MULTIDIMENSIONAL ANALYSIS OF CONSUMER EXPERIENCE OF CIGARETTE PRODUCTS AND IDENTIFICATION OF KEY INFLUENCING FACTORS

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Abstract: This study constructs a multi-dimensional evaluation system based on consumer behavior theory and the principles of sensory evaluation. Using the entropy weight method to determine indicator weights, and employing correlation analysis and multiple linear regression analysis, this study explores the key factors influencing consumers' experience with cigarette products. The results indicate that the overall consumer acceptance of the tested cigarette products is high. Among specific indicators, the durability of the cigarette aroma scores the highest, while the strength of the cigarette and the stimulation of the flavor are particularly prominent, and the richness of the flavor and oral comfort receive relatively lower scores. Correlation analysis shows that each dimension of experience is significantly positively correlated with consumer satisfaction, with the strength of the cigarette and the richness of the flavor displaying the highest correlation coefficients. Regression analysis identifies five key influencing factors: the richness of the flavor, the intensity of the flavor, the strength of the cigarette, the durability of the cigarette aroma, and the stimulation of the flavor, with the durability of the cigarette aroma having the most significant impact on consumer experience. Heterogeneity analysis reveals that consumers with high experience focus more on the smoothness of inhalation and the authenticity of the aroma. Young consumers are particularly sensitive to the durability of the aroma, the richness of the flavor, and the intensity of the flavor, while middle-aged consumers place greater emphasis on the authenticity of the aroma, the strength of the cigarette, and the stimulation of the flavor. This study provides decision-making support for cigarette companies in optimizing product quality and accurately meeting consumer demands.
Keywords: Cigarette products; Consumer experience; RFM model; Entropy weight method; Influencing factors

1 INTRODUCTION

In the context of rapid global economic development, the evolution of consumer behavior patterns has profoundly impacted various industries, with the cigarette industry being particularly significant [1]. According to statistics from the National Tobacco Monopoly Administration of China in 2022, China, as the largest cigarette consumption market in the world, has an annual consumption volume of 2.58 trillion cigarettes, with a noticeable trend of slowing growth rates each year [2]. On one hand, the traditional cigarette market is shifting towards health, quality, and personalized needs. Consumers are increasingly focusing on the experience and perceived value of products when selecting cigarette brands [3], indicating that cigarette manufacturers need to conduct in-depth research on consumer experience to enhance their market competitiveness. On the other hand, with the growing public health awareness and the widespread understanding of the dangers of smoking, smoking rates in some developed countries have significantly declined, prompting cigarette manufacturers to seek new avenues for market growth. A survey targeting Chinese teenagers revealed that over 60% of respondents considered multiple dimensions in their cigarette consumption decisions, mainly involving key elements such as brand image, product quality, packaging design, and flavor characteristics [4-5].

Therefore, the core strategic issue faced by cigarette companies is how to increase market share and achieve sustainable development by enhancing consumer satisfaction and brand loyalty. In light of this, the significance of this study lies in its in-depth analysis of consumer experience with cigarette products, providing quantitative decision-making support and strategic recommendations for relevant companies, helping them maintain an advantage in a highly competitive market.

Research on consumer experience originated from the development of sensory evaluation studies in the mid-20th century. Early research paradigms primarily focused on the quantitative assessment of single sensory dimensions, conducting objective evaluations of product quality through independent sensory channels such as taste, smell, and touch [6]. As research progressed, the theory of sensory evaluation became more refined, with its core idea emphasizing a comprehensive evaluation of product quality based on consumers' sensory responses [7-8]. This laid a solid theoretical foundation for subsequent studies on consumer experience.

With the continuous advancement of consumer behavior theories, scholars began to recognize the multidimensional and complex nature of consumer experiences. Research perspectives expanded beyond the evaluation of a single sensory dimension to include multiple facets of the consumer's cognitive processes, emotional responses, and behavioral expressions [9-10]. The emergence of experience economy theory further propelled the in-depth study of consumer experience. This theory highlights the central role of experiential value creation in modern business activities,

suggesting that consumers purchase not only the functional attributes of a product, but also the unique experience value it offers during use [11]. Guided by this theory, businesses began to systematically consider the perceived experiences of consumers during product use as the core basis for optimizing product design and continuous quality improvement, facilitating a strategic shift from traditional product-oriented models to modern experience-oriented approaches.

In the field of consumer experience research related to cigarette products, early scholars primarily focused on exploring evaluation methods based on single sensory dimensions [12]. Studies have shown that individual indicators such as smoothness of taste, intensity of aroma, and ease of inhalation significantly impact consumer satisfaction [13]. However, this unidimensional evaluation approach has evident limitations in comprehensively reflecting the consumer experience. As research gradually deepened, scholars began recognizing the multidimensional and complex characteristics of consumer perceptions during the cigarette consumption process. Consequently, the focus shifted towards the theoretical construction and methodological enhancement of multidimensional evaluation systems [14-15]. Recent studies have started to delve into the inherent relationships between the sensory attributes of cigarette products, emotional experiences, and cognitive evaluations, employing advanced statistical methods such as structural equation modeling and multiple regression analysis to systematically analyze the interaction patterns among various dimensions [16-17]. With the continuous development of consumer behavior research, scholars have begun to utilize more advanced and diversified research methods to explore the complex mechanisms influencing cigarette product experiences. Multivariate statistical methods, including factor analysis, cluster analysis, and discriminant analysis, have been widely applied to accurately identify key influencing factors [18-19], providing important empirical evidence and decision support for product optimization and upgrades. Additionally, some cutting-edge studies have introduced advanced physiological measurement techniques such as eye-tracking technology, electroencephalogram monitoring, and functional magnetic resonance imaging to investigate the cognitive processing mechanisms and emotional response patterns of consumers during the cigarette consumption process from a neuroscience perspective [20-21].

Despite significant progress in evaluating consumer experience with cigarette products, existing research still has three key shortcomings: First, many studies primarily employ unidimensional evaluation methods, lacking a systematic multidimensional evaluation framework. This limitation makes it difficult to comprehensively reflect the complex perceptual experiences of consumers during smoking, which involve various factors, including the physical transfer of smoke, chemical sensory stimuli, and physiological and psychological feedback. Second, most research focuses on qualitative descriptions and simple statistical analyses, lacking a scientific mechanism for determining weights and identifying key factors. This results in an inability to accurately quantify the relative importance and impact of various indicators on consumer experience. Third, existing studies exhibit relatively weak theoretical construction, lacking a systematic indicator system based on consumer behavior theory and sensory evaluation principles. Furthermore, many studies have limited sample sizes and tend to concentrate on specific regions or brands, raising questions about the generalizability and applicability of the research findings.

Based on the current research status and existing shortcomings, this study constructs a multidimensional evaluation system for consumer experience with cigarette products, encompassing ten indicators across three dimensions: the physical transfer characteristics of smoke, the perception of chemical sensory stimuli, and physiological and psychological feedback responses. Utilizing the entropy weight method and multiple linear regression analysis, the study thoroughly investigates key factors influencing consumer experience based on data from 326 valid questionnaires. The main contributions of this research are reflected in the following three aspects:

First, this study constructs a systematic multidimensional evaluation framework for consumer experience, effectively addressing the theoretical deficiencies in existing research. It provides an important theoretical foundation and practical analytical tools for the field of consumer experience studies. Second, the innovative application of the entropy weight method to scientifically determine the weights of various indicators, along with the use of multiple linear regression analysis to accurately identify key influencing factors, successfully overcomes the methodological limitations seen in previous studies. This offers a valuable methodological approach for similar research. Third, the empirical research, based on a large sample size, significantly enhances the reliability and generalizability of the findings. It provides essential decision support for optimizing product quality in the industry and accurately meeting consumer demands. Additionally, it offers scientific and reliable references for policymakers and business managers in formulating relevant development strategies.

2 CONSTRUCTION OF THE EXPERIENCE INDICATION SYSTEM

To scientifically and systematically evaluate consumers' smoking experiences and meet their increasingly refined demands for product quality and experience, this study constructs a multidimensional evaluation indicator system for cigarette experience based on existing research [22-23]. The design of this system strictly follows the principles of sensory evaluation and closely aligns with the core sensory attributes of cigarette products and the actual perception processes of consumers. The indicators are selected from three aspects: physical inhalation, chemical sensory stimulation, and physiological and psychological feedback. This approach aims to accurately identify the key indicators influencing consumer preferences and satisfaction. The specific indicator system is shown in Table 1.

Table 1 Indicator System for Cigarette Product Experience

Dimension	Indicator	Consumer Perception Significance

Physical Transfer of Smoke	Original Aroma	The aroma that naturally emanates when the cigarette is unlit
	Smoothness of Inhalation	Reflects the consumer's experience of inhalation resistance
	Burning Style of Cigarette experienced during	The core flavor experienced during inhalation, representing the brand's taste profile brand's taste profile
	Purity of Aroma	Reflects the consumer's assessment of the cigarette product's purity
Chemical Sensory Stimulation	Duration of Aroma	The length of time the aroma lasts, indicating the perceived value of the cigarette product
	Smoothness of Flavor	The smoothness of the taste, reflecting whether there is a scratchy feeling in the throat
	Intensity of Flavor	Reflects the consumer's subjective perception of flavor impact
	Strength of Cigarette	Reflects the consumer's physiological satisfaction the consumer's aftertaste experience
Physiological and Psychological Feedback	Stimulus of Flavor	Reflects the consumer's perception of discomfort the consumer's aftertaste experience
	Comfort of the Mouth	The overall residual feeling in the mouth, reflecting the consumer's aftertaste experience

3 METHODS

3.1 Market Research Method

The market research employs a survey questionnaire method to examine consumers' experiences with a particular brand of cigarettes during the smoking process. The specific research approach involves the following steps: Randomly select several consumers with a certain level of smoking experience from the survey location. The RFM (Recency, Frequency, Monetary) model is used to filter a high-value customer group based on relevant criteria. The selected consumers are then given the opportunity to test the specified cigarettes. Participants fill out a cigarette experience questionnaire. The questionnaire content comprises two main sections: Consumers evaluate the importance of the ten dimensions of their smoking experience. And consumers provide detailed evaluations of their experiences with the test cigarettes, including their overall satisfaction and other related aspect [24]. This method ensures that the collected data is relevant and reflective of the target consumer group's preferences and sensitivities regarding cigarette products.

3.2 Weight Determination

This study utilizes the entropy weight method to calculate the weight values for the cigarette product experience indicators, thereby accurately reflecting the importance of each indicator from the consumer's perspective. The calculation steps are as follows:

Step 1: Data standardization using the range method. To eliminate dimensional relationships between the indicators and achieve comparability, the original data is standardized using the range method. The specific formula for standardization is:

$$z_{ij} = \frac{x_{ij} - \min(x_{ij})}{\max(x_{ij}) - \min(x_{ij})} \tag{1}$$

Among them, i denotes the consumer participating in the survey, j denotes the indicator, x_{ij} is the original data of the i consumer for the j indicator, and z_{ij} is its standardized value. $\max(x_{ij})$ and $\min(x_{ij})$ represent the maximum and minimum values of the j Indicator, respectively.

Step 2: Calculate the information entropy for the j indicator

$$E_j = -\frac{1}{\ln n} \sum_{i=1}^{n} M_{ij} \ln M_{ij} \tag{2}$$

Where $M_{ij} = z_{ij} / \sum_{i=1}^{n} z_{ij}$, and n is the number of consumers who filled out the questionnaire.

Step 3: Calculate the weight of the j indicator

$$W_j = \frac{1 - E_j}{\sum_{j=1}^{m} (1 - E_j)} \tag{3}$$

Where m is the total number of indicators in the system.

Based on the above formulas, the weights for each indicator in this paper are as follows:

Table 2 Weight Distribution of the Cigarette Product Experience Indicator System

Dimension	Indicator	Consumer Perception Significance
Physical Transfer of Smoke	Original Aroma Original Aroma	0.1022
	Smoothness of Inhalation	0.0913
	Burning Style of Cigarette experienced during	0.0995
	Purity of Aroma	0.0879
Chemical Sensory Stimulation	Duration of Aroma	0.1232
	Smoothness of Flavor	0.0896
	Intensity of Flavor	0.0946
	Strength of Cigarette	0.1142
Physiological and Psychological Feedback	Stimulus of Flavor	0.1170
	Comfort of the Mouth	0.0804

3.3 Key Factor Identification

3.3.1 Correlation analysis

Correlation analysis is used to measure the strength and direction of the linear relationship between two variables. In this paper, the Pearson correlation coefficient method is adopted to examine the correlation between consumers' attention to experiential indicators and their satisfaction, as well as the significance of these correlations. The specific calculation formula is shown in Equation (4):

$$r = \frac{\sum_{i=1}^{n}\left(X_i - \bar{X}\right)\left(Y_i - \bar{Y}\right)}{\sqrt{\sum_{i=1}^{n}\left(X_i - \bar{X}\right)^2}\sqrt{\sum_{i=1}^{n}\left(Y_i - \bar{Y}\right)^2}} \tag{4}$$

where r denotes the correlation coefficient, n is the number of consumers participating in the survey, $X_i\left(Y_i\right)$ and $\bar{X}\left(\bar{Y}\right)$ are the sample data and their respective means.

3.3.2 Multiple linear regression analysis

Multiple linear regression analysis is used to examine the relationship between respondents' overall utility evaluation of cigarette products and their evaluation results for various experiential dimensions. This helps identify the key factors influencing the perception of cigarette smoking. The specific calculation formula is as follows:

$$Y = \beta_0 + \sum_{i=1}^{10}\beta_i X + \varepsilon \tag{5}$$

where Y denotes the respondent's overall utility evaluation of cigarette products, X represents the respondent's evaluation results for each experiential dimension, β_0 is the constant term, β_i are the regression coefficients, and ε is the random error term.

4 RESULTS

4.1 Consumer Evaluation of Cigarette Product Experience

Based on the analysis of 326 valid questionnaires, this study assigns weights to each dimension according to Table 2 and computes consumer evaluations of the test cigarette's experience, with the results illustrated in Figure 1. According to the calculated results, one consumer rated the experience score between 0 and 1, indicating a poor experience with the cigarette product. Twenty-five consumers rated their overall evaluation scores between 2 and 3, suggesting a fair experience. One hundred fifty-one consumers scored their experience between 3 and 4, indicating a good experience. Lastly, one hundred forty-nine consumers rated their overall evaluation scores between 4 and 5, reflecting a high level of acceptance for the cigarette product. Overall, more than 90% of consumers evaluated their experience with the product above 3 points, indicating a strong recognition of the product among the surveyed consumers. Additionally, the mean analysis shows that the average evaluation of the testing cigarette from the 326 valid questionnaires is 3.9859, further demonstrating high consumer satisfaction with the cigarette and indicating strong market potential for the product.
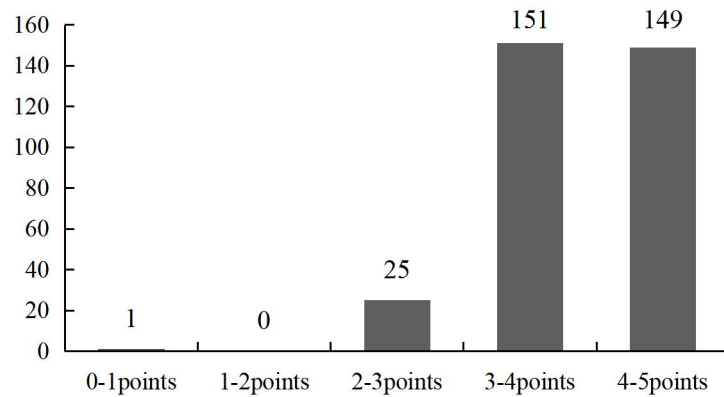
Figure 1 Evaluation of Cigarette Consumers' Experience Assessment

Next, this study further analyzes consumers' evaluation results for the experience indicators of the cigarette product, with the findings illustrated in Figure 2. According to the mean scores, four dimensions received average scores greater than 0.4, indicating that the product has gained significant recognition from testers in aspects such as "strength," "burning style," "persistence of aroma," and "stimulation." Among these, the average score for "persistence of aroma" reaches as high as 0.4922, reflecting a high level of appreciation in this area, which stands out as a notable advantage of the cigarette product. In contrast, the average scores for "smoothness of flavor" and "oral comfort" are relatively low, both below 0.35. Therefore, future improvements should focus on these two aspects to better meet consumer demands.
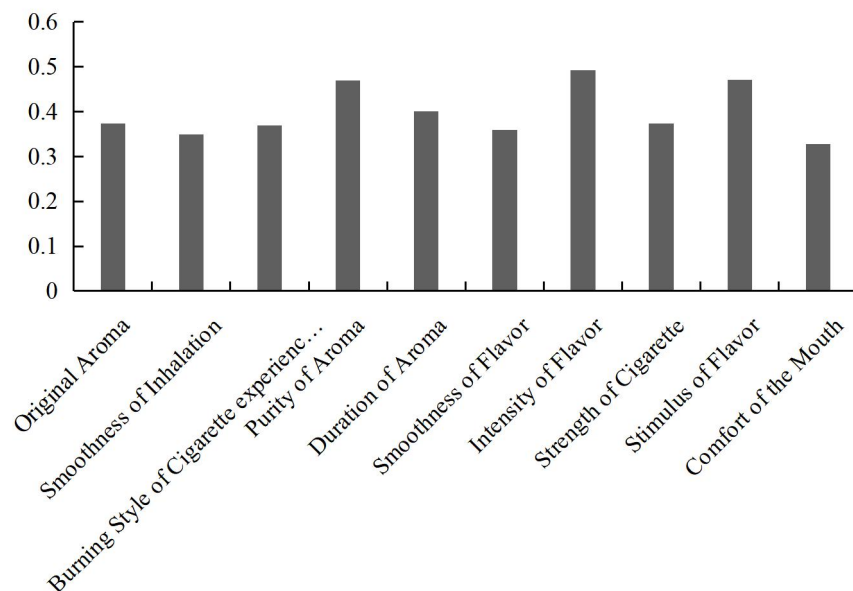

Figure 2 Mean Evaluation of Various Indicators for Cigarette Experience

In terms of the specific score distribution for each indicator, there are significant differences in the scores among the testing population (Table 3).

Regarding the "physical transmission characteristics of smoke," respondents believe that the product excels in the aroma style when opening the box. For the "original aroma" indicator, the majority of consumers scored the cigarette product between 3 and 4 points, with 137 participants rating it, which accounts for over 60% of respondents giving a score greater than 3. This indicates a general recognition of the product's aroma intensity upon opening the box.In terms of "smoothness of inhalation," 212 individuals rated the product's filter design above 3 points, reflecting a high level of satisfaction with the inhalation process among most consumers in this group.

For the "chemical sensory stimulation perception," aside from the "purity of aroma" indicator, more than 100 respondents rated other indicators between 4 and 5 points, indicating satisfaction with the product's olfactory, gustatory, and integrated sensory experiences. Specifically, concerning the "burning style of the cigarette," 261 respondents scored above 3 points, with over 30% of testers rating it between 4 and 5 points, suggesting that the core flavor of the product is well-received.

Regarding the "purity of aroma," the majority of scores fell between 3 and 4 points, with 144 respondents indicating that they perceive the aroma purity of the product to be relatively high. However, it is noteworthy that 76 individuals rated this indicator between 2 and 3 points, suggesting that there is still room for improvement in the product's aroma purity.

In terms of "persistence of aroma," 159 respondents and 104 respondents rated it between 3 and 4 points and 4 and 5 points, respectively, reflecting the participants' recognition of the cigarette product's aroma persistence, indicating a favorable cost-performance ratio for the product.

With regard to "smoothness of flavor," the highest ratings were in the range of 4 to 5, with 148 respondents, accounting for more than one-third, indicating that respondents perceive the product's smoke to have a moderate smoothness in the mouth and throat, contributing to a harmonious experience. Finally, regarding "intensity of flavor," over 80% of respondents felt that the scores for the tested product exceeded 3 points, indicating a rich flavor profile.

In terms of "physiological and psychological feedback response," respondents' evaluations of the test product predominantly fell between 3 and 4 points, with the exception of the negative indicator "stimulation of flavor." Specifically, regarding the "strength of the cigarette, 155 individuals rated this indicator between 3 and 4 points, accounting for nearly 50% of all respondents. This suggests that consumers find the physiological satisfaction offered by the product to be moderate, indicating that there is still room for improvement. For the "stimulation of flavor," over 70% of respondents rated the product below 2 points, indicating that most consumers perceive a low level of discomfort associated with the cigarette, and they are generally satisfied with its flavor profile. Regarding "oral comfort," 151 and 107 respondents rated their experience between 3 and 4 points and 4 and 5 points, respectively. This reflects that respondents find the overall residual feeling in their mouths after experiencing the product to be quite comfortable, indicating a favorable perception of the aftertaste associated with the cigarette.

Table 3 Evaluation Results of Various Indicators for Cigarette Product Experience

Indicator	Mean	Score details for each indicator (number of people)				
		0-1	1-2	2-3	3-4	4-5
Original Aroma	0.3729	11	38	73	137	67
Smoothness of Inhalation	0.3733	4	8	102	116	96
Burning Style of Cigarette experienced during	0.4012	4	4	57	149	112
Purity of Aroma	0.3595	5	4	76	144	97
Duration of Aroma	0.4922	2	8	53	159	104
Smoothness of Flavor	0.3491	8	28	38	104	148
Intensity of Flavor	0.3699	5	7	61	152	101
Strength of Cigarette	0.4687	2	7	66	155	96
Stimulus of Flavor	0.4709	90	146	66	20	4
Comfort of the Mouth	0.3281	4	5	59	151	107

4.2 Identification of Key Influencing Factors

To identify the key determinants of perceived draw (inhalation) experience, this study first employs an indicator–utility association approach to examine the correlation between consumers' attention to each experiential attribute and its utility. Second, by specifying a utility function and estimating a linear regression model, we identify the principal drivers of the cigarette draw experience.

4.2.1 Correlation analysis

Based on 326 valid questionnaires, we first summarize respondents' overall evaluations of the test cigarette: 114 were very satisfied, 133 satisfied, 69 neutral, 6 dissatisfied, and 4 very dissatisfied. We then code these categories as numerical scores—very satisfied = 5, satisfied = 4, neutral = 3, dissatisfied = 2, and very dissatisfied = 1—and use the resulting values as the consumer utility measure for the product.

Subsequently, we apply the indicator–association analysis to examine the correlation between respondents' attention to each experiential dimension and the utility value; the results are reported in Table 4. As shown, all dimensions of cigarette quality evaluation exhibit significant positive correlations with satisfaction. In other words, consumers' attention to the "physical transmission characteristics of smoke," "chemical sensory stimulation perception," and "physiological and psychological feedback response" is positively associated with their satisfaction with the product. Further inspection of the correlation coefficients indicates that "strength of the cigarette" and "smoothness (mellowness) of smoke flavor" have the largest coefficients, both exceeding 0.58, implying the strongest associations with the post-draw utility level. By contrast, the coefficients for "original aroma," "burning style of the cigarette," and "purity of aroma" are all below 0.50, suggesting relatively weaker associations with post-draw utility.

Table 4 Results of Correlation Analysis

Dimension	Indicator	Correlation coefficient
Physical Transfer of Smoke	Original Aroma Original Aroma	0.398***
	Smoothness of Inhalation	0.556***

	Burning Style of Cigarette experienced during	0.490***
	Purity of Aroma	0.424***
Chemical Sensory Stimulation	Duration of Aroma	0.533***
	Smoothness of Flavor	0.581***
	Intensity of Flavor	0.579***
	Strength of Cigarette	0.588***
Physiological and Psychological Feedback	Stimulus of Flavor	0.573***
	Comfort of the Mouth	0.516***

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively; the same applies hereafter.

4.2.2 Baseline regression results

We further estimate regressions of overall utility on respondents' ratings of each experiential dimension to identify the key determinants of the perceived draw (inhalation) experience. The results are reported in Table 5. The estimates indicate that, except for "original aroma" and "smoothness of inhalation," all coefficients are positive. Moreover, the coefficients on "persistence of aroma," "smoothness (mellowness) of smoke flavor," "intensity of flavor," "strength of the cigarette," and "stimulation of flavor" are statistically significant. This suggests that, for this cigarette product, these five dimensions constitute the principal drivers of the inhalation experience and represent the primary preference attributes guiding consumers' choice of the product.

Table 5 Key Influencing Factors of Cigarette Experience

Dimension	Indicator	Standardized coefficient	t-statistic
Physical Transfer of Smoke	Original Aroma Original Aroma	-0.414.	-0.97
	Smoothness of Inhalation	-0.151	-0.22
	Burning Style of Cigarette experienced during	1.001	1.45
	Purity of Aroma	0.400	0.86
Chemical Sensory Stimulation	Duration of Aroma	1.592***	3.16
	Smoothness of Flavor	1.945***	2.77
	Intensity of Flavor	1.505**	2.49
	Strength of Cigarette	1.074*	1.76
Physiological and Psychological Feedback	Stimulus of Flavor	0.955**	2.03
	Comfort of the Mouth	1.084	1.45
Constant term		0.392*	1.77

4.2.3 Robustness checks

(1) Outlier Treatment
To ensure the robustness of the findings, we validate the baseline regression by addressing outliers. Specifically, we apply 1% winsorization at both tails to reduce the influence of extreme values. As reported in Table 6, column (1), the coefficients on the five key factors—persistence of aroma, mellowness of smoke flavor, intensity of flavor, cigarette strength, and flavor stimulation—remain positive and statistically significant, with magnitudes closely aligned with the baseline estimates. This indicates that, after mitigating the impact of outliers, the identified key influencing factors remain stable, corroborating the reliability of the conclusions.

(2) Alternative econometric specification
Given that the dependent variable, "consumer satisfaction," is bounded and may exhibit features of censoring/truncation, we further employ a Tobit model as a robustness check. The Tobit model appropriately handles dependent variables subject to lower and upper bounds, thereby avoiding the biases that ordinary least squares (OLS) can incur when applied to censored data. As shown in Table 6, column (2), the significance levels and signs of the core variables are highly consistent with the baseline regression results.

Table 6 Robustness Test

Dimension	Indicator	Outlier treatment	Tobit specification
		(1)	(2)
Physical Transfer of Smoke	Original Aroma	-0.376 (-0.90)	-0.233 (-0.38)

Dimension	Indicator	(1)	(2)
	Smoothness of Inhalation	0.074 (0.11)	0.706 (0.73)
	Burning Style of Cigarette experienced during	0.871 (1.25)	1.697* (1.73)
	Purity of Aroma	0.348 (0.76)	0.738 (1.16)
Chemical Sensory Stimulation	Duration of Aroma	1.527*** (3.10)	2.163*** (3.09)
	Smoothness of Flavor	1.841*** (2.66)	3.072*** (3.08)
	Intensity of Flavor	1.553** (2.56)	1.900** (2.22)
	Strength of Cigarette	1.063* (1.72)	0.849 (1.00)
Physiological and Psychological Feedback	Stimulus of Flavor	1.151** (2.28)	1.348** (2.05)
	Comfort of the Mouth	0.901 (1.23)	1.663 (1.57)
Constant term		0.390* (1.76)	-1.215*** (-3.38)

4.2.4 Heterogeneity analysis

(1) Grouping by consumer experiential level

To explore demand differences across consumers with varying levels of experiential perception, we group respondents based on their composite experiential score. Given the empirical distribution, those scoring 4 or 5 are classified as the high-experience group, while the remainder constitute the medium/low-experience group. As shown in Table 7, columns (1) and (2): For the high-experience group, "smoothness of inhalation," "purity of aroma," "mellowness of smoke flavor," and "oral comfort" all exhibit significant positive effects. This indicates that high-experience consumers place greater emphasis on fine-grained quality attributes, demanding higher comfort during the draw, cleaner aroma, and a pleasant mouthfeel/aftertaste. Notably, smoothness of inhalation emerges as a core concern, reflecting their heightened sensitivity to the product's fundamental functional attributes. By contrast, among the medium/low-experience group, the coefficients of the experiential indicators fail to reach statistical significance. This may suggest that these consumers apply more relaxed standards to experiential attributes, or that their satisfaction is more strongly influenced by other factors such as price and brand image.

(2) Grouping by consumer age

To explore the differentiated demand characteristics of consumers' experiential perceptions of cigarette products across age cohorts, we divide the sample into three groups—youth (18–35), middle-aged (36–50), and older adults (51+)—and conduct separate regressions. As shown in Table 7, columns (3)–(5), the key experiential drivers differ markedly by age. Youth exhibit high sensitivity to core quality indicators: the coefficients on persistence of aroma, mellowness of smoke flavor, and flavor intensity are all significantly positive. This suggests that younger consumers place greater emphasis on sensory performance, with heightened requirements for aroma duration, smooth mouthfeel, and the strength of flavor impact—patterns likely tied to their pursuit of novelty and experiential quality, and a greater tendency to judge value through direct sensory cues. Middle-aged consumers display more mature and rational preference profiles. Their key drivers—purity of aroma, cigarette strength, and flavor stimulation—are all statistically significant, with cigarette strength exerting the most pronounced influence. This indicates a stronger emphasis on physiological satisfaction, potentially related to higher work pressures and a faster pace of life, alongside a concern for product stability and reliability reflected in attention to aroma purity. For older adults, none of the experiential coefficients are statistically significant. This may indicate more entrenched product preferences and lower sensitivity to fine-grained experiential attributes; alternatively, their purchase decisions may be more strongly shaped by brand loyalty, price sensitivity, or health considerations rather than purely sensory experience.

Table 7 Heterogeneity Test

Dimension	Indicator	Analysis grouped by consumer satisfaction		Analysis grouped by consumer age		
		Medium/low	High	Youth	Middle-aged	Older adult
		(1)	(2)	(3)	(4)	(5)
Physical Transfer of Smoke	Original Aroma	-0.214 (-0.29)	0.310 (0.94)	-0.031 (-0.07)	-1.337* (-1.76)	-5.658 (-1.05)

	Smoothness of Inhalation	0.288 (0.25)	1.127** (2.04)	-0.542 (-0.59)	1.449 (1.57)	-4.962 (-0.65)
	Burning Style of Cigarette experienced during	-0.506 (-0.45)	0.475 (0.84)	0.412 (0.51)	1.120 (0.95)	5.286 (0.73)
	Purity of Aroma	-0.035 (-0.05)	0.736* (1.83)	-0.342 (-0.63)	1.641** (2.13)	5.986 (1.00)
Chemical Sensory Stimulation	Duration of Aroma	0.880 (1.25)	0.080 (0.17)	2.723*** (4.88)	0.566 (0.58)	-5.291 (-0.72)
	Smoothness of Flavor	0.662 (0.50)	1.041* (1.92)	2.436*** (2.97)	1.075 (0.92)	3.557 (0.63)
	Intensity of Flavor	-0.656 (-0.65)	0.393 (0.80)	2.205*** (3.05)	-0.274 (-0.30)	5.894 (0.75)
	Strength of Cigarette	0.812 (0.85)	0.157 (0.31)	0.323 (0.45)	3.453*** (3.27)	2.935 (0.29)
Physiological and Psychological Feedback	Stimulus of Flavor	0.138 (0.15)	0.386 (1.10)	0.894 (1.56)	1.777* (1.98)	-1.982 (-0.67)
	Comfort of the Mouth	1.359 (1.01)	1.118* (1.96)	0.912 (0.95)	0.311 (0.31)	3.948 (0.59)
Constant term			2.193*** (10.69)	0.350 (1.25)	-0.143 (-0.42)	1.339 (1.02)

5 CONCLUSIONS AND RECOMMENDATIONS

Drawing on consumer behavior theory and the principles of sensory evaluation, this study develops a multidimensional evaluation framework for the consumer experience of cigarette products, encompassing 10 indicators across three dimensions: the physical delivery characteristics of smoke, chemosensory stimulation perception, and physiological–psychological feedback responses. We determine indicator weights using the entropy weighting method and employ Pearson correlation analysis and multiple linear regression to identify the key factors influencing consumers' experiential perceptions of cigarette products.

The empirical results show that the test cigarette product achieved a high level of consumer acceptance: over 90% of consumers rated their experience above 3 points, with an average score of 3.9859. Among specific indicators, aroma persistence received the highest score; cigarette strength and flavor stimulation also performed well, whereas mellowness of smoke flavor and oral comfort scored relatively lower, indicating substantial room for improvement. Correlation analysis reveals that all experiential dimensions are significantly and positively correlated with consumer satisfaction, with the highest coefficients observed for cigarette strength and mellowness of smoke flavor. Regression analysis further identifies five key drivers—mellowness of smoke flavor, flavor intensity, cigarette strength, aroma persistence, and flavor stimulation—among which aroma persistence exerts the most significant impact on consumer experience, underscoring the importance of perceived lasting value. Heterogeneity analysis indicates that high-experience consumers place greater emphasis on fine-grained quality attributes such as smoothness of inhalation and purity of aroma; younger consumers are more sensitive to aroma persistence, mellowness, and flavor intensity; middle-aged consumers focus more on aroma purity, cigarette strength, and flavor stimulation; while older consumers' experience evaluations are relatively stable and may be more influenced by factors such as brand loyalty.

Based on the above empirical findings, this paper proposes three policy recommendations. First, optimize the configuration of core sensory indicators and build a precision-oriented system for product quality enhancement. Establish a formula-optimization mechanism centered on aroma persistence; through improvements in tobacco-leaf fermentation processes, optimization of flavoring and fragrance ratios, and innovation in filter-tip materials, extend the duration of aroma in consumer perception and enhance perceived product value. Given that cigarette strength is a key indicator of physiological satisfaction, establish a precise control system grounded in physicochemical metrics such as nicotine content and smoke nicotine yield, and configure strength differentially according to the physiological needs of distinct consumer segments. Intensify technological efforts to improve the mellowness of smoke flavor, focusing on addressing insufficient smooth mouthfeel. By optimizing the structure of tobacco raw materials, improving the cut-rag process, and adjusting rod-making parameters, reduce throat scratchiness and enhance consumer comfort. In parallel, build a sensory quality management and control system covering the entire process—from raw material procurement and production processing to quality inspection—and conduct regular consumer sensory evaluation tests to ensure stable performance on key experiential indicators.

Second, develop a multi-tiered product matrix to meet heterogeneous preference profiles for experiential attributes. The importance of specific experiential indicators varies significantly across consumer groups; firms should therefore design a tiered and categorized product-portfolio strategy. Based on flavor intensity—the core gustatory perception indicator—develop diversified product lines that span rich, light, and intermediate styles to address different needs for flavor impact. Rich-style products should reinforce intrinsic tobacco aroma and enhance flavor fullness; light-style products

should emphasize elegance and softness to reduce sensory burden; intermediate-style products should strike a balance to fit mainstream preferences. Regarding flavor stimulation, establish a classification system based on consumer tolerance and develop low-, medium-, and high-stimulation products, achieving precise control by adjusting tobacco formulations, optimizing combustion temperatures, and improving filtration technologies. Given variation in the importance of oral comfort across age and gender groups, design targeted products that emphasize aftertaste experience, employing natural plant extracts and modified filter-tip materials to improve the comfort of residual mouthfeel. Additionally, build a precision marketing system grounded in consumer profiling, using big-data analytics to identify experiential preference patterns in different market segments and to match products to demand with greater accuracy.

Finally, refine industry evaluation standards and advance the standardization of experiential assessment systems. Establish unified definitions of experiential indicators and standardized testing protocols that specify measurement standards, rating scales, and data-processing procedures, ensuring comparability and consistency of evaluation results across firms and products. Build third-party testing and certification mechanisms to regularly assess the experiential performance of mainstream market products, institute a public disclosure system for product quality information, and publish authoritative experiential evaluation reports to guide rational consumer choice. Promote the establishment of internal experiential management systems within firms, incorporating consumer experience into assessment metrics across product development, quality control, and marketing, thereby fostering a consumer-experience-oriented quality management culture. At the same time, create experiential evaluation databases and information-sharing platforms to support technological innovation and product improvement. In addition, increase R&D investment in experiential evaluation technologies, support research institutions in developing new techniques and methods in sensory evaluation, promote the shift from traditional physicochemical metrics toward a comprehensive, consumer-experience-centered evaluation paradigm, and facilitate the high-quality development of the cigarette industry.

COMPETING INTERESTS

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