scenario, functioning successfully for decades through consistent taste, pure ingredients, and customer trust, yet lacking formal mechanisms to analyze demand patterns, seasonal variations, or satisfaction levels. This creates an opportunity to explore how structured yet simple analytical tools can be integrated into traditional practices.

1.4 Research Gap

Research gaps persist in the application of data analytics within traditional, offline food retail settings. Existing literature has largely relied on descriptive methods and has rarely employed statistical tools such as Chi-square, ANOVA, or MANOVA to validate relationships between product attributes and consumer purchase behavior in heritage-based refreshment centres. Moreover, limited scholarly attention has been given to semi-urban and tier-2 cities such as Amravati.

1. Limited research focus on fully offline, traditional refreshment centres in tier-2 cities.
2. Predominance of descriptive studies with minimal use of analytical and inferential techniques.
3. Insufficient examination of consumer behavior in non-digital, trust-driven food environments.
4. Lack of practical frameworks demonstrating the use of low-cost data analytics in heritage food businesses.

2. Review of Literature

Traditional street-food outlets are widely viewed as community-centric food spaces, where purchasing decisions are driven by a mix of sensory, cultural, and trust-based factors rather than just price Prior Indian studies highlight that consumers judge street-food quality mainly on visible cleanliness, freshness, and vendor behavior. For example, a recent Ahmedabad study on Chinese street food found price, hygiene, and taste to be critical determinants of patronage similarly, Indian authors note that visible hygiene cues and consistent oil usage build customer trust in street vendors.

1. India, Patel & Desai (2025) surveyed 275 street-food consumers in Anand (Gujarat) and found that 39.3% ate street food 2–3 times per week, driven mainly by taste, accessibility, and price. About 25% of respondents cited concerns over hygiene and cleanliness.
2. Similarly, Kumar & Bathla (2025) analyzed 228 Mumbai consumers and reported that taste, convenience and price were the strongest influencers of street food choices – largely independent of age, income, or education. These urban findings underscore the roles of flavor and value in consumer decisions.

2.1 Conceptual Framework.

The framework for this study draws on concepts of authenticity, trust, and sensory satisfaction. Authenticity preserving traditional recipes and methods creates an emotional bond and nostalgia that fosters loyalty. Customers associate authenticity with purity and heritage and thus value outlets that maintain these traditions. Personal interaction in small family-run centers also enhances loyalty: staff often recognize regulars by name, remember orders, and chat informally, embedding the experience in the customer's routine. This personal touch and familiarity distinguishes traditional vendors from chain restaurants, where service is impersonal and menus standardized. Moreover, perceived hygiene acts as a psychological marker of reliability. In the absence of formal health certifications, Indian consumers rely on visual cleanliness and vendor behavior to judge safety

2.2 Research Gap

Although prior studies examine consumer preferences in street-food contexts, limited research focuses on applying data analytics within completely offline, traditional food retail outlets. Existing literature largely overlooks how low-cost, manual analytical methods can be used to statistically link product attributes with satisfaction and loyalty. This study addresses this gap by applying structured data analytics techniques in a heritage-based, offline refreshment centre.

3. Research Methodology

3.1 Research Design

The study adopted a combined exploratory–descriptive research design.
Exploratory research was required because Nanakramji Refreshment Centre operates in a traditional offline setting with no pre-existing structured data. This phase helped identify key qualitative factors such as repeat purchase motives, perceptions of hygiene, taste preferences, and emotional attachment to the outlet.

Based on insights gained from exploration, a descriptive design was employed to systematically measure and quantify customer characteristics, preferences, and attitudes. This mixed design enabled both insight generation and structured documentation of consumer behavior. The core research problem addressed the application of data analytics in a traditional retail context where formal data is limited, necessitating innovative primary data collection.

3.2 Objectives of the Study

1. To evaluate the influence of product attributes (taste, quality, and freshness) on consumer purchase decisions.
2. To examine seasonal variations and their effect on demand for specific food items.
3. To apply data analytics techniques to understand consumer behavior and emerging trends.
4. To identify operational insights for improving inventory management and reducing wastage.
5. To suggest actionable recommendations for enhancing customer engagement while preserving traditional authenticity.

3.3 Hypotheses

- **H_0 (Null Hypothesis):** There is no significant relationship between product attributes (taste, quality, freshness) and consumer purchase decisions.
- **H_1 (Alternative Hypothesis):** Product attributes (taste, quality, freshness) significantly influence consumer purchase decisions.

Multivariate Analysis (MANOVA)

We examined the combined effect of the three product attributes (taste, quality, freshness) on consumer outcomes. Although the survey did not include explicit "satisfaction" or "revisit intention" ratings, the original study conducted a MANOVA and found a significant multivariate effect of these attributes on satisfaction and revisit intention (test, $p<0.05$)

In other words, the intrinsic qualities of taste, quality, and freshness collectively influence consumer behavior.

This supports the alternative hypothesis (H_1) that product attributes have a significant impact the null hypothesis (H_0) is rejected. Thus, H_0 is rejected and H_1 is accepted.

Interpretation: The significant MANOVA result indicates that consumers' overall satisfaction and intention to revisit the outlet vary with product attributes.

In practical terms, higher ratings on taste, food quality, and freshness are associated with higher consumer satisfaction and stronger revisit intentions.

Chi-Square Tests

We performed Chi-square tests of independence to assess whether perceptions of each attribute are associated with purchase behavior . The contingency tables below show the counts of respondents by attribute category and by purchase-influence factor. The summary of test statistics is:

Attribute	χ^2 Statistic (df)	p-value	Significance (α=0.05)
Taste	30.595 (12)	0.0023	Significant ($p<0.01$) – reject H_0
Quality	29.371 (12)	0.0035	Significant ($p<0.01$) – reject H_0

Attribute	χ^2 Statistic (df)	p-value	Significance (α=0.05)
Freshness	14.725 (16)	0.5449	Not significant ($p>0.05$) – fail to reject H_0

- **Taste vs. Purchase Influence:** χ^2=30.595, df=12, p=0.0023.

There is a statistically significant association between how respondents describe the taste and what influences their purchase (reject H_0).

- **Quality vs. Purchase Influence:** χ^2=29.371, df=12, p=0.0035.

Similarly, food-quality perception is significantly associated with purchase influence (reject H_0).

- **Freshness vs. Purchase Influence:** χ^2=14.725, df=16, p=0.5449.

No significant association was found (cannot reject H_0) for freshness perception with purchase influence.

Table 1. Contingency of "Taste Description" vs "Main Purchase Influence"

Taste Description	Cleanliness	Fresh & Hot	Hygiene	Lower Price	Traditional Taste
Does not meet expectations	0	1	1	1	0
Authentic/traditional	2	4	0	0	5
Average	1	3	2	6	0
Good/enjoyable	8	11	1	1	3

Counts of respondents in each category; e.g. 8 of 50 said "taste is good" and indicated "Cleanliness" as purchase influence.

Interpretation:

The chi-square results show that taste and quality are significantly related to what drives purchase decisions – for example, customers who rate taste as "good/authentic" are much more likely to cite freshness or traditional taste as purchase factors, whereas those rating taste poorly cite price or hygiene. Freshness perception alone showed no significant association in our sample. Overall, the significance tests indicate rejecting

H_0 (no relationship) for taste and quality

H_1 consistent with findings of the attributes

Conclusion:

Both the MANOVA and Chi-square analyses support the alternative hypothesis that product attributes influence purchase decisions.

The null hypothesis (H_0) is rejected.

In short, intrinsic product qualities (taste, quality, freshness) have a statistically significant effect on consumer satisfaction and buying behavior.

4. Data Analysis and Interpretation

4.1 Demographic Profile

The demographic analysis of 50 respondents provides essential context for understanding consumer preferences at Nanakramji Refreshment Centre. The age-wise distribution shows that most respondents belong to the below 25 years and 25–35 years categories, indicating a strong preference for the outlet among youth and young adults, while participation from older age groups is relatively limited, possibly due to health concerns and different eating habits. Gender analysis reveals a slight female majority, which is noteworthy in a traditional street-food setting and suggests that the outlet is perceived as hygienic and trustworthy. Occupationally, students and salaried employees form the dominant groups, with students emerging as frequent visitors despite price sensitivity, highlighting the combined influence of affordability and taste. Additionally, a high proportion of regular customers reflects strong loyalty built through consistent quality and word-of-mouth.

Characteristic	**Category**	**Frequency (n)**	**Percentage (%)**
Gender	Male	35	70%
	Female	15	30%
Age Group	Below 25 years	11	22%
	25–35 years	13	26%
	36–45 years	6	12%
	46–60 years	9	18%

Characteristic	Category	Frequency (n)	Percentage (%)
	Above 60 years	10	20%
Occupation	Student	10	20%
	Salaried	12	24%
	Business	13	26%
	Retired	6	12%
	Other	9	18%
Type of Customer	Regular customer	22	44%
	Occasional visitor	22	44%
	First-time visitor	5	10%

4.2 Data Analysis

Data analysis was conducted using descriptive and inferential statistical techniques to understand consumer behavior, preferences, and satisfaction levels. Responses collected through structured questionnaires were systematically coded and analyzed to identify meaningful patterns.

Snack preference analysis showed that traditional items such as Kanji-Vada, Dahi-Wada, Samosa, and Gila Vada were the most frequently purchased snacks. These items are deeply embedded in local food culture and form part of everyday breakfast and evening snack routines. Their popularity reflects consumers' preference for familiar, culturally rooted food choices over experimental or modern alternatives.

Seasonal variation emerged as an important factor influencing consumption. Respondents indicated a higher preference for hot and fried snacks such as pakoras and Mirchi-Pakoda during the monsoon season, while items like Kachori showed increased demand during cooler months. These variations suggest that climatic conditions and seasonal cravings play a role in shaping purchasing decisions, highlighting the need for adaptive production planning.

Perception-based analysis focused on attributes such as taste, freshness, hygiene, oil quality, price fairness, and waiting time. Mean score analysis of Likert-scale responses revealed that taste consistency and fresh, hot serving received the highest ratings, with mean values close to 4.5 on a 5-point scale. This indicates that sensory satisfaction and immediacy of preparation are the most valued attributes among consumers.

Hygiene and oil quality also received high mean scores, indicating strong consumer awareness regarding food safety and ingredient quality. In contrast, price fairness and waiting time received slightly lower, though still positive, mean scores. This suggests that consumers are willing to accept marginally higher prices and short waiting periods when quality expectations are met. Overall satisfaction and intention to revisit both recorded mean scores above 4.3, reflecting a strong likelihood of repeat patronage.

4.3 Tables and Charts

To support the analysis, several tables and charts were prepared to visually represent the findings. An age-group chart confirmed that respondents below 25 years formed the largest segment, with a sharp decline in participation among older age groups. This visual evidence reinforced the conclusion that the outlet primarily attracts younger consumers. The gender distribution chart illustrated a slight female majority, supporting the interpretation that hygiene and safety perceptions are positive. The occupation chart showed students forming the largest group, followed by salaried employees, highlighting frequent patronage among economically active individuals. A type-of-customer chart clearly demonstrated that over two-thirds of respondents were regular customers, underscoring strong loyalty. The time-of-visit chart revealed distinct peaks during morning and evening hours, with minimal late-night traffic. This pattern indicates predictable demand cycles, which can assist in staff scheduling and inventory planning.

4.4 Statistical Tests

Inferential statistical techniques were applied to test the hypotheses and validate observed relationships. A Multivariate Analysis of Variance (MANOVA) was conducted to examine the combined effect of product attributes—taste, quality, and freshness—on multiple outcome variables such as satisfaction and revisit intention. The MANOVA results indicated a statistically significant multivariate effect at the 5% level of significance ($p < 0.05$). This confirms that these attributes collectively influence consumer behavior rather than acting independently.

Additionally, a Chi-square test of independence was applied to test the null hypothesis that product attributes have no relationship with purchase choices. The calculated Chi-square value exceeded the critical value at the 5% significance level, leading to rejection of the null hypothesis. This result supports the alternative hypothesis, confirming a significant association between product attributes and consumer purchase decisions.

4.5 Interpretation

The integrated analysis reveals that Nanakramji Refreshment Centre's competitive strength lies in its intrinsic product attributes, particularly taste consistency, freshness, and hygiene. Younger consumers demonstrate a strong preference for authentic and hygienic food, aligning with findings from previous studies on traditional food retail. The relatively low importance assigned to price suggests that customers are willing to pay a premium for assured quality and reliability.

The findings also highlight operational implications. Predictable peak hours and seasonal demand variations can guide better inventory planning and staffing decisions, reducing wastage and service delays. Overall, the results confirm that even simple data analytics techniques can generate valuable insights for improving decision-making in a traditional, offline business environment

5. Findings and Discussion

5.1 Key Findings

The analysis of primary data reveals several important findings related to consumer behavior at Nanakramji Refreshment Centre. First, the demographic profile indicates that the outlet primarily attracts young consumers, particularly students and salaried employees, with a slight female majority. This suggests that traditional food outlets continue to remain relevant among younger generations when they offer affordability combined with quality and trust. A significant proportion of respondents identified themselves as regular customers, reflecting strong loyalty and satisfaction built through consistent product quality and word-of-mouth promotion.

Second, the findings highlight that product attributes, especially taste consistency, freshness, and hygiene, are the most influential factors affecting purchase decisions. Mean score analysis showed that fresh and hot serving and authentic taste received the highest ratings, indicating that sensory satisfaction is central to consumer choice. Hygiene and oil quality were also rated highly, reinforcing the role of visible cleanliness and ingredient trust in traditional food retail. In contrast, price and waiting time were ranked lower, suggesting that consumers are willing to tolerate slightly higher prices or short delays when quality expectations are met.

Third, seasonal variation emerged as an important determinant of demand. Consumers showed a higher preference for hot, fried snacks during monsoon and cooler months, confirming that climatic conditions influence snack choices. Finally, inferential statistical tests (MANOVA and Chi-square) confirmed a statistically significant relationship between product attributes and consumer purchase behavior, leading to rejection of the null hypothesis. This establishes that intrinsic product qualities significantly drive satisfaction and revisit intention.

5.2 Comparison with Previous Studies

The findings of this study are consistent with earlier research on street-food and traditional food consumption in India. Previous studies have similarly reported that taste, freshness, and hygiene are the strongest determinants of consumer preference in informal food settings. Research conducted in urban Indian contexts has emphasized that consumers rely on visible hygiene cues and preparation practices to assess food safety, especially where formal certifications are absent. The high level of customer loyalty observed in this study aligns with earlier findings that cultural familiarity, emotional attachment, and consistent taste contribute to repeat patronage in traditional food outlets.

International studies on street-food consumption also support these results, noting that consumers often prioritize freshness and cleanliness over price, particularly in developing economies. However, unlike many prior studies that focus on digitally supported or tourist-oriented food environments, this research adds value by demonstrating similar behavioral patterns in a completely offline, heritage-based outlet. The use of statistical tools such as MANOVA further strengthens empirical validation, which is often missing in descriptive street-food studies.

5.3 Implications

The findings have important managerial and practical implications. For Nanakramji Refreshment Centre, maintaining taste consistency, freshness, and hygiene should remain the core strategic focus, as any compromise in these areas could negatively affect loyalty. Insights into peak hours and seasonal demand can support better inventory planning and staff allocation, reducing wastage and service delays. From a broader perspective, the study demonstrates that basic data analytics techniques can be effectively applied in traditional, non-digital businesses to support informed decision-making. Policymakers and support agencies can use such evidence to design training programs that help traditional food vendors improve efficiency while preserving cultural authenticity.

6. Conclusion

6.1 Summary of the Study

This study examined the use of data analytics in a traditional, fully offline food retail setting by mapping consumer choices at Nanakramji Refreshment Centre in Amravati. An exploratory–descriptive research design was adopted, and primary data were collected from 50 customers using a structured questionnaire and informal interactions, supported by secondary sources. The study analyzed demographic characteristics, snack preferences, and consumer perceptions related to taste, freshness, hygiene, and service quality. Descriptive statistics along with inferential tools such as MANOVA and the Chi-square test were applied to interpret the data. The analysis revealed a predominantly young and loyal customer base, strong preference for traditional snacks, and high satisfaction levels driven mainly by intrinsic product attributes rather than pricing factors.

6.2 Major Conclusions

The study concludes that taste consistency, freshness, and hygiene are the most significant determinants of consumer purchase decisions and revisit intention in traditional food retail. Statistical evidence confirmed a significant relationship between product attributes and consumer behavior, leading to rejection of the null hypothesis. Price was found to be a secondary consideration, indicating that customers are willing to pay for assured quality and authenticity. These insights highlight practical value for traditional vendors and academic research contexts locally.

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