Marketing insights & new product launch suggestions for PepsiCo

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KANTAR WORLDPANEL
A CTR SERVICE IN CHINA

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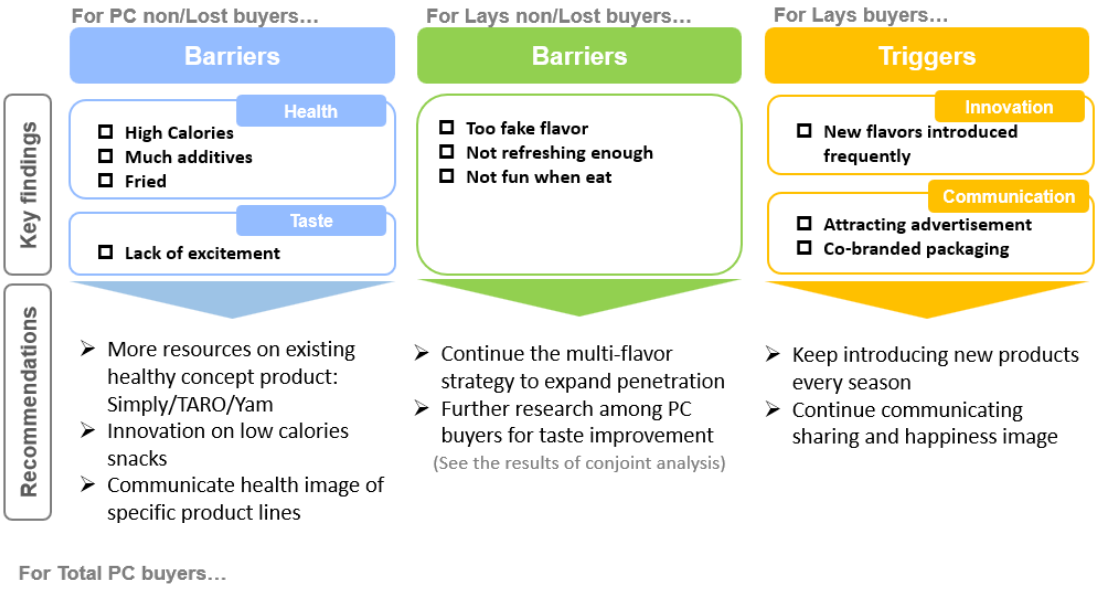
Table of Contents

1. Executive Summary



For Total PC buyers...

Product Lines

- **Develop "Healthy + Portable" Concept Products---- apply portable small packages to current mild flavor products(e.g., nature taste and Taro Chips)**
- **Develop Family Sharing Packs---- Incorporate regional flavors as well as festive features into new products, with super larger package**
- **Innovation on sweet flavor (e.g., Honey butter chips)**
- **Apply super large package size to current top-selling strong flavor products and mild flavor products(e.g., Hotpot Series and Nature Series)**

2. Introduction

2.1 Who We Are and What We Offer

Kantar World panel is a leading global market research organization providing consumer insights through a consumer panel. We have different types of consumer panel for a specific research topic. The panel is to look for representative samples in the population that we want to study, and we continuously track their purchasing behavior over a long period of time.

Household panel is the panel that I will use for this project. Since this year, we have expanded to 62,000 samples for our household panels, and it covers total range in China from different region or city tier. Every time they purchase some products, the panelists record data via our APP through scanning the QR code so that we can record the actual purchase behaviors. Above from the purchase behavior, we have basic demographic

information of panelists, such as household monthly income, family size, family life stage, etc.

Figure1. Household Panel

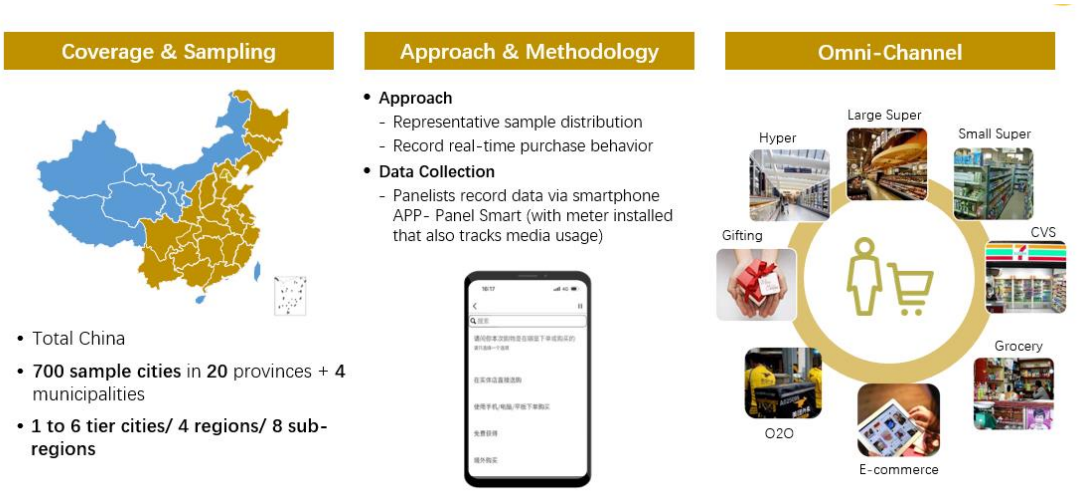


Figure 2. Sample Criteria of Household Panel

Kantar World panel collect purchase behavior data so that we can know about who, where, what and how. We have demographic information such as household size, life stage etc. At the same time, we can dive into the region. City tier, channel and retailer, the attributes of the products can also be discussed.、

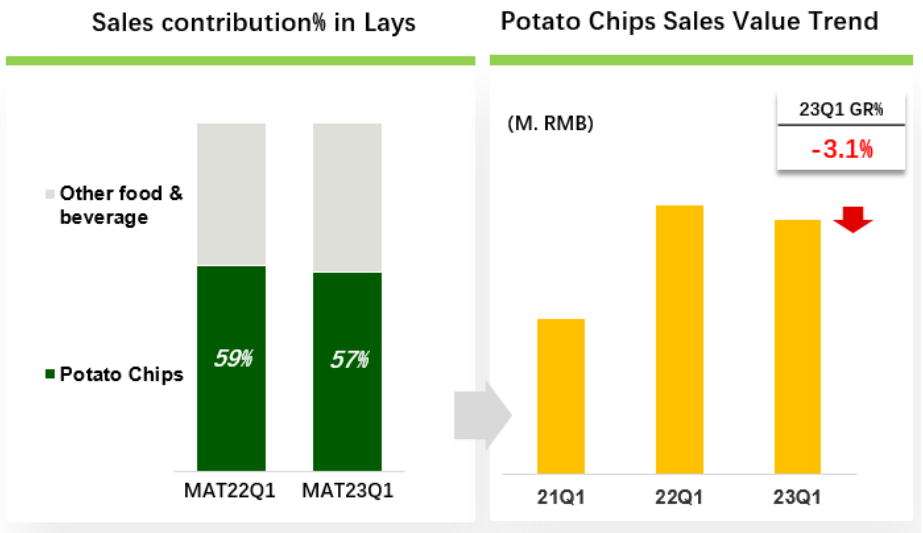
Figure 3. What does Panel Data offer

WHO	WHERE	WHAT	HOW
Demographic Household Size Life stage Income Level **Behavioral Demographic** Heavy category user Brand loyal shopper Online Shopper ...	Region City Tier Channel Retailer	Manufacturer Brand Series/Sub-brand Variant Pack type Pack size Flavor	Units Spend

2.2 Client's Request

Potato Chips account for the major sales of LAYS, however, the market showed significant decline in Q1 after the promising growth.
Therefore, LAYS wanted to understand the reasons for the decline in the market， design and launch new products according to consumer needs.

Figure 4. Project Background



3. Business Objectives and Data Analytics Objectives

3.1 Business Problem

1. **To identify Potato Chips Market Landscape**
   - Conduct Gain & Loss analysis to identify potato chips market landscape and competitive landscape based on customer purchase data and information.
2. **To track key behaviors of LAYS Potato Chips**
   - Conduct Measure Tree analysis to identify the driving factors of total sales.

- Identify potential opportunities/risks

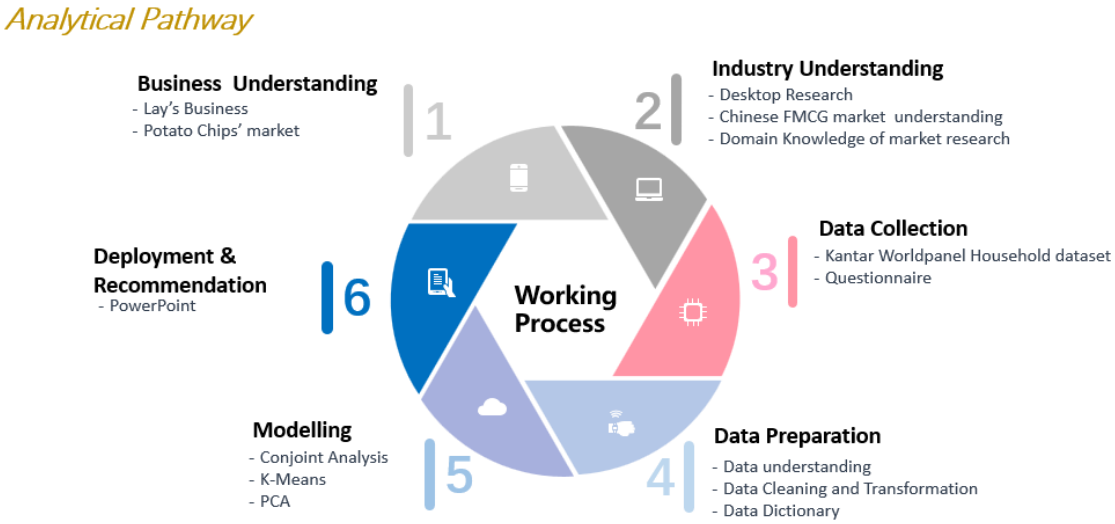
3. **To make product launch suggestions**
   - Using fractional factorial method to design Product Profiles.
   - Conduct questionnaire designs for data collection to know about consumers' attitude, needs, opinions, and usage of Lays.
   - Build a K-Means model for customers profiling.
   - Conduct conjoint Analysis to identify target customer's preferences.

3.2 Data Analytics Objectives

- Conduct customer segmentation by using clustering analysis on users' behavioral and demographic data. Enhance understanding for customers and help to develop future strategies for specialized groups.
- Deploy principal component analysis for perceptual maps, investigating the barrier of Lays.

4. Project Plan

Figure 5. Analytical Pathway



5. Data Acquisition and Data Description

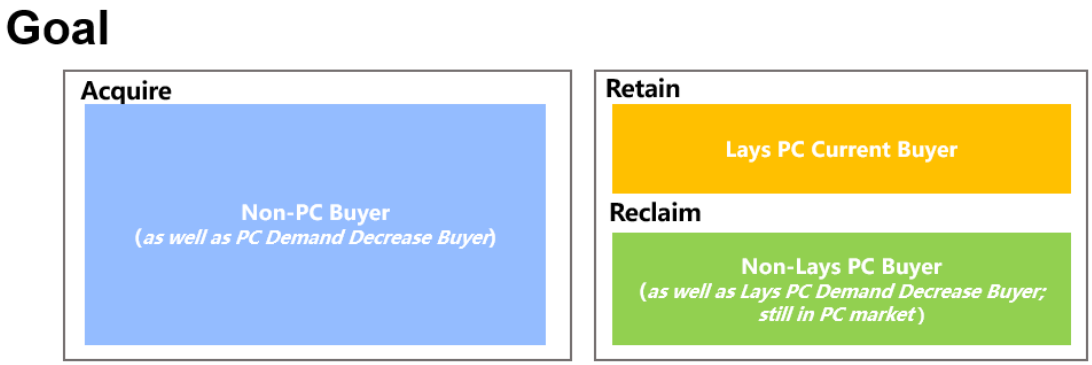
The dataset we used in this project will contain Panel data (purchase behavior included) and questionnaire data. It is insufficient to solve our business problem by only using the panel data. We need to understand how consumers think and how they behave.

Fig 6. Data Source

5.1.1 Questionnaire Design

The first thing to do is to identify relevant groups to survey. Our goal is to increase penetration by acquiring non-PC buyers, retaining Lays current buyers, and reclaiming non-Lays PC buyers. We therefore collected information on these three groups by distributing questionnaires.

Figure 7. Relevant Groups to Survey



The questionnaire has slight differences between the 3 groups of people (non-PC buyers, Lays PC current buyers and Non-Lays PC buyers), but generally it contains four sections. The first part is the consumers' basic information, which includes consumers' gender, age, city tier, family stage and Monthly Disposal Income.

The second part is the consumer's purchase behavior, including the competing categories/brands they purchase, frequency, annual spend, channel and occasions.

The third part is consumers' attitude towards the brand and potato chips category.

The fourth part identifies the four most critical attributes that affect consumers' buying potato chips preferences, namely flavor, texture, price, package size and oil, with each attribute having 2 to 4 levels.

Table 8. Data Dictionary for Questionnaire Samples

Variables	Type	Description
Gender	Categorical	1=Male, 0=Female

Age	Ordinal	1=15-24 y.o; 2=25-34 y.o; 3=35-44 y.o; 4=45-54 y.o; 5= more than 54 y.o;
City Tier	Categorical	1=Key&A Cities; 0=B-D Cities
Life Stage	Categorical	Young Singles&Couples, Mixed Families, Teenager Families, Adult Families, Empty Nest Families
Monthly Income	Ordinal	1= less than 5k RMB; = 5-7k RMB; 3= 7-9k RMB; 4= 9-12k RMB; 5=12-16k RMB; 6= more than 16k RMB
Frequency	Ordinal	1= once for a few months; 2= 1-2 times/months; 3= 3-6 times/months; 4= >6 times/months
Annual Spend	Ordinal	1= less than 50 RMB; 2= 50-100 RMB; 3= 100-150 RMB; 4= 150-200 RMB; 5= more than 200 RMB
Channel	Categorical	Hyper, Super, CVS, Accepting, EC, O2O
Occasion	Categorical	Festivals, Friends, Chatting, TV, Outdoor, Study&Work, Diet
Attitude towards PC	Nominal	
Attitude towards Brands	Nominal	
Preference for different portfolios	Ordinal	Rated from 0 to 10

For the conjoint Analysis part, by means of preliminary desktop research and summary, the most representative attributes and levels in Potato Chips were selected.

Table 9. Conjoint Analysis

For Conjoint Analysis..

Attributes	Levels			
Package Size	Small Package (<=50g)	Medium Package (50-120g)	Large Package (110-220g)	Super Large Package (>220g)
Price	5 RMB	10 RMB	15 RMB	
Flavor	Mild	Strong	Sweet	Traditional Flavor
Texture	Thin	Thick		
Oil	Baked crisps(no oil added)	Deep-fried chips		

5.1.2 Survey and data collection

To ensure that the participants can better understand and fill in the questionnaire, a detailed explanation of the attributes and levels related to potato chips was given to the participating consumers at the beginning of the questionnaire.

To ensure the quality of the data, this paper adopts the online method to distribute the questionnaire. The questionnaire was mainly distributed and collected through the platform, with random participants and high data quality.

To increase the motivation of the interviewed consumers, a random red packet is used to ensure the quality of the data and obtain more authentic and effective questionnaire data. The final number of valid questionnaires collected is 903.

Figure 10. Distribution by group, Questionnaire Data

Group	Number	Ratio
Non-PC buyers	187	20.7%
Non-Lays buyers/Lays lost buyers (but still in PC market)	201	22.3%
Lays current buyers	515	57%

Figure 11. Distribution by City Tier, Questionnaire Data

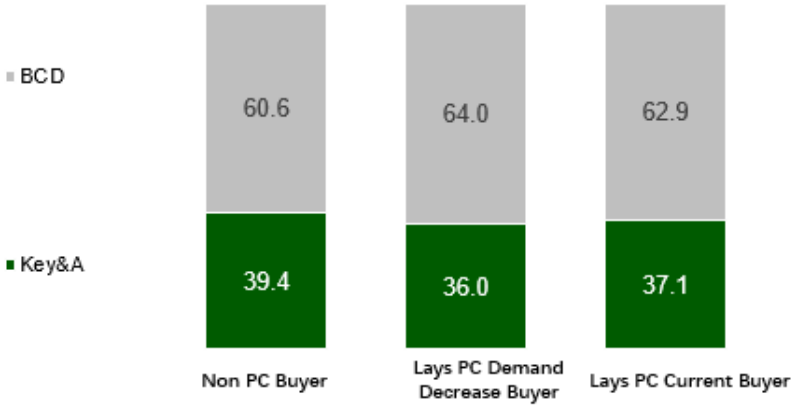
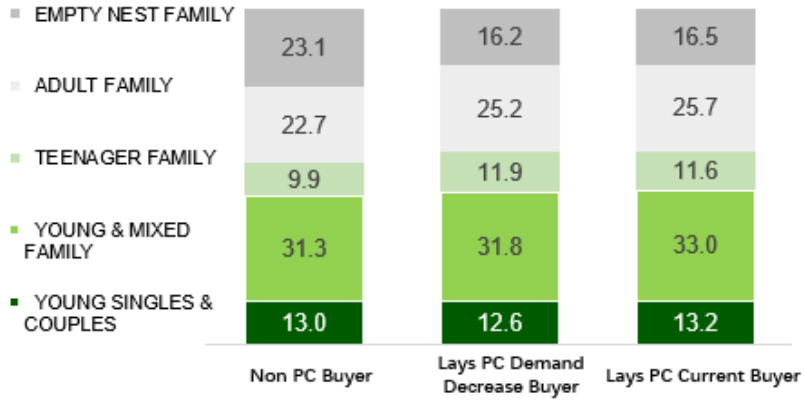


Figure 12. Distribution by Life Stage, Panel Data



According to the questionnaire data, the maximum difference between the distribution of the respondent's city tier and Life Stage compared with the distribution of the panel data is within 5.5 per cent.

5.1.3 Experimental Design for Conjoint Analysis

1. **Formulate Attributes and Levels**

To implement a conjoint analysis, it is necessary to identify all those attributes, as well as establishing the levels associated with each attribute.
By means of preliminary desktop research and summary, the most representative attributes and levels in Potato Chips were selected.

Figure 13. Word Cloud generated from Ecommerce Platform

The attributes (and their levels) identified as most important when buying Potato Chips w ere:
a) Texture (thick and thin)
b) flavor (strong, mild, sweet, and traditional)
c) Price(5,10,15rmb)
d) Package Size (small, medium, large, super large)
e) Oil (no oil added, Deep-fried crisps)

Table 14. Attributes and Levels

Attribute	Level
Texture	thick
	thin
Flavor	Mild Flavor
	Strong Flavor
	Sweet Flavor
	Traditional Flavor
Price	5 RMB
	10 RMB
	15 RMB
Package Size	50g/pack，small package
	100g/pack，medium package
	150g/pack，large package
	200g/pack，super large package
Oil	Baked crisps (no oil added)
	Deep-fried crisps

2. Fractional Factorial Design

A full profile approach would involve 192 (2×4×3×4×2) profiles for the Potato Chips. To reduce the number of profiles to a manageable size, the orthogonal design procedure in

SPSS statistical program was used. This reduced the number of profiles to be evaluated to 16.

Having established the card profiles for Potato Chips, each respondent was given sixteen cards, with each card defining the levels of each of the seven attributes. Respondents were asked to rate each of the sixteen cards by circling the most appropriate number, where one equals a completely unsatisfactory product and ten equals an ideal product.

Table 15. Hypothetical Potato Chips Profiles Represented to Respondents

	PackageSize	Price	Flavor	Crispness	Oil	STATUS_	CARD_
1	150g/pack,large pa...	5 rmb	Traditional Fla...	thick	Deep-fried cris...	设计	1
2	50g/pack,small pa...	5 rmb	Traditional Fla...	thin	Baked crisps(...	设计	2
3	200g/pack,super la...	5 rmb	Sweet Flavor	thick	Deep-fried cris...	设计	3
4	50g/pack,small pa...	15 rmb	Sweet Flavor	thick	Deep-fried cris...	设计	4
5	100g/pack,medium...	5 rmb	Sweet Flavor	thin	Baked crisps(...	设计	5
6	150g/pack,large pa...	10 rmb	Sweet Flavor	thin	Baked crisps(...	设计	6
7	200g/pack,super la...	10 rmb	Light Flavor	thin	Deep-fried cris...	设计	7
8	100g/pack,medium...	5 rmb	Strong Flavor	thin	Deep-fried cris...	设计	8
9	50g/pack,small pa...	10 rmb	Strong Flavor	thick	Baked crisps(...	设计	9
10	100g/pack,medium...	10 rmb	Traditional Fla...	thick	Deep-fried cris...	设计	10
11	150g/pack,large pa...	15 rmb	Strong Flavor	thin	Deep-fried cris...	设计	11
12	200g/pack,super la...	5 rmb	Strong Flavor	thick	Baked crisps(...	设计	12
13	50g/pack,small pa...	5 rmb	Light Flavor	thin	Deep-fried cris...	设计	13
14	150g/pack,large pa...	5 rmb	Light Flavor	thick	Baked crisps(...	设计	14
15	200g/pack,super la...	15 rmb	Traditional Fla...	thin	Baked crisps(...	设计	15
16	100g/pack,medium...	15 rmb	Light Flavor	thick	Baked crisps(...	设计	16

6. Exploratory Analysis

6.1 Identify Potato Chips Market Landscape

6.1.1 Market Trend

Over time, it became increasingly evident that consumers had varying preferences when it came to potato chip package sizes. Some preferred smaller packages that were easier to carry around and consume on-the-go, while others preferred larger packages that offered more value for their money. Overall, consumer demand for potato chip package sizes started to polarize.

Table 16. Potato Chips Market Share by Package Size

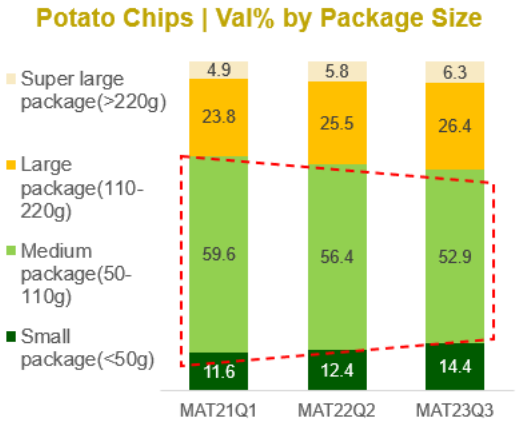
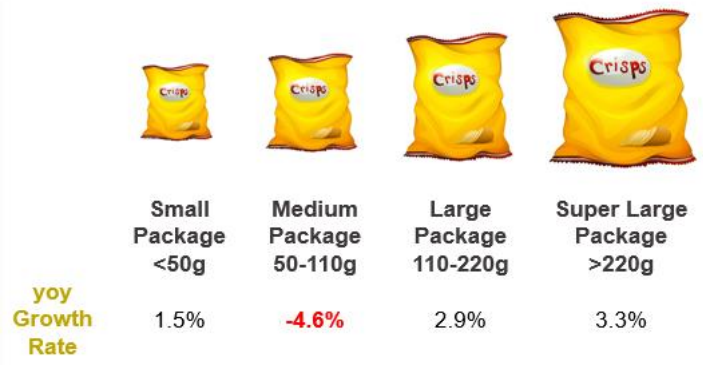


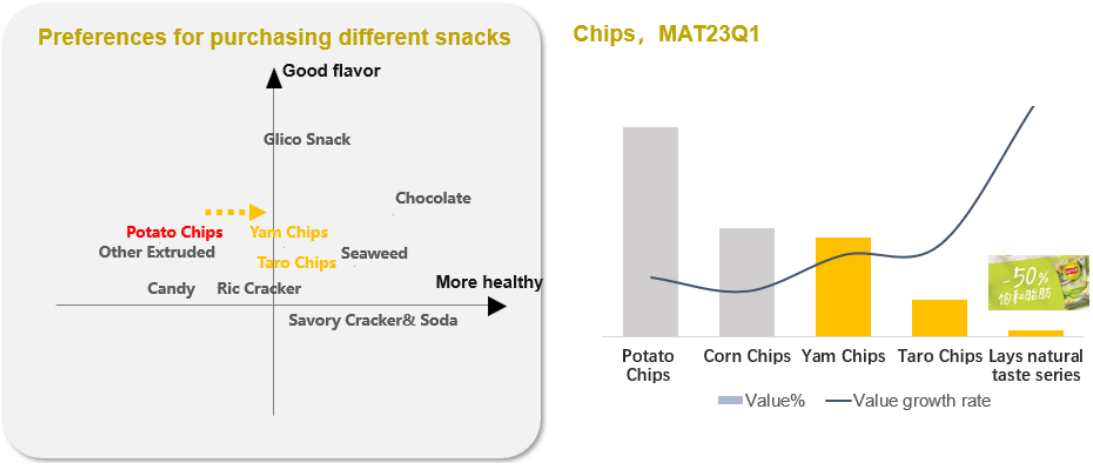
Table 17. Potato Chips Growth Rate by Package Size



Consumers perceive different snack categories differently, which is why it is crucial to understand their preferences and choices. One such category is the chips category, which is further divided into various types, including potato chips, taro chips and yam chips.

Due to increasing health concerns, consumers are always on the lookout for healthier snacking options. Therefore, it is essential to focus on providing healthy snacking options to consumers, such as taro and yam chips that are low in calories and high in nutrition. Brands can also consider introducing different flavors and spices to cater to the diverse taste preferences of consumers. Moreover, it is crucial to create awareness among consumers about the health benefits of consuming taro and yam chips. This can be done through effective marketing campaigns and by highlighting the nutritional value of these chips.

Table 18. Consumers' Preferences for Purchasing Different Snacks



6.1.2 Competition Landscape

Based on our analysis of consumer spending across snack and adjacent categories, we have identified the main competing categories as savory biscuits, nuts, and chocolate.

Further examination of consumer behavior and preferences within these categories may reveal opportunities for expansion or differentiation in our own product offerings.

Table 19. Shifting across Snacks

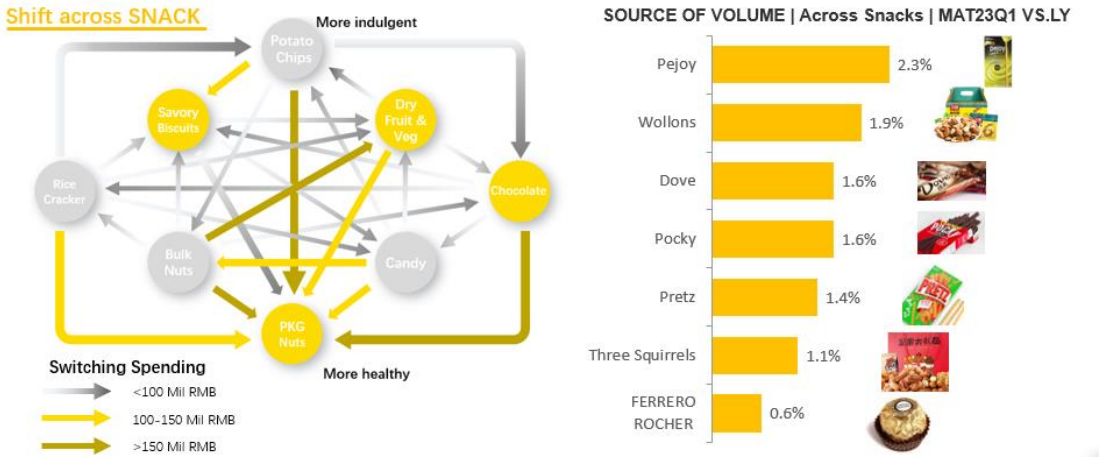
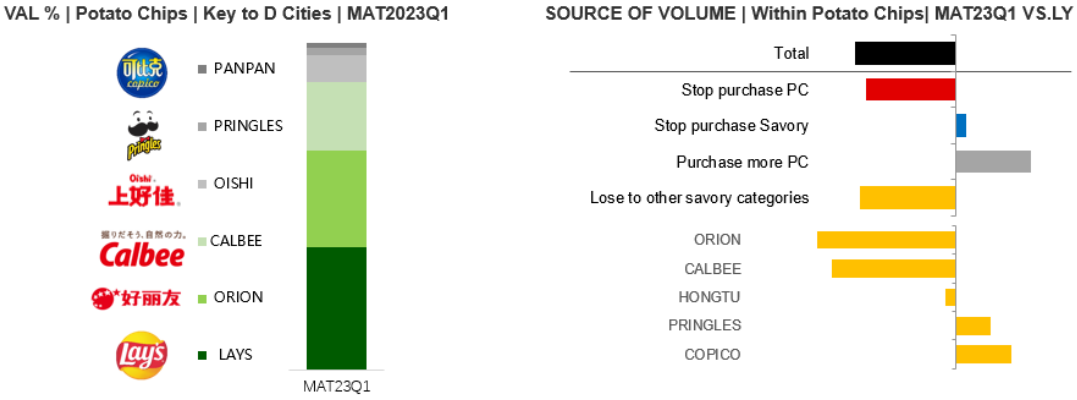


Table 20. Shifting across Potato Chips Brands



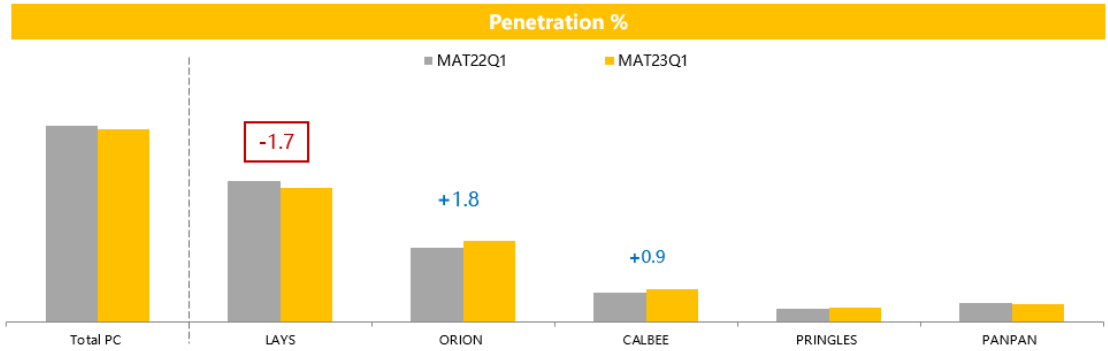
Lays, ORION, CALBEE and Oishi are top players in Chinese Potato Chips market. In MAT2023Q1, Lays underperformed due to less category buyers and huge shift to ORION and CALBEE brands.

6.2 Key Behavior of Lays

6.2.1 Driving Factors

Lays needs to speed up new buyer recruitment as currently it's behind competitors. Thus, acquiring non buyers, retaining Brand's current buyers and reclaiming brand's losing buyers are crucial.

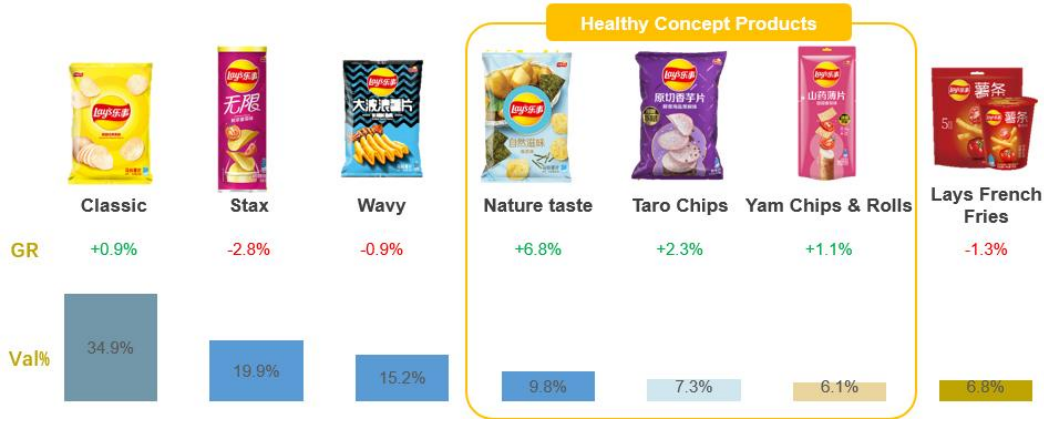
Table 21. Penetration Change



6.2.2 Opportunities and Risks

Consistent with the industry trend, the healthy concept product line, including Nature Taste, Taro Chips, and Yam Chips, is experiencing significant growth.

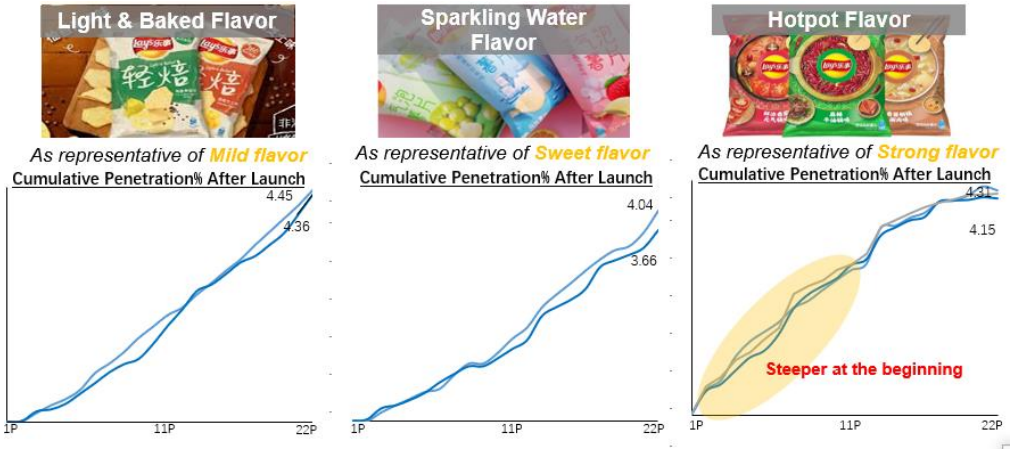
Table 22. sub-brand performance



New flavors can be developed based on investigation on repeat rate and penetration of previous launches.

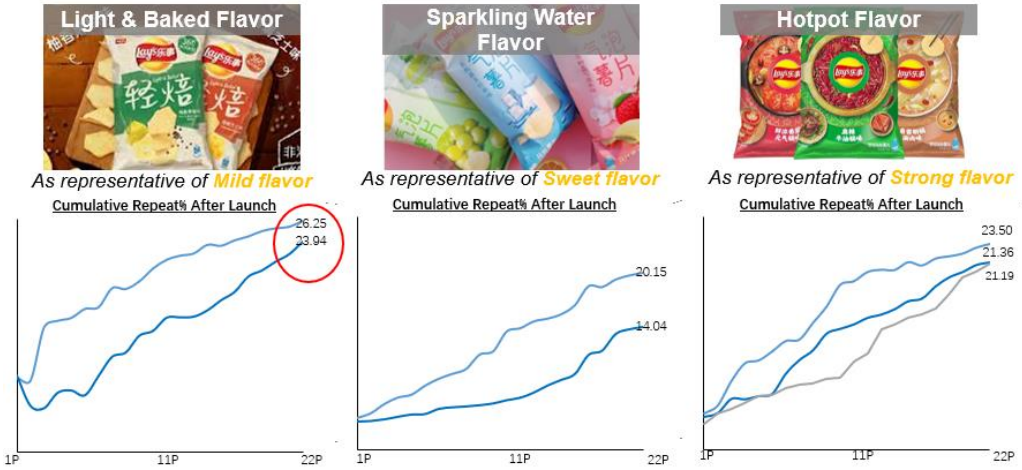
As we can see from the graphs below, after launching for the same period, the penetration rate of Light & Baked flavor and Hotpot flavor are similar. However, Hotpot flavor accumulates higher penetration at the beginning.

Table 23. Cumulative Penetration



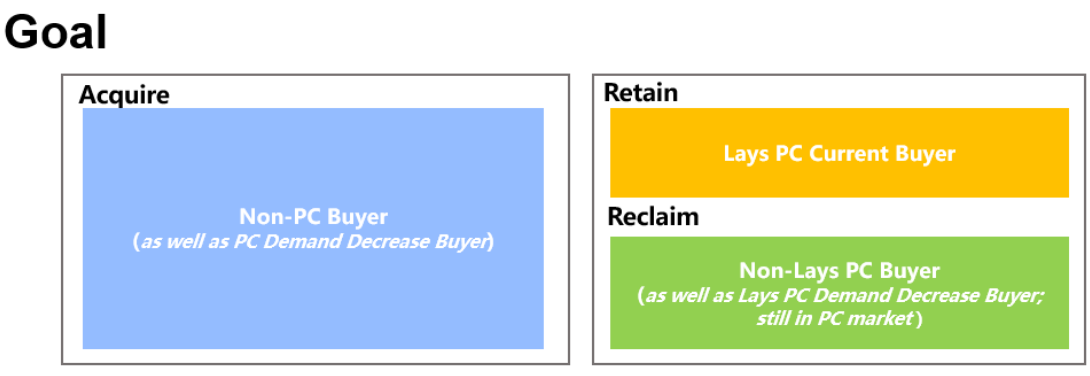
Light & Baked flavor has a higher repeat rate compared to Hotpot flavor.

Table 24. Cumulative Repeat%



7. Data Analysis based on questionnaire

Our goal is to increase penetration by acquiring non-PC buyers, retaining Lays current buyers, and reclaiming non-Lays PC buyers. We therefore collected information on these three groups by distributing questionnaires.



7.1 What are the barriers to purchasing Potato Chips for Non-PC buyers?

- For young & Mixed families, Seaweed, Glico biscuits and Snacking Cheese are main competing categories.
  The key barriers for this group are:
  - Less stock up needs after COVID *(less family time at home after Covid)*
  - Can't find package size I want (prefer Independent small pack, won't overeat)
- For Adult families, Nuts, bean snack, savory biscuit are main competing categories.
  The key barriers for this group are the same as total.
- For Empty Nest families, Nuts, Chinese pastry, Dry Vegetable & Fruits are the main competing categories. They usually have high health concerns. It's relatively difficult for PC to fulfill their functional healthy needs.
- For Young singles & couple families, Nuts, cheese, Rice Cracker are the main competing categories.
  The key barrier for this group is negative info online.
- For young & Mixed families, Nuts, Glico biscuits, seafood snack are main competing categories.
  The key barriers for this group are:
  - Tired of eating (segment lack of excitement)
  - Can't find package size I want (prefer Independent small pack, convenient)

Figure 25. Barriers for Non-PC buyers (different household)

	Total	Y&M	Adult	E. Nest	Teen	Y S&C
Main consumer	-	<15 y.o.	18-24, 35-44 y.o.	45-64 y.o.	<18 y.o.	25-34 y.o.
Key barriers (by demo only highlight differentiating barrier)	• **Not healthy** • High Calories • Much additives • Fried snack	• Less stock up needs after COVID *(less family time at home after Covid)* • Can't find package size I want (prefer Independent small pack, won't overeat)	(Same barriers as total)	• High health concern • Fried	• Negative info online	• Tired of eating *(segment lack of excitement)* • Can't find package size I want (prefer Independent small pack, convenient)
Competing category (rank by importance)	Nuts, cheese, seafood snack	Seaweed, Glico biscuits Snacking Cheese,	Nuts, bean snack, savory biscuit	Nuts, Chinese pastry, Dry Vegetable & Fruits	Nuts, cheese, Rice Cracker	Nuts, Glico biscuits, seafood snack
Key Insight	Need to bridge our brand with **healthy image to reduce barriers**	• Parents are critical gate keeper to **avoid overweight** • Need to communicate **consumption occasion** to encourage stock up	• **Low calories & natural ingredient** products are good to engage them	• Difficult for salty to fulfill their **functional healthy needs**	• Easily influenced by **online negative information**	• Like to seek **taste enjoyment and excitement** • **Convenient package** solution is value added
Action for Lays	• More resources on existing healthy concept product: **Simply/TARO/Yam** • Innovation on low calories snacks	• Communicate different **consumption occasion** • **Provide Convenient package**	• Expand penetration among **Simply/TARO**	• Some **occasion penetration** like CNY to promote the family reunion	• Positive Word-of-Mouth • **Digital engagement** to remove the concern	• Keep bring **PC new news** to them • **Provide Convenient package**

7.2 For Potato Chips Buyers

7.2.1 K-Means Clustering and Customer Profiling

1. K-Means Clustering

In order to have a detailed description of customer segmentation for Potato Chips buyers, K-Means was conducted.

For the K-means clustering, only Demographic Purchase data were used. I Visualized the

elbow method to get the optimal value of K, zoom out this curve then we will see that last elbow comes at k=6. By using the elbow method, a cluster of number of 6 was chosen.

Figure 26. Elbow Method Output

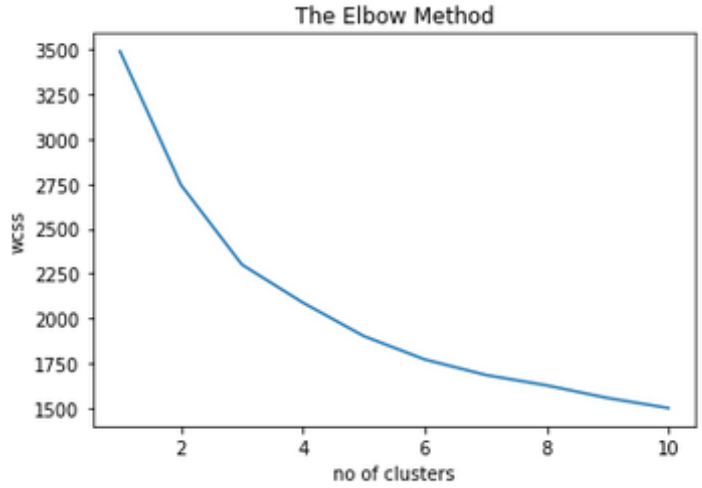


Figure 27. Cluster Comparison Output (JMP)

Cluster Comparison

Method	NCluster	CCC	Best
K Means Cluster	3	6.72146	
K Means Cluster	4	16.6194	
K Means Cluster	5	36.5167	
K Means Cluster	6	40.7047	
K Means Cluster	7	35.9067	
K Means Cluster	8	42.6255	Optimal CCC

Columns Scaled Individually

The results of K-Means are presented below (Figure 28):

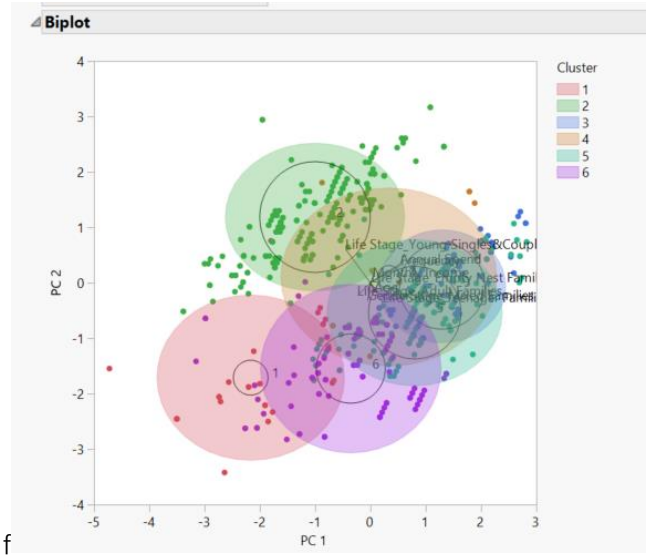
K Means NCluster=6

Columns Scaled Individually

Cluster Summary

Cluster	Count	Step	Criterion
1	25	7	0
2	253		
3	151		
4	11		
5	177		
6	99		

Figure 28. Biplot



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2. Consumers' Profiling

Descriptive statistics for each profile are shown below:

Figure 29. Gender Distribution by Cluster

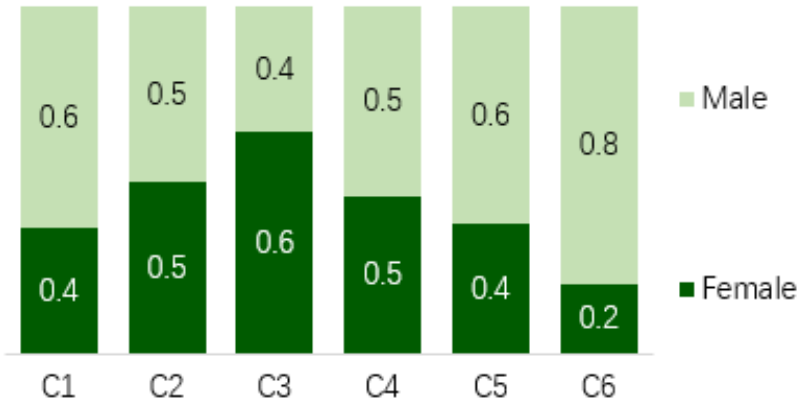


Figure 30. Age Distribution by Cluster

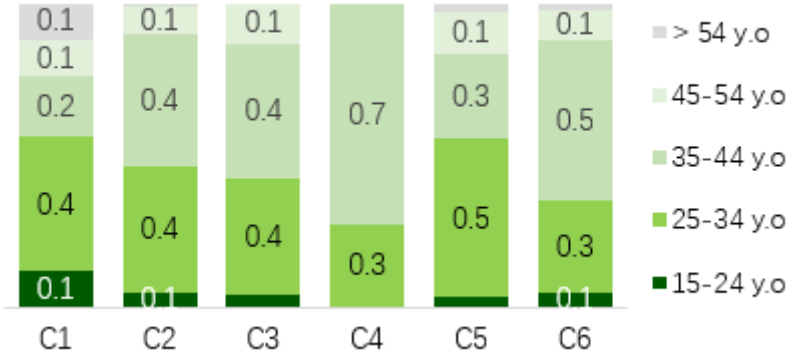


Figure 31. City Tier Distribution by Cluster

Figure 32. Monthly Income Distribution by Cluster

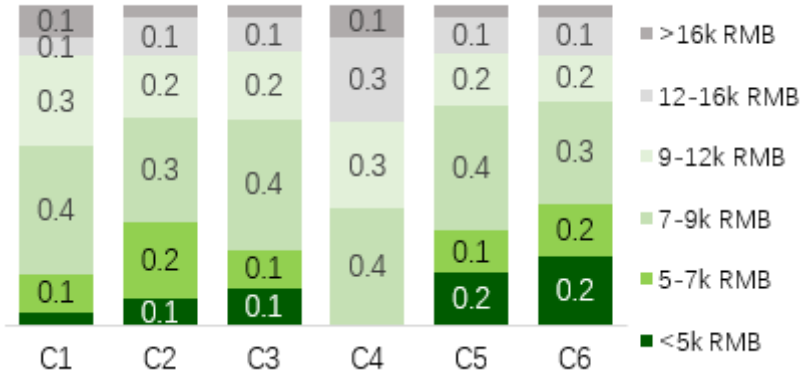


Figure 33. Purchase Frequency Distribution by Cluster

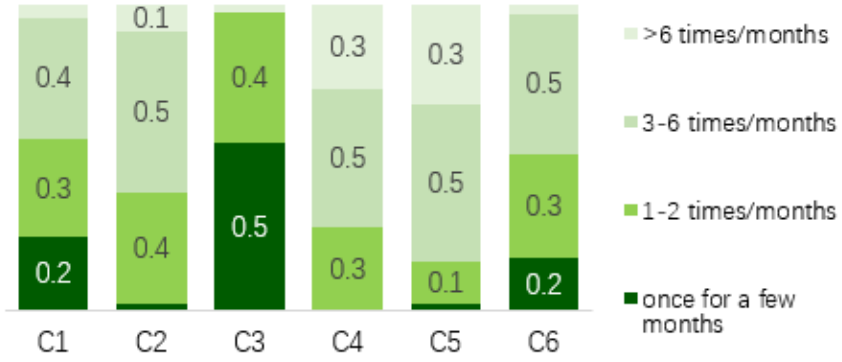
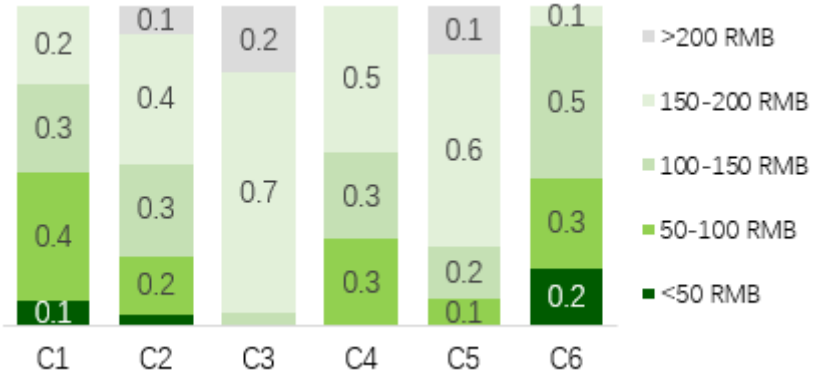
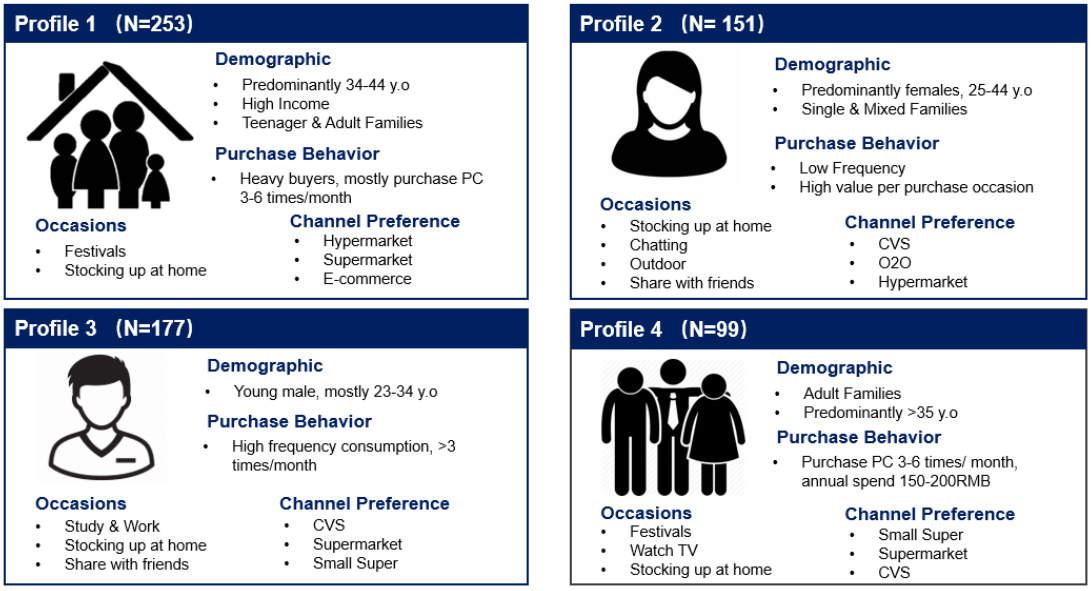


Figure 34. Annual Spend Distribution by Cluster



As the sample sizes for the first and fourth groups were too small(<50), we only analyzed the other four groups further.

Figure 35. Customer Profiling



7.2.2 Conjoint Analysis

1. Estimation of Part-worth Utilities

In conjoint measurement, a customer's total utility for a product is a function of his/her part-worth utilities. To determine a customer's total utility for a product, part-worth utilities for each product attribute must be estimated.

In this study; for each respondent, the part-worth was estimated using Ordinary Least Square (OLS) regression analysis. OLS regression assumes independent product attributes. Given the attributes used in this investigation, the overall preference or total utility of a combination (Rate) can be expressed by the following model:

$$\text{Rate} = UTexture_i + UFlavor_j + UPrice_k + UPackageSize_l + UOil_m + constant$$

2. Measure of the Relative Importance of Product Attributes

Table 36. Output from the combined analysis of global statistics

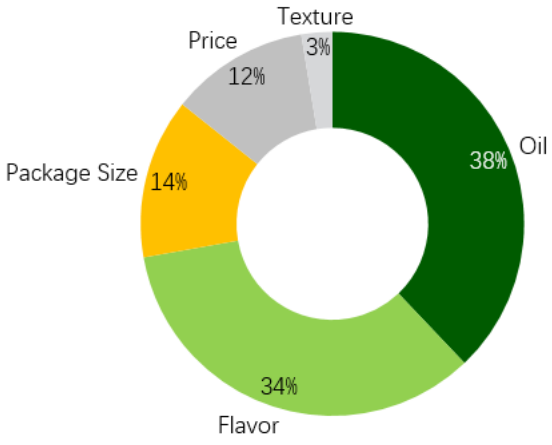
Attribute	Importance	Relative importance (%)	Level	Utility
Oil	4.23	37.951%	Baked crisps (no oil added)	2.115
			Deep-fried crisps	-2.115
Texture	0.291	2.611%	thick	0.146
			thin	-0.146
Flavor	3.823	34.297%	Mild Flavor	2.644
			Strong Flavor	-1.178
			Sweet Flavor	-0.831
			Traditional Flavor	-0.635
Price	1.299	11.658%	5 rmb	0.523
			10 rmb	0.253
			15 rmb	-0.776
Package Size	1.503	13.483%	100g/pack，medium package	-0.968
			150g/pack，large package	0.359
			200g/pack，super large package	0.535
			50g/pack，small package	0.074
Constant	7.835			

Table 37. Correlation Output

	Value	Sig.
Pearson's R	0.652	.000
Kendall's tau	0.528	.000

** The Pearson and Kendall tau coefficients of correlation were significant at the 99 percent confidence level*

Table 38. Relative Importance of Different Attributes



First, the importance of each attribute is analyzed, from the above table: the importance of

each attribute is ranked in the following order: Oil>Flavor>Package Size>Price>Texture

3. Analysis of Utility at Different Levels

- For Oil, the ranked utility value of each level is: Baked crisps (no oil added) > Deep-fried crisps.
- For Flavor, the rankings of utility values for each level are: Mild Flavor > Traditional Flavor > Sweet Flavor > Strong Flavor.
- For Package Size, the rankings of the utility values of each level are: 200g/pack, super large package> 150g/pack, large package> 50g/pack, small package> 100g/pack, medium package.
- In terms of Price, the utility values of each level are ranked as follows: 5 rmb > 10 rmb > 15 rmb.
- For Texture, the ranked utility values for each level are: thick> thin

4. Measure of the Product Preference for Different Customer Segmentation

Table 39. Relative Importance of Attributes for different consumers

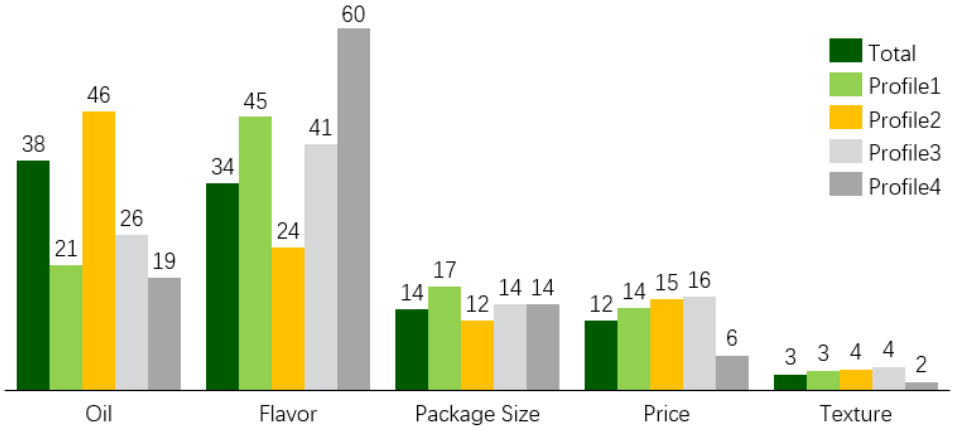


Table 40. Part-worth and relative importance of attributes for different segmentations

Attribute	Level	Profile 1		Profile 2	
		Importance (%)	Utility	Importance (%)	Utility
Oil	Baked crisps(no oil added)	20.8	-1.261	46.1	2.644
	Deep-fried crisps		1.261		-2.644
Texture	thick	3.3	-0.201	3.6	0.208
	thin		0.201		-0.208
Flavor	Mild Flavor	45.1	-3.637	23.6	1.611
	Strong Flavor		1.843		-1.092
	Sweet Flavor		1.272		0.106
	Traditional Flavor		0.522		-0.625
Price	5 rmb	13.7	0.22	15.1	0.593
	10 rmb		0.719		0.54

	15 rmb		-0.94		-1.133
Package Size	50g/pack，small	17.2	-0.75	11.6	0.229
	100g/pack，medium		-0.978		-0.815
	150g/pack，large		0.621		0.518
	200g/pack，super large		1.107		0.068
Constant		4.984		8.311	
Pearson's R Value		0.778		0.765	
Pearson's R Sig		.000		.000	
Kendall's tau		0.619		0.655	
Kendall's tau Sig		.000		.000	

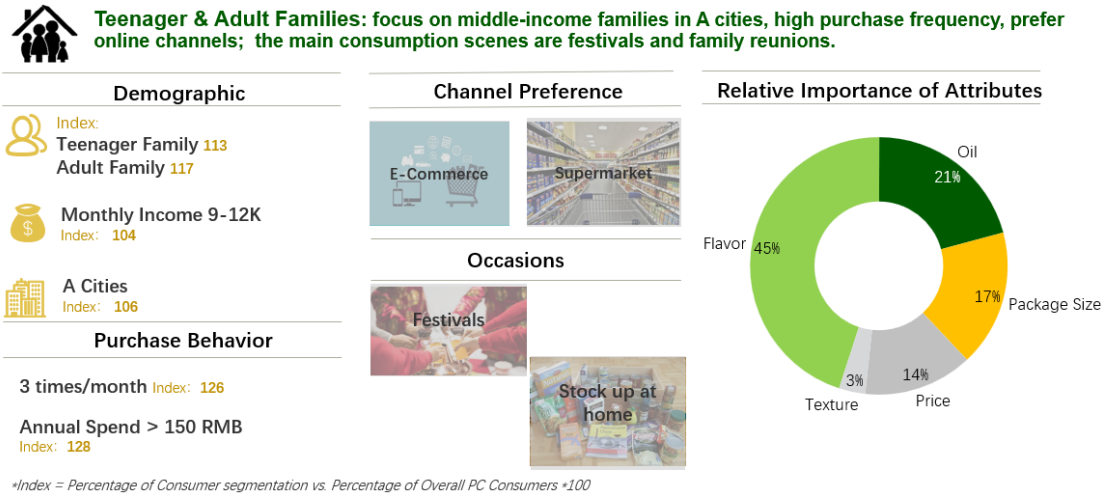
Table 41. Part-worth and relative importance of attributes for different segmentations

Attribute	Level	Profile 3		Profile 4	
		Importance (%)	Utility	Importance (%)	Utility
Oil	Baked crisps(no oil added)	25.7	-1.571	18.7	2.166
	Deep-fried crisps		1.571		-2.166
Texture	thick	3.9	-0.213	1.5	0.172
	thin		0.213		-0.172
Flavor	Mild Flavor	40.6	1.911	59.6	9.029
	Strong Flavor		5.932		-2.988
	Sweet Flavor		-3.906		-4.773
	Traditional Flavor		-3.937		-1.267
Price	5 rmb	15.6	0.61	5.8	0.459
	10 rmb		0.413		-0.884
	15 rmb		-1.023		0.424
Package Size	50g/pack，small	14.2	-1.322	14.4	0.052
	100g/pack，medium		0.129		-1.599
	150g/pack，large		0.162		-0.186
	200g/pack，super large		1.031		1.733
Constant		5.786		7.799	
Pearson's R Value		0.687		0.799	
Pearson's R Sig		.000		.000	
Kendall's tau		0.583		0.555	
Kendall's tau Sig		.000		.000	

** The Pearson and Kendall tau coefficients of correlation were significant at the 99 percent confidence level*

a) Product Preference for Cluster 1(Teenager & Adult Families)

Figure 42. Customer Profiling (Teenager & Adult Families)



The above Table shows the part-worth utility scores for each level of each attribute. For Teenager& adult families, Flavor identified as the most important factor (45.1%), followed by Oil (20.8%), Package Size (14.4%), Price (5.8%) and Texture (1.5%).

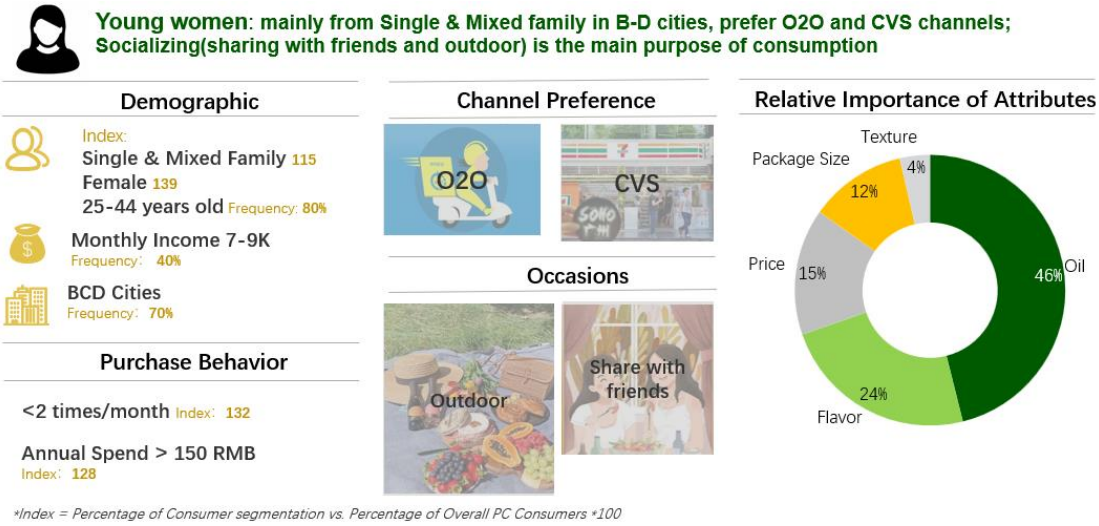
Within the attributes, the utilities of each level were also investigated. The overall 99 respondents obtained a higher utility from a Potato Chips made with no oil added (U=1.261) than from a Deep-fried crisp.
Within flavor, the most utility was obtained from strong flavor (U=1.843), whereas the utility of traditional flavor was lower (U=-1.267).
Within Package Size, the most utility was obtained from Super large package size (U=1.107), followed by large package size(U=0.621).
Within Texture, the most utility was obtained from thin (U=0.201).
Within the price, the most utility was obtained from 10 rmb (U=0.719)

The result of this study also shows that respondents' total utility derived from part-utility values of each attribute level by considering of the attributes of an ideal Potato Chips. The factor and factor level having the highest total utility is preferred by consumers with priority. The ideal Potato Chips had the following attributes: Strong Flavor Potato Chips made with no oil added, super large package size.

- Recommendations for Lays:
  - Incorporating regional flavors as well as festive features into new product
  - Innovation on sweet flavor (e.g., Honey butter chips of CALBEE can be benchmarked)

b) Product Preference for Cluster 2 (Young Females, Single & Mixed Families)

Figure 43. Customer Profiling (Young women)



For Young females, Oil identified as the most important factor (46.1%), followed by Oil (25.7%), Price (15.6%), Package Size (14.2%) and Texture (3.6%).

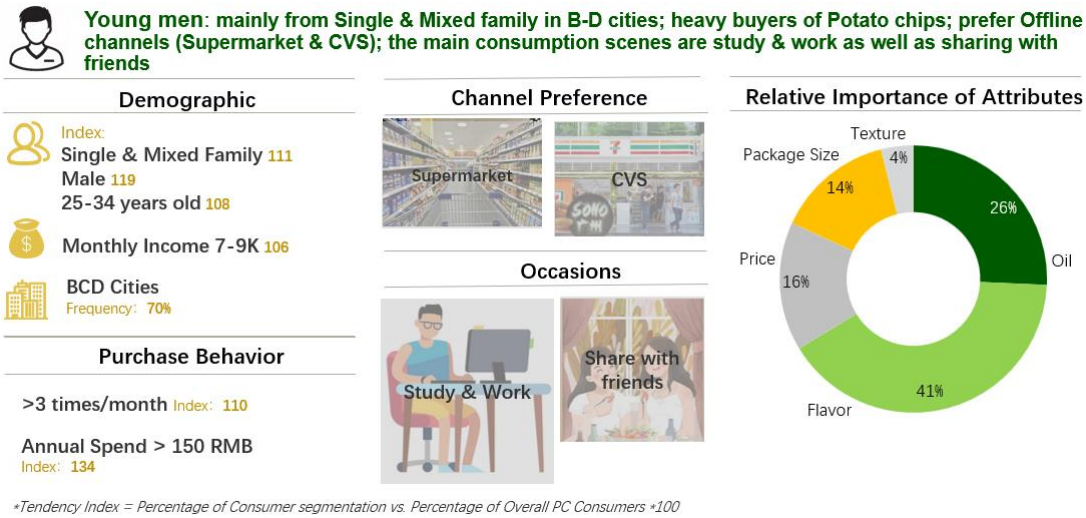
Within the attributes, the utilities of each level were also investigated. The overall 151 respondents obtained a higher utility from a Potato Chips made with no oil added (U=2.644) than from a Deep-fried crisp.
Within flavor, the most utility was obtained from mild flavor (U=1.611), whereas the utility of a sweet flavor was lower (U=0.106), but higher than a traditional flavor (U=-0.625) and Strong Flavor (-1.092).
Within Package Size, the most utility was obtained from Super large package size (U=0.518), followed by small package size(U=0.229).
Within Texture, the most utility was obtained from thick (U=0.208).
Within the price, the most utility was obtained from 5 rmb (U=0.593)

The ideal Potato Chips for this segmentation had the following attributes: mild flavor Potato Chips made with no oil added, thick texture is preferred. At the same time, small or large package sizes can be designed for different occasions.

- Recommendations for Lays:
  - Apply portable small packages and super large packages to current mild flavor products (e.g., nature taste and Taro Chips)

c) Product Preference for Cluster 3 (Young Males)

Figure 44. Customer Profiling (Young men)



*Tendency Index = Percentage of Consumer segmentation vs. Percentage of Overall PC Consumers *100*

For Young Males, Flavor identified as the most important factor (40.6%), followed by Oil 25.7%), Package Size (17.2%), Price (13.7%) and Texture (3.9%).

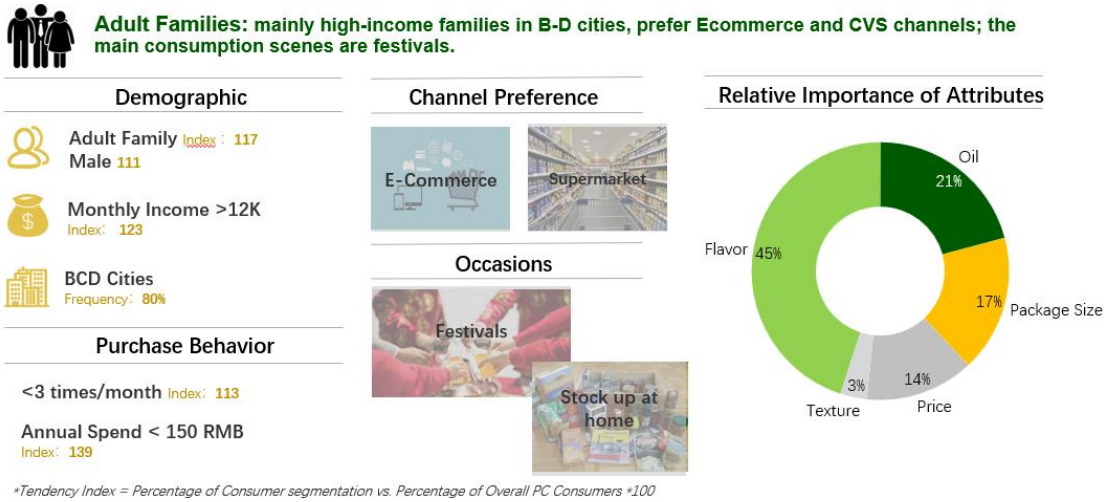
Within the attributes, the utilities of each level were also investigated. The overall 177 respondents obtained a higher utility from a Deep-fried crisp (U=1.571) than from a 0-oil added crisps.
Within flavor, the most utility was obtained from strong flavor (U=5.932), whereas the utility of a mild flavor was lower (U=1.911).
Within Package Size, the most utility was obtained from Super large package size (U=1.031).
Within Texture, the most utility was obtained from thin (U=0.213).
Within the price, the most utility was obtained from 5 rmb (U=0.459)

The result of this study also shows that respondents' total utility derived from part-utility values of each attribute level by taking into account of the attributes of an ideal Potato Chips.
The ideal Potato Chips for young males group had the following attributes: deep-fried crisp with strong Flavor and thin texture, super large package size.

- Recommendations for Lays:
  - Introduce super large package size to current top-selling strong flavor products (e.g., Hotpot Series)
  - Communicate sharing and relaxing image, combined with at-home scenarios.

d) Product Preference for Cluster 4 (Adult Families)

Figure 45. Customer Profiling (Adult Families)



For Teenager& adult families, Flavor identified as the most important factor (59.6%), followed by Oil (18.7%), Package Size (14.4%), Price (5.8%) and Texture (1.5%).

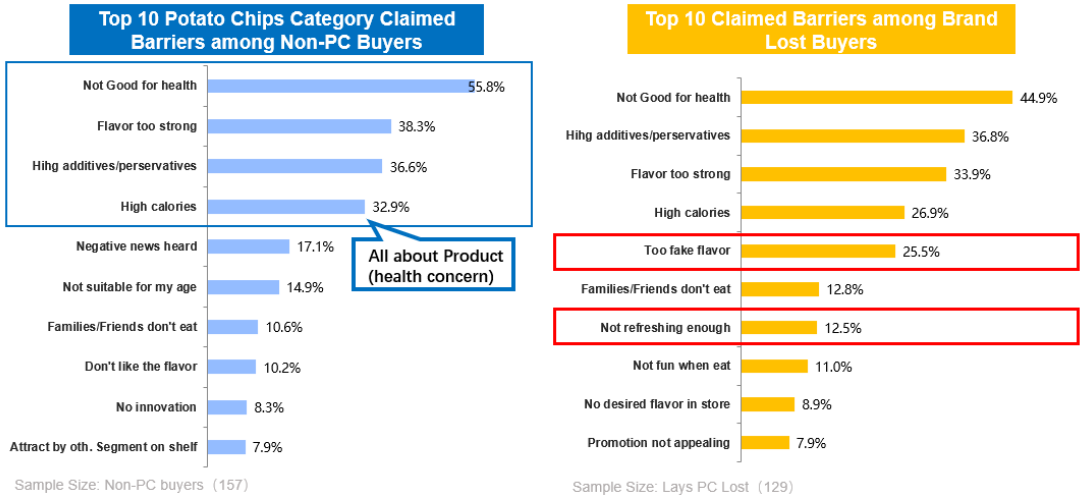
Within the attributes, the utilities of each level were also investigated. The overall 99 respondents obtained a higher utility from a Potato Chips made with no oil added (U=2.166) than from a Deep-fried crisp.
Within flavor, the most utility was obtained from mild flavor (U=9.029), whereas the utility of a traditional flavor was lower (U=-1.267).
Within Package Size, the most utility was obtained from Super large package size (U=1.733), followed by small package size(U=0.052).
Within Texture, the most utility was obtained from thick (U=0.172).
Within the price, the most utility was obtained from 5 rmb (U=0.459)

The ideal Potato Chips for adult families had the following attributes: mild flavor Potato Chips made with no oil added and thick texture, super large package size.

7.2.3 Barriers for Lays PC Brand Lost Buyers

The Key barriers among Lays non/lost buyers are too fake flavor, not refreshing enough and not fun when eat.
Lays should continue the multi-flavor strategy to expand penetration. Meanwhile, conduct further research among PC buyers for taste improvement.

Figure 46. Top10 Claimed Barriers among Lays Lost Buyer



7.2.4 Barriers for Lays Current Buyers

Principle component analysis for perceptual maps

we have a number of Potato Chips brands (observations) that are rated on a number of attributes/comments such as “refresh myself”, “not expensive”, “attracting advertisement”, etc. (dimensions).

I analyzed data from the survey in which respondents were asked to rate seven brands of Potato chips on thirteen dimensions.

1. **Retain factors**

   We see that two components explain 84.5 percent of the variance in the ratings. This is quite a lot already and it suggests we can safely do with two dimensions to describe our data. A rule of thumb here is that the cumulative variance explained by the components should be at least 70%.

Figure 47. Eigenvalue

	eigenvalue	percentage of variance	cumulative percentage of variance
comp 1	7.38550517	56.8115782	56.81158
comp 2	3.60341956	27.7186120	84.53019
comp 3	1.27908463	9.8391125	94.36930
comp 4	0.54334920	4.1796093	98.54891
comp 5	0.10693829	0.8226023	99.37151
comp 6	0.08170314	0.6284857	100.00000

2. **Principal components analysis**

   a) Factor loadings

   We can now inspect the table with the *factor loadings*:

Figure 48. Factor Loadings

	Dim.1	Dim.2
share_with_friends_and_families	0.1521337	0.483359405
good_for_stocking_up_at_home	0.8131744	0.511371122
healthier_than_other_brands	0.1962594	0.917230032
refresh_myself	0.9044804	0.391147624
new_flavours_are_introduced_frequently	0.9483652	-0.265632025
crispy	0.7844454	-0.097498371
low_calories	0.1280068	0.979237800
lighter_in_flavour	-0.1939803	0.972231549
not_expensive	-0.8514716	0.074750630
attracting_advertisment	0.9260779	-0.001122538
many_campaigns_on_social_platforms	0.9198025	-0.160894704
co-branded_packaging	0.9645896	-0.178181803
unique_packaging_designs	0.9574164	-0.257960250

We see that *good_for_stocking_up_at_home*, *refresh_myself*, *new_flavors_are introduced frequently* and *attracting_advertisement* score highly on the first factor, whereas *healthier_than_other_brands*, l*ow_calories*, and *lighter_in_flavor* score highly on the second factor. We could therefore say that the first factor describes the leisure, entertainment and advertisement. The second factor describes the health.

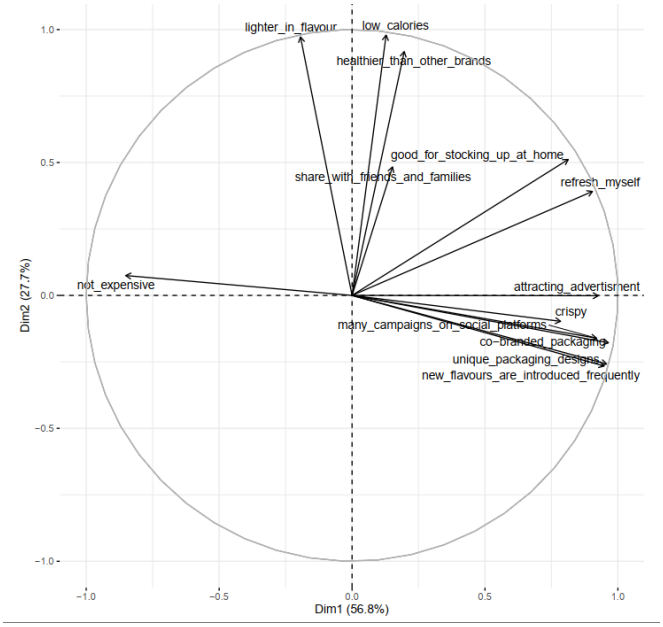
b) Loading plot and biplot

Figure 49. Biplot

Dim.1	Dim.2	variable	communality	uniqueness
<dbl>	<dbl>	<chr>	<dbl>	<dbl>
0.152	0.483	share_with_friends_and_families	0.257	0.743
0.813	0.511	good_for_stocking_up_at_home	0.923	0.0772
0.196	0.917	healthier_than_other_brands	0.880	0.120
0.904	0.391	refresh_myself	0.971	0.0289
0.948	-0.266	new_flavours_are_introduced_frequently	0.970	0.0300
0.784	-0.0975	crispy	0.625	0.375
0.128	0.979	low_calories	0.975	0.0247
-0.194	0.972	lighter_in_flavour	0.983	0.0171
-0.851	0.0748	not_expensive	0.731	0.269
0.926	-0.00112	attracting_advertisment	0.858	0.142
0.920	-0.161	many_campaigns_on_social_platforms	0.872	0.128
0.965	-0.178	co-branded_packaging	0.962	0.0378
0.957	-0.258	unique_packaging_designs	0.983	0.0168

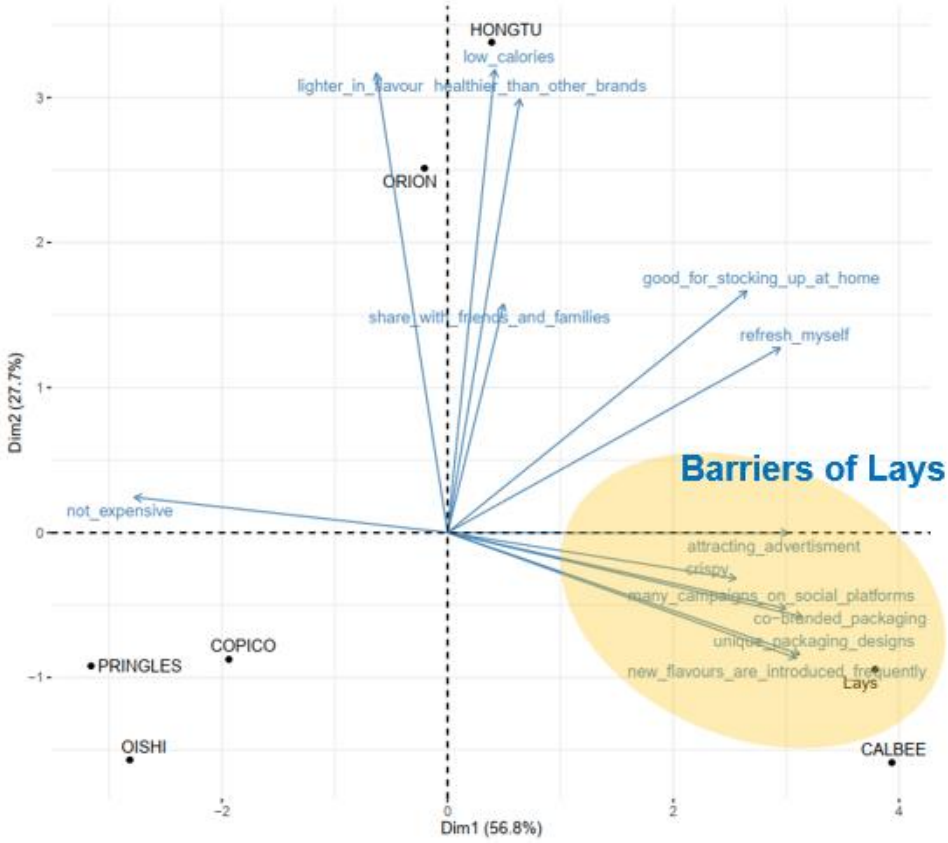
We can also plot the loadings.

Figure 50. Loadings-1



We can also add the observations (the different brands) to this plot:

Figure 51. Loadings-2



We can see, for example, that Lays scores highly on the first factor.