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Clustering Consumer Adoption Behavior with Respect to Innovative Tea Products in the Chinese Market

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Abstract: This study explores the diffusion of innovative tea products in the Chinese market, examining the shift from traditional tea consumption toward "new tea" products characterized by convenience, variety, and alignment with contemporary consumer preferences. Using a structured questionnaire, data were collected from 543 participants and analyzed through factor-cluster analysis to segment consumers based on their innovation adoption behavior. The results indicate that younger, educated, and higher-income groups adopt new tea innovations more rapidly. Notably, early adopters, representing over half of the consumer base, are not frequent consumers of these beverages, compelling suppliers to continually innovate to maintain long-term revenue growth. This study contributes to the literature by highlighting the influence of sociodemographic factors on adoption rates and offering strategic marketing insights to enhance the uptake of new tea products. These findings underscore the importance of targeting demographic segments effectively and addressing the unique consumption patterns of early adopters to drive sustained market growth.

Keywords: tea; consumer behavior; food innovation; China

1. Introduction

For more than a millennium, tea and its associated cultural rituals have been central to Asian cultures, particularly in Chinese society. Tea is deeply ingrained in local communities, serving not only as a daily beverage but also as a symbol of hospitality, social ritual, and spiritual contemplation [1]. However, while this beverage has remained remarkably unchanged in its preparation and consumption for centuries, due to its embeddedness in Confucian cultures, traditional tea consumption is now undergoing significant changes [2,3].

The transformation of the tea market in China can largely be attributed to a generational shift in consumer behavior. As post-millennial consumer groups increasingly dominate the consumer landscape, their preferences and values—shaped by an era of rapid technological advancement and global cultural exchanges—are driving innovation in traditional sectors, including tea [4]. Unlike their predecessors, who upheld the traditional, ritualistic, and ceremonial aspects of tea consumption, younger consumers are increasingly motivated by convenience, variety, and alignment with modern consumption patterns [5].

This generational transition has made innovation a crucial factor in maintaining tea's relevance in the market. Innovative tea products, often referred to as "new tea" (or xīncháyǐn in Chinese), are perceived in the market as differentiated beverages due to their departure from traditional tea consumption, mainly in terms of the inclusion of additional ingredients such as alcohol, texturized snacks, and most notably, dairy derivatives (see Section 2 for a conceptual definition). Some of these innovations represent significant departures from the traditional range of tea products, rather than mere variations. Notable examples include the globally popular "bubble tea", which emerged in Taiwan in 1984 [6], and the more recent addition of fresh cheese to cold tea beverages [7].

While scholarly studies on this phenomenon are scarce, recent reports have confirmed a clear trend towards innovation in the tea industry, with a particular emphasis on the fusion of traditional and novel ingredients to create unique alternatives that cater to the tastes of the younger demographic [8–10]. Consumers are also increasingly health-conscious, leading to a rise in demand for beverages with added nutritional value and health benefits, such as those incorporating herbal ingredients like embolic and shaddock peel [11–13]. Moreover, increased transparency and customization, with the disclosure of nutritional information and choice over ingredients, as seen in leading tea chains such as HeyTea, are becoming the norm in this industry. The "new tea" market is projected to reach RMB 200 billion (USD 27.6 billion) by 2030 [14].

This paper investigates recent transformations within the Chinese tea market, emphasizing the diffusion of innovative tea products amid rapid market changes. Given the emergence of new innovations, understanding the dynamics of tea innovation diffusion in the consumer market is central. We specifically examine the factors driving consumer adoption of innovative tea products, focusing on how sociodemographic characteristics influence this adoption, as conceptualized by Rogers [15]. Furthermore, we explore the relationship between consumer adoption rates and the frequency of consumption of these products. This analysis is vital for market stakeholders, as it sheds light on the demand dynamics that new products encounter upon entering this competitive market. At the conclusion of this study, we find that younger, educated, and higher-income groups are more likely to adopt new tea innovations quickly. However, early adopters, who account for more than half of the consumers, are not frequent consumers of the beverage. This effectively locks the suppliers into a path of continuous innovation to secure long-term income generation and growth.

2. The "New Tea" Concept: Definition and Relevant Literature

The "new tea" (or xīncháyǐn in Chinese) concept represents a contemporary evolution of traditional tea beverages [16]. From the perspective of consumers, the concept of "new tea" products is by now widely known in the Chinese market and differentiates itself from traditional tea based on the incorporation of modern flavors, ingredients, and presentation styles [17]. This concept reflects a broader shift in consumer preferences towards products that are aligned with contemporary consumer demands. This approach has fueled continuous growth in the tea industry in China, attracting a new generation of tea drinkers.

Traditional tea in China, deeply embedded in cultural and historical contexts, is characterized by its simple preparation methods and the use of pure tea leaves. It holds significant cultural importance, often associated with social rituals, spiritual contemplation, and symbols of hospitality [18]. Varieties such as green tea, oolong tea, black tea, and pu-erh have been consumed for centuries, with a focus on the natural flavors and health benefits of the tea leaves themselves. The consumption of traditional tea emphasizes the appreciation of its inherent qualities, including aroma, taste, and the meditative process of brewing and drinking [19]. This historical backdrop provides a stark contrast to the emerging concept of "new tea", which incorporates modern flavors, ingredients, and presentation styles to cater to contemporary consumer preferences.

"New tea" beverages, on the other hand, often feature unconventional flavors such as fruits, cheeses, and floral notes, along with unique additions like tapioca pearls, jelly, fruit pieces, and cheese foam, transforming the tea into a complex, snack-like experience [16,17,20]. Furthermore, "new tea" products are distinguished by modern, stylish branding and packaging that resonate with younger demographics, positioning the beverage as a lifestyle accessory [17]. This is complemented by aggressive marketing strategies that leverage digital platforms, social media buzz, influencer partnerships, and visually appealing storefronts to enhance visibility and desirability among consumers [17,21].

The literature on or directly relevant to the "new tea" market is well-established, covering a broad spectrum of studies. These focus either on the supply side, with special

emphasis on the physiological aspects of these products and studies on the nutritional or chemical content of beverages [22,23] or their impact on health [24]; or on the demand side, where contributions explore this industry from the perspective of consumer demand and examine the determinants of purchasing decisions in terms of product attributes [25], marketing strategies to promote new products [26], or the sensory influences behind consumer choice [27]. Interestingly, although the connection between sociodemographic characteristics of consumers and beverage consumption has not been actively explored, such characteristics are known to significantly shape consumers' behavior [6,28]. The present paper contributes further knowledge on this front by profiling the sociodemographic characteristics of consumer groups segmented based on their adoption behavior with respect to "new tea".

3. Hypothesis Development

Rogers introduced the concept of adopter categories as part of the Diffusion of Innovations Theory (1962), which has been applied in various fields, including communication, agriculture, public health, criminal justice, social work, and marketing [29,30]. This theory is used to understand how new ideas or products spread through a social system and how individuals adopt them over time. It highlights the importance of understanding the characteristics of the target population, as different strategies are needed to appeal to each adopter category [15]. By recognizing the distinct characteristics of each adopter category, stakeholders can effectively persuade (or dissuade) specific groups, thereby increasing (or decreasing) the likelihood of widespread adoption.

In Rogers' work, each category of individuals is characterized by distinct traits and behaviors, influencing how they perceive and adopt new ideas, products, or services (p. 254 [14]). The first group, Innovators, are the earliest adopters, driven by a desire to be among the first to try something new and are often venturesome and willing to take risks. Following them are the Early Adopters, consisting of opinion leaders comfortable with change and requiring minimal persuasion to adopt new ideas. They are influential in shaping trends and are often respected by their peers. The Early Majority group adopts new ideas or technologies after witnessing evidence of their effectiveness, being pragmatic and making decisions based on utility and practical benefits. The Late Majority shares some traits with the early majority but is more cautious and needs more convincing before committing to adopt new ideas, products, or technologies. Finally, the Laggard group is slow to adapt to new ideas or technologies, often adopting only when forced to or because everyone else has already. They tend to be more skeptical and resistant to change.

H1: *Adoption behavior of consumers with respect to the "new tea" allows for segmentation by consumer group.*

Rogers posits a correlation between sociodemographic characteristics and consumer innovativeness in his seminal work (1984), linking factors such as education, age, literacy, and domain of activity with innovation adoption behavior. However, more recent empirical literature finds contradictory results for correlations between sociodemographics and domain-specific innovativeness [31,32]. For instance, Hirunyawipada and Paswan [33], working in the high technology product market, find a positive correlation between consumer income and adoption behavior, while Goldsmith et al. [34], studying social values in the fashion market, do not find the same correlation. The ambiguous empirical findings likely emanate from behaviors specific to different products, setting the stage for hypotheses regarding adoption groups in the tea market.

The first sociodemographic factor considered is the age of the consumers. While Rogers found an inconclusive relationship between adoption speed and age, more recent research largely identifies a positive correlation. This might be explained by the increase in the pace of technological and market innovations in recent decades, which have altered the underlying dynamics of adoption [35]. In this context, younger consumers are found to be

more innovative than older consumers [36], and more open to innovations [37]. Acceptance of novelties in the food market is hence not only due to enhanced 'cognitive abilities' to process information related to novel products but also to better access to the latest mass information tools to receive relevant information about the novel product [38].

H2a: *Younger consumers are faster adopters of innovations in tea products.*

In the literature on food innovation adoption, a consistent theme emerges regarding behavior variations between males and females. Guerrero et al. [39], for instance, conducted an investigation on consumer preferences and acceptance of new food innovations and found that males exhibit a higher propensity to embrace food innovations compared to females. This was explained by differences in taste preferences and risk-taking propensity of male respondents. Menozzi et al. [40] conducted a study exploring gender differences in food consumption patterns and reached a similar conclusion, highlighting the role of societal norms and cultural influences in shaping gender-specific attitudes towards novel food products.

H2b: *Males are faster adopters of innovations in tea products.*

In terms of education, Rogers advances that "Early adopters have more years of education than later adopters" (p. 251 [14]). Similarly, Gutkowska et al. [41] find that individuals with higher levels of education are more willing to accept changes in food derived from animals compared to those with lower educational attainment. This correlation is further supported by Rabadán's [42] research on wine products, which consistently found that lower levels of education were associated with increased neophobia, while individuals with higher levels of education tended to be more open to trying new wines. Additionally, Schnettler et al. [43] confirmed that consumers with university education are more inclined to accept changes in both animal-based and plant-based foods.

H2c: *More educated consumers are faster adopters of innovations in tea products.*

Rogers generalizes that "Earlier adopters have higher social status than later adopters", which he defined as higher income and occupational prestige (p. 251 [14]). This is confirmed in studies on food innovations [44,45]. Sajdakowska et al. [46] assert that individuals with higher incomes often seek novelty and variety in their food consumption patterns, leading them to actively seek out and embrace innovative food products. This propensity for experimentation and exploration is facilitated by the financial flexibility afforded by higher income levels.

H2d: *Higher income consumers are faster adopters of innovations in tea products.*

Beyond sociodemographic characteristics, we formulate another hypothesis on the relationship between adoption behavior and another individual trait: the frequency of consumption. Previous research generally indicates that an increase in the frequency of purchasing a certain type of product tends to lead to a higher acceptance of innovative products for other categories. For instance, a study conducted on Chinese consumers revealed that those who frequently purchase new food items are more inclined to accept and try innovative products from international brands [47]. Similarly, research conducted in Europe suggests that consumers who regularly experiment with new food items are more open to purchasing and trying new food [48].

However, this might not be true when considering frequency of purchases within the same food category. Consumers who purchase a particular product at a high frequency may exhibit a tendency to reject new varieties of the same product due to the strong familiarity resulting from frequent purchases. As a result of this high level of familiarity, consumers develop strong preferences for a particular product [49], which may lead to resistance

towards trying new varieties. Consequently, when making decisions, the heightened familiarity resulting from frequent purchases may lead them to engage in routine decision-making processes rather than engaging in exploratory thinking [50,51]. This, in turn, may further contribute to consumers overlooking new information and alternatives [52].

H3: *Early adopters are more frequent consumers of "new tea".*

4. Materials and Methods

This study investigates the adoption of innovative tea products and characterizes distinct consumer clusters based on their innovation adoption behaviors, examining differences in age, education level, income level, and purchasing frequency. To achieve these objectives, data analysis was conducted involving Exploratory Factor Analysis (EFA), and a two-step cluster analysis followed by ANOVA and Tukey post hoc tests, using IBM SPSS Statistics 25.

The initial step involved conducting an EFA using principal component analysis (PCA) with varimax rotation on the 14 innovation-related items. EFA helps identify the underlying dimensions of innovation adoption for new tea beverage consumption without imposing a predefined structure on the data. A varimax rotation was then employed to clarify the social meanings of the factors [53]. To ensure the reliability of the constructs, both Composite Reliability (CR) and Cronbach's Alpha were calculated for each factor identified in the EFA. Cronbach's Alpha assesses the internal consistency of the items within each factor, while Composite Reliability provides a more comprehensive measure by considering the factor loadings. Both metrics exceeded the commonly accepted threshold of 0.70, indicating good reliability [54].

Following the EFA, a two-step cluster analysis was performed to identify distinct clusters of "new tea" consumers based on their adoption behaviors. The two-step method is advantageous as it helps to determine the optimal number of clusters inductively [55,56]. The first step involved pre-clustering the cases using a sequential clustering method. In the second step, hierarchical clustering was applied to the pre-clustered cases to refine the cluster solution. After identifying the clusters, one-way ANOVA tests were conducted to compare the mean scores of sociodemographic characteristics and consumption frequency across the clusters. The Tukey post hoc test was then used to explore statistically significant differences between the clusters, providing detailed insights into the distinct characteristics of each consumer segment [57].

4.1. Questionnaire Development

The questionnaire consists of two sections. The first section includes measurement scales for 14 items related to consumer innovation, using seven-point Likert scales that range from 1, representing "fully disagree", to 7, representing "fully agree". Recognizing that consumer innovation should be evaluated as a multi-item construct, we follow the approach of Sajdakowska et al., [46] and adapt the survey questions developed in their study on food innovation adoption to the "new tea" context. The concept of "new tea" is introduced to the consumer using the Chinese term xīncháyǐn, which literally means "new tea beverage" and is widely known to refer to the innovative tea products as described above. In order to ensure alignment with the focus of the research project, the names of the most successful new tea brands are provided as examples (i.e., HeyTea, Naixue's Tea, Auntie Shanghai). The second section comprises several sociodemographic and individual-based questions, including age, income, gender, educational level, and frequency of consumption, among others. A control question designed to identify disengaged respondents is embedded in the survey to reduce noise in the data [58–60].

4.2. Data Collection and Sample

The online survey was conducted in April 2024 through Wenjuanxing (WJX), the largest online survey platform in China, akin to Qualtrics. The targeted population for

sampling is the market segment that is known to represent potential consumers for "new tea" products in the Chinese market—i.e., younger, urban consumers [57]. As this coincides with WJX's respondents' sociodemographics, one single recruitment criterion was set for this survey—i.e., adults aged 18 or older. The survey took approximately 15–20 min to complete. Participants were incentivized with reward points directly credited to their WJX accounts, which could be converted into monetary rewards. Research ethics approval for this study was granted by Xi'an Jiaotong-Liverpool University. Out of 636 responses collected, 543 (85.4%) were deemed valid for analysis (Table 1).

Table 1. Sample distribution (*n* = 543).

Item	Number of Respondents	Percentage
Gender		
Male	257	47.33%
Female	286	52.67%
Age		
18–25	179	32.96%
26–30	205	37.75%
31–40	138	25.41%
41–50	17	3.15%
Above 50	4	0.74%
Education level		
High school and below	13	2.39%
Technical school	54	9.94%
Undergraduate	423	77.9%
Postgraduate and above	53	9.76%
Income (thousand RMB)		
0–5	21	3.87%
5–10	89	16.39%
10–15	99	18.23%
15–20	98	18.05%
20–25	102	18.78%
25~30	57	10.5%
Above 3	77	14.18%
Children		
Yes	388	71.45%
No	155	28.55%
Living environment:		
Urban	485	89.32%
Rural	58	10.68%
Frequency of consumption:		
Never	5	0.92%
Daily	53	9.76%
Several times per week	342	62.98%
Several times per month	143	26.34%

In terms of gender distribution, the proportion of males and females is balanced, with a slight majority being female. The respondents' ages are primarily concentrated between 18 and 40 years, with the highest proportion in the 26 to 30 age group (37.75%).

Most respondents hold a bachelor's degree (77.9%), representing the largest educational group. Income levels are broadly distributed, with the most common bracket being the upper middle-income range, specifically monthly household disposable incomes of RMB 20 K–25 K (approximately USD 2800–3500). Additionally, the vast majority of respondents reside in urban areas (89.32% of the sample). Regarding the frequency of consumption, most respondents report purchasing new tea beverages several times a week (62.98%).

5. Results

5.1. Innovation Adoption Profiles

A principal component analysis with varimax rotation was conducted on 14 items related to innovation. The Kaiser–Meyer–Olkin (KMO) index, which indicates sampling adequacy, was recorded at 0.897, and a significant Bartlett's test (chi-square = 2168.835, df = 55, $p < 0.001$) confirmed the sample's suitability for factor analysis. Following Kaiser's criteria (1974), two items—"I know more about new tea beverage products than other people" and "I'm very picky about the new tea drinks I'll have"—were excluded due to their low factor loadings (below 0.5). Additionally, the item "When thinking about afternoon tea, I try new tea drinks" was excluded because it loaded on different scales. Harman's single-factor test [61], conducted using a non-rotated exploratory factor analysis, indicated no significant concerns with common method bias. The analysis confirmed three dimensions of consumer innovation using the remaining 11 items, which collectively explained 63.40% of the variance (see Table 2).

Table 2. Factor analysis—factor loadings.

Principal Factor	Innovative Leadership	Confident Experimentation	Emotional Enthusiasm for Novelty
1. When a new product is launched, I am usually the first to try it.	0.84		
2. I know more about new products than others.	0.83		
3. When new products are launched, I try them earlier than my friends and neighbors.	0.81		
4. I actively gather information about new products.	0.76		
5. I often try different new products.	0.55		
6. I am not uncomfortable with novelty tea beverages; I really want to try them.		0.76	
7. I'm not afraid to try new tea beverages that I've never tried before.		0.75	
8. Even if I'm not sure about the specific ingredients in the new tea beverage, I will still try it.		0.68	
9. I enjoy trying new tea beverages.			0.89
10. Trying new products makes me excited.			0.59
11. I like new tea beverages from different brands.			0.56
Cronbach's ά	0.87	0.76	0.71

The first factor, termed Innovative Leadership, demonstrated high reliability with Cronbach's alpha coefficients of 0.87. This dimension includes five items: (1) "When a new product is launched, I am usually the first to try it"; (2) "I know more about new products than others"; (3) "When new products are launched, I try them earlier than my friends and neighbors"; (4) "I actively gather information about new products"; and (5) "I often try

different new products". These items suggest a proactive and knowledgeable approach to new products, where individuals actively seek out information and are often the first to experiment with new offerings. This proactive behavior indicates a willingness to explore and embrace novelty, positioning such consumers as trendsetters within their social circles.

The second factor, Confident Experimentation, exhibited strong reliability with a Cronbach's alpha of 0.76. It comprises three items: (6) "I am not uncomfortable with novelty tea beverages, I really want to try it"; (7) "I'm not afraid to try new tea beverages that I've never tried before"; and (8) "Even if I'm not sure about the specific ingredients in the new tea beverage, I will still try it". This factor reflects a lack of fear or hesitation when it comes to trying unfamiliar products, indicating a willingness to experiment with new tea beverages even without prior knowledge of their contents. It suggests a degree of trust or absence of risk aversion.

The third factor, Emotional Enthusiasm for Novelty, consists of three items: (9) "I enjoy trying new tea beverages"; (10) "Trying new products makes me excited"; and (11) "I like new tea beverages from different brands". This factor is characterized by Cronbach's alpha coefficients of 0.71. The items within this factor focus on the emotional thrill and pleasure derived from experiencing new tea products, indicating an affective reaction to novelty.

In the overall sample, the average scores were as follows: Innovative Leadership at 5.43 (SD = 1.36), Emotional Enthusiasm for Novelty at 5.55 (SD = 1.46), and Confident Experimentation relatively lower at 3.90 (SD = 1.46). These results suggest that Chinese consumers generally show high acceptance of new beverages and find pleasure in trying them. However, a number of consumers still feel apprehension toward trying products they are unfamiliar with, although they will engage with the new beverage. This opens interesting questions related to the motivation for adoption, whether the decision to adopt is based on fulfilling social norms centered upon the adoption of novelty products or on individual hedonic motivations related to food consumption.

5.2. Cluster Analysis

A two-stage cluster analysis, based on respondents' scores across the three dimensions—Innovative Leadership, Confident Experimentation, and Emotional Enthusiasm for Novelty—identified four distinct consumer groups, with an average Silhouette value of 0.4 [62]. The scores for each of the innovation factors across these clusters are detailed in Table 3. Additionally, the differences between groups were statistically analyzed using one-way ANOVA, followed by post hoc Tukey multiple comparison tests to discern statistically significant differences among the clusters.

Table 3. Innovation-based market segmentation (average scores on seven-point Likert scales).

	Confident Early Adopters	Early Adopters	Late Adopters	Cautious Laggards
Innovative Leadership	5.99 [a]	5.73 [a]	5.18 [b]	3.91 [c]
Confident Experimentation	4.91 [a]	3.09 [d]	4.01 [b]	3.85 [c]
Emotional Enthusiasm for Novelty	5.90 [a]	6.01 [a]	4.09 [c]	5.31 [b]
Number of respondents	245	87	120	91
% of sample	45.1	16	22.1	16.8

[a]; [b]; [c]; [d] Scores in one row with a different superscript are significantly different at $p < 0.05$ (one-way ANOVA and post hoc Tukey multiple comparison test); "[a]" means the accordance value is relatively higher, followed by "[b]" "[c]" and "[d]".

The first cluster, which we named Confident Early Adopters, comprises 45.1% of the sample. This group has the highest scores across all factors, indicating that these consumers are leaders in trying new products, demonstrate confidence in their experimentation with new teas, and exhibit strong emotional enthusiasm for novelty. These characteristics align closely with those typically associated with early adopters in Rogers' theory (1984), who are

known for their willingness to take risks on new innovations and their proactive approach to embracing novelty.

The second cluster, Early Adopters, accounts for 16% of the sample. This cluster displays similar scores to the Confident Early Adopters in terms of Innovative Leadership and Emotional Enthusiasm for Novelty, suggesting a comparable zeal and proactive stance towards new tea products. The absence of significant differences in these factors, as revealed by the Tukey test, suggests that their adoption behavior and enthusiasm are essentially on par with the Confident Early Adopters. However, they are differentiated by a notably lower score in Confident Experimentation, indicating a relative apprehension towards the consumption of new beverages, despite their general eagerness and initiative. This suggests that while they are eager to explore new tea offerings, they may approach them with more caution or hesitancy.

The third cluster, Late Adopters, comprises 22.1% of the overall sample and shows moderate scores in all factors, reflecting a more cautious yet still open attitude toward new products. This group aligns with Rogers' late majority, both in terms of the timing of their market entry (after more than 50% have adopted the product) and their comparative size. They are not as hesitant as laggards but do not exhibit the same level of enthusiasm or leadership as the early adopters. Late Adopters typically wait until new products have been tested and accepted by the majority before trying them themselves, preferring to avoid the risks associated with early adoption.

The final cluster, Cautious Laggards, represents 16.8% of the sample and has the lowest scores in Innovative Leadership and Confident Experimentation but, surprisingly, a higher score in Emotional Enthusiasm for Novelty compared to their scores in other factors. This again maps well with Rogers' theoretical 'laggards', who account for the last segment of the consumer population. While these consumers may eventually come to appreciate new products, they are much more hesitant and take longer to adopt innovations. Cautious Laggards tend to be more skeptical of new trends and innovations, preferring to stick with familiar products and routines until they are convinced of the benefits of change.

5.3. Sociodemographic Determinants and Cluster Analysis

The one-way ANOVA with a Tukey post hoc test revealed significant differences among the four groups in terms of age, education level, income level, and purchasing frequency. However, differences in gender were not found to be statistically significant (Table 4).

Table 4. Sociodemographic characteristics and innovation adoption clusters.

	Confident Early Adopters	Early Adopters	Late Adopters	Cautious Adopters	Hypothesis	
Age	25.4 [c]	28.4 [b]	33.1 [a]	36.6 [a]	H2a	Supported
Gender	1.52 [a]	1.62 [a]	1.56 [a]	1.42 [a]	H2b	Not supported
Education level	3.20 [a]	2.98 [b]	2.91 [b]	2.75 [c]	H2c	Supported
Income level	4.74 [a]	3.97 [b]	4.21 [b]	3.67 [c]	H2d	Supported
Purchase frequency	3.05 [b]	3.09 [b]	3.11 [b]	3.52 [a]	H3	Not supported
Number of respondents	245	87	120	91		
% of sample	45.1	16	22.1	16.8		

[a]; [b]; [c] Scores in one row with a different superscript are significantly different at *p* < 0.05 (one-way ANOVA and post hoc Tukey multiple comparison test); "[a]" means the accordance value is relatively higher, followed by "b" and "c".

In relation to age, the one-way ANOVA revealed a significant difference ($\chi^2 = 12.33$; $p = 0.01$), with the Cautious Laggards group having a higher average age of 36.6 years compared to other groups. The youngest average age is observed in the Confident Early Adopters group at 25.4 years. This difference may be attributed to a negative correlation

between age and Factor 2, Confident Experimentation (p = 0.023), indicating that older individuals tend to be more cautious when it comes to risk-taking. Consequently, older consumers may find it challenging to embrace innovation in tea products when faced with uncertainty about the ingredients. Contrary to Rogers' generalization, and in line with more recent studies, we conclude that younger consumers are faster adopters of novelty tea beverages.

Regarding education level, the ANOVA results show a significant effect (χ^2 = 2.15; p = 0.03), with Confident Early Adopters possessing the highest levels of education, whereas Cautious Laggards have the lowest. This suggests that individuals with higher education are more open-minded, have better access to information, and are thus more inclined to accept and try new tea beverages. Indeed, more educated consumers are faster adopters of innovations in tea products.

In terms of income levels, there was a significant disparity (χ^2 = 8.32; p < 0.001), with Confident Early Adopters comprising a higher proportion of consumers with higher incomes, while Cautious Laggards had the lowest income levels among the groups. This difference can be explained by the fact that consumers with higher income levels are less concerned about the trial-and-error costs associated with new products and are therefore more inclined to embrace the uncertainty of new offerings.

Finally, purchasing frequency also showed a significant difference among the four clusters (χ^2 = 14.47; p < 0.001). As the frequency of consuming new tea beverages increases, consumer innovativeness decreases. The cluster with the highest innovativeness, Confident Early Adopters, exhibits the lowest beverage consumption frequency, followed by Early Adopters and Late Adopters. Conversely, Cautious Laggards, the group with the lowest innovativeness, has the highest consumption frequency. This pattern could be explained by the fact that higher consumption frequency increases routine and habitual decision-making, which in turn raises the heuristic cost of adopting new alternatives.

6. Discussion

The findings from our analysis on the adoption behavior of innovative tea products in the Chinese market have led to several notable observations. These insights contribute to our understanding of how innovative products can effectively penetrate markets characterized by traditional preferences and rapidly evolving consumer behaviors.

We built on Rogers' work on market segmentation and sociodemographic analysis [15] as a foundation to map out consumer groups in terms of their adoption behavior of "new tea" products. In this context, our empirical findings resonate with theoretical predictions regarding adoption groups, especially for consumers who are slower to adopt. However, a notable difference is observed in the larger size of the early adopters clusters in our study, which suggests that the market for innovative tea products is rife with consumers who are keen to experiment with new flavors and concepts. For marketers, this highlights the importance of targeting these consumers with strategies that emphasize the innovative aspects of the product, leverage digital marketing to reach younger consumers, and engage through storytelling that resonates with a desire for novelty and personal expression.

At the same time, our study indicates that there is a complex relationship between the frequency of consumption and the propensity to try new products. While one might assume that frequent consumers are always open to new experiences, our findings suggest that the highest frequency consumers exhibit a lower degree of innovativeness compared to those who consume less frequently. This could be explained by brand loyalty as over time, frequent consumers develop strong brand and product loyalty based on trust and consistent satisfaction with their existing tea products. This loyalty makes them resistant to trying new options, as there is a perceived risk that the new product may not meet their expectations. Previous studies on consumer behavior in this industry have shown that loyalty to specific brands creates a significant barrier to adopting new innovations [63,64]. Another explanation might come from a saturation effect where consumers who frequently consume new tea products may become less receptive to further innovations [65]. This would be in

line with the fact that frequent tea consumers place a significant emphasis on the sensory experience, including taste, aroma, and brewing techniques. Frequent tea consumers who have refined their palate for existing tea options may find innovative products lacking in these sensory qualities, leading to lower receptivity [66]. This observation challenges marketers to re-engage frequent consumers and reignite their interest in new offerings.

When considering in parallel the large size of early adopter groups and the negative correlation between consumption frequency and early adoption behavior, it becomes apparent that the tea market is underpinned by peculiar market dynamics, given that half the market will rush to try novelties but will not be regularly consuming the product. On the other hand, slow adopters (but more frequent consumers), forming only a fraction of the market, are better contributors to the long-term income generated by a single innovation. These findings provide an underlying mechanism to explain the state of the current new tea industry in China, which continuously innovates and develops new products at a fast pace [67].

In terms of individual sociodemographic characteristics, the data from our study support the hypothesis that age, income, and education are decisive factors influencing the speed at which consumers adopt innovative tea products in the Chinese market. This falls in line with expectations and confirms that the tea market shares similarities with other innovation markets. Younger consumers have shown a propensity for quicker adoption, which is further justified by the fact that the new tea market in China is by now heavily reliant on digital platforms for marketing, sales, and delivery of its products. This was developed for the convenience of younger, connected generations, which contributes to their increased comfort in adopting new beverages in this context [68,69]. This inclination is further facilitated by educational attainment, which our findings indicate correlates with openness to innovation. Educated consumers are typically more exposed to new information and ideas, enhancing their willingness to experiment with novel products. Additionally, income levels play a pivotal role, as higher-income individuals are more likely to try new products due to their greater disposable income and lower relative financial risk in purchasing premium or untested products. This economic capability not only allows them to experiment but also positions them as trendsetters within their social circles. The convergence of these three demographic factors—age, income, and education—provides the consumer segment that drives the market for new tea products.

On the other hand, contrary to previous studies in the field of consumer behavior which often find significant differences in how men and women adopt new products, our study found that gender does not play a significant role in the adoption of new tea products. This could be indicative of a choice context in which traditional gender preference biases— e.g., in terms of risk tolerance [70] or symbolic valuation [71]—are not pertinent enough to the decision to purchase tea beverages.

7. Conclusions

In this study, we explore the diffusion of innovative tea products within the Chinese market, focusing on the sociodemographic characteristics that shape consumer adoption. Our analysis reveals a distinct preference for these new tea variants among younger, highly educated, and higher-income consumers. This segment exhibits a faster adoption rate, propelled by their openness to new experiences and a lifestyle that embraces modern consumption patterns. Interestingly, our findings suggest that gender does not significantly influence the adoption of innovative tea products.

Segmenting consumers into clear adopter categories offers valuable insights into market dynamics and consumer behavior. The segmentation unveils a receptive market for innovative tea products, with a substantial proportion of consumers classified as early adopters. These individuals not only eagerly embrace new products but also wield influence over others due to their social status and willingness to take risks. However, we observe that early adopters may not necessarily be frequent consumers of the beverage,

underscoring the need for continuous innovation to sustain long-term income generation and growth.

These findings underscore the strategic importance of innovation and of targeting the early adopter segment, which is characterized by a blend of curiosity and enthusiasm for new experiences—but infrequent consumption. Marketing strategies leveraging digital platforms, engaging consumers through storytelling, and accentuating product uniqueness could prove particularly effective in continuously engaging early adopters. At the same time, while consumers with high purchase frequency may not necessarily be driven by innovation in new tea beverages, suppliers ought to consider maintaining a range of classic products to retain these consumers.

In conclusion, our study offers comprehensive insights into the factors driving the adoption of innovative tea products in China, emphasizing the pivotal role of demographic influences and market segmentation. Armed with this understanding, stakeholders in the tea industry can tailor their strategies to effectively reach and engage the most receptive consumer segments, fostering growth and innovation in this dynamic market.

8. Limitations

While this study provides valuable insights, it is important to acknowledge several limitations that could be addressed in future research. Firstly, the sample predominantly consists of younger, urban participants, potentially limiting the generalizability of the findings to more rural areas where traditional tea consumption practices are prevalent and adoption patterns may differ. Additionally, the fast-paced nature of market changes and innovations in the tea industry suggests that the findings may quickly become outdated, highlighting the need for ongoing research to stay current with evolving consumer trends and preferences. Lastly, while this study builds on a segmentation of consumers based on innovation behavior, relying solely on this framework may overlook other psychological or sociocultural factors that could influence adoption behavior and warrant further exploration. Studies based on segmentation also need further verification through follow-up research as the findings might be dependent on the sample population in the present research.

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