ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor Thesis: International Bachelor Economics and Business Economics

The market environment of Chinese smartphone in Europe and future

marketing strategy research

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Executive summary

This study was conducted by the analysis of the impact of smartphone features on customer's purchase intention as well as the efficiency of promotion channels in the European smartphone market based on the interview, the choice-based conjoint test and survey. This study collected 121 valid questionnaires, with 11 choice-based questions combining 5 key smartphone's attributes based on previous studies and the interviews as well as 12 scale questions which represent the consumer's impression of 4 aspects of 3 top smartphone brands, Samsung, Apple and Huawei. The results of conjoint regression show that brand is the most important attribute that affects consumers' purchasing intentions, and the Apple brand brings the highest utility gain. Smart cameras and storage size also have a significant impact on consumers' purchasing intentions. European consumers are significantly inclined to mobile phones with larger storage sizes and more intelligent camera functions. Through the questionnaire survey, we learned that the image of the Apple brand in the hearts of European consumers is that the product prices are higher, but the simplicity and smoothness of mobile phones are outstanding. Huawei mobile phones have left consumers with an impression of high cost performance and high innovation, but smooth performance is weak. Samsung's image is a mid-to-high-priced, high-fluency mobile phone, but lacks innovation. Management implications based on the above results are included in this paper.

Keyword: Marketing; Smartphone; Utility; Apple; Huawei; Samsung; Promotion

Content

1. Introduction

In recognition of the booming technological era, cutthroat tactics were employed by tech companies in an attempt to outdo their competition, which has prompted significant breakthroughs in the smartphone industry. Foldable smartphones with ultra resolution were introduced by Samsung to increase the portability of smartphones as well as maximizing the display area. Huawei's groundbreaking 5G technology was officially put into use in the second half of 2019, redefining the internet. "In the 5G era, the speed of the internet is climbing and your daily experiences of social life, shopping, and entertainment will be innovated. Huawei is pushing for a completely interconnected and intelligent world at an unimaginable speed," as mentioned on Huawei's official website. Subsequently, the thirst for better and faster gadgets of consumers can never be quenched. Hence, the indispensable role of artificial intelligence in people's daily life meant greater reliance on smartphones.

Like our universe, the already huge smartphone industry is expanding rapidly. It was speculated that by the end of 2020, there will be no less than 3.5 billion smartphone users all over the world, and there will be 1560.85 million smartphones sold to end-users worldwide in 2020, according to Statista (Statista, 2020). More and more companies hope to share a piece from this big cake. As of June 2020, there are 236 smartphone brands worldwide (Droidchart, 2020). The competition in handset manufacturing has become increasingly intensive and aggressive due to increased software focus and decreased entry barriers (Mika & Husso, 2011). Moreover, to realize the expectations of users, manufacturers need solid innovational fundings for speedy updates of their products. According to Samsung's annual report, 20,192,935 million US dollars were invested in research and development in 2019 (Samsung, 2019). Since innovation requires manufacturers to have a large amount of capital, most brands cannot meet the needs of users for product innovation, therefore the smartphone market is gradually becoming an oligopoly market where a few companies taking most of the market share. Samsung takes the highest market with a proportion of 30.95%, Apple followed closely with the market share of 24.82% in 2020 (Mobile Vendor, 2020). The top 2 brands of the smartphone who take more than 50%

of the smartphone market share are both from developed countries, which indicates that developed countries are currently the main force in the smartphone industry.

Alongside the rapid development of technology in developing countries represented (e.g. China) yield the changing market structure of smartphones. Evidence of this change is the significant increase in the market share of Chinese smartphone brand Huawei. In October of 2016, Huawei owns only 3.69% of the smartphone market, listed behind LG (4.04%) and Nokia (4.38%), and way behind the two leading brands, Samsung and Apple. While in July of 2020, Huawei has become one of the biggest competitors of Samsung and Apple. Similarly, other growing brands such as Xiaomi and Oppo, take 8.94% and 4.69% share of the smartphone market. Today, 3 out of the top 5 smartphone brands are from China, engrossing more than 20% of the smartphones in the market. Data shows that Chinese smartphone brands headed by Huawei are impacting the traditional smartphone market.

Based on the trends above, this paper will use the Huawei brand as the first perspective to investigate the European smartphone market environment to answer the following research questions. The first question is how is the current market environment for smartphones in Europe? In this topic, we consider analyzing two of Porter's five forces: competitive rivalry in the smartphone industry and the bargaining power of consumers. Therefore the two sub-questions are asked: what are consumer's attitudes and preferences to smartphone products and smartphone brands? What is the competitive environment for smartphones in Europe? Secondly, after we have a certain understanding of the European smartphone market, the practice question to Chinese smartphones will follow: What market strategy should Huawei adopt in Europe?

The rest of this paper is organized as follows. Firstly, we will do descriptive desk research to show the current knowledge in this study area, following with an introduction to the gap in the current study, and how this research is designed to fill the gap. The methodology section includes an explanation of the data and the method of field research including a Choice-based Conjoint test (CBC). Following is the data and method section, where the result of the field

research will be explained thoroughly. Finally, in the discussion section, implications in practice to Chinese smartphone brands based on the results will be discussed.

1.1 literature review

To study the smartphone market environment, previous studies are useful to gain a more comprehensive understanding of the market. Previous researches have analyzed the smartphone market environment in Taiwan, South Africa, US and UK. Chen & Ann (2014) research analyzed the status quo of Taiwan's smartphone market, the factors affecting consumers' purchase of smartphones, and the relationship between brand loyalty, customer satisfaction, and manufacturer's efficiency. Their survey results show that Apple, Samsung, and HTC are the three leading brands in the smartphone market. The survey about Taiwan's consumer's preference indicates that the exterior appearance is one of the most important factors affecting consumer's purchase, with the proportion of 27.3% respondents. Consumers also care about other factors like price (25.8%) and brand reputation (24.9%). In the study of relations between brand loyalty, customer satisfaction, and manufacturer's efficiency, they find that both consumer's loyalty level and consumer satisfaction have a positive correlation with the manufacturer's efficiency. Meanwhile, consumer satisfaction levels were also positively related to brand loyalty. This implicates that improving customer satisfaction can enhance customer loyalty and further improve the efficiency of manufacturers to achieve a virtuous circle.

Raven Jainarain's (2012) research compared the smartphone markets in South Africa, the United States, and the United Kingdom and summarized the factors that have the greatest impact on consumers' purchasing propensity in different markets. Customers in the three smartphone markets have similarities. They all value social network-related factors such as email access and internet browsing. A similar conclusion also appeared in the study of D Guleria & YS Parmar (2015) in Solan town of Himachal Pradesh. Research data shows that the most commonly used phone functions of smartphone users are calling, messaging and Internet browsing. Based on this conclusion, they further investigated the smartphone performance that users are most concerned about, which is usage ease and processing speed.

Furthermore, brand image and purchase intention are also necessary to offer an efficient marketing strategy for the Chinese smartphone brand. Research by ME Malik & MM Ghafoor (2013) shows that brand image has a strong positive influence on consumers' buying behavior, and advertising also has a positive impact on consumers' buying behavior. Research of Huawei and Apple made by Yanhui Mao (2020) analyzes the relationships between brand image, flow, and purchase intention. The result shows that brand identity has both a direct and indirect effect on purchase intention, while flow and brand image are both just intermediate factors to affect the purchase. Therefore, these findings indicate that the best attribute to benefit smartphone users and the most direct predictive indicator is their identity. However, Khasawneh and Hasouneh (2010) believe that there is no direct connection between brand awareness and consumers' buying behavior. Their research points out that the brand name of a product will affect consumers' evaluation of the product, which indirectly affects consumers Influence. Peter W. (2000) also emphasized the importance of corporate image in his paper analyzing customer confusion. Suppliers should establish a strong brand image and be aware of the importance of word of mouth as a reference point for consumers.

Jean.AT (2017) emphasized the importance of innovation for smartphones. He analyzed the investment in smartphone innovation of Apple, Samsung and Huawei from 2012 to 2016 and their respective software strategies, and concluded that Apple's technology hub and/or source of steady profit are operation systems, while Samsung and Huawei are hardware production. On this basis, he proposed that Hardware manufacturers should continue to invest in hardware research and development, but software development should combine marketing and technological innovation to develop new content and operating systems.

Previous research also discovered the competition environment in the US and Europe. Firstly, the marketing and negotiation efforts in the United States are typically targeted at mobile operators who dominant the consumers, while in Europe smartphone manufacturers compete over consumers' minds, (Landler, 2007). Second, the competition field of smartphones gradually moved from hardware to software, specifically in the high-end market (Hämmäinen,

2011). The shift in the field of competition has further escalated the competition between smartphone brands. The IOS system led by Apple and the Android system led by Samsung have gradually become the main factor in smartphone competition (M Husso, 2011). In addition, competition in the smartphone market is also affected by the external environment. Zhang & Prybutok (2005) emphasized in their paper that technology, usage patterns and policies have a great influence on the competition among smartphone manufacturers.

Studying the previous strategies of the Huawei brand is also a reference for developing the European smartphone market. Sunny Li (2009) analyzed the development strategy of Huawei as a multinational enterprise from emerging economies. He emphasized that Huawei takes internationalization as a key step to achieve strategic learning, capacity building and company growth. Ke Fu & Dan Fu (2011) analyzed Huawei's strategy in different periods of entering the European market. During the initial period, Huawei established a low-cost but stable corporate image. In the mature period, it used sponsorships and activities to increase brand awareness and popularity, and shifted the focus of product development to technological innovation.

1.2 Gap in knowledge

The previous study gave a comprehensive prescriptive about the smartphone environment. However, there is not enough evidence to prove that the customer preferences of the United States, Taiwan and South Africa are consistent with the European smartphone customer preferences. Research shows that different from the US market, some European countries such as Germany and the Netherlands have a heritage of co-operative relations between producers and consumers(C Strünck, 2005). There is no previous research on customer preferences in the European smartphone market. Therefore, the study of the smartphone market environment in Europe is necessary. The research in this paper is aimed to better understand European consumers' preference for smartphones and what factors affect European consumers' purchase intentions through interviews and questionnaires.

1.3 Hypothesis

Through previous research, it is identified that consumers in the Taiwan smartphone market are sensitive to the appearance, price, and brand of smartphones, and these factors affect consumers' buying tendency. These survey results provide a reference for our hypothesis on the European smartphone market. Since the appearance of smartphones cannot be quantified, appearance-related parameters were used. Through interviews, I learned that most respondents prefer mobile phones with larger screens. The screen size is an integral part of the appearance of mobile phones which may also affect the propensity to consume. Therefore, I choose the screen size as a quantitative standard to measure the appearance of the phone. So far, I put the first hypotheses:

H1: All the selected factor have effect on consumer's purchase intention

> *H1a: Apple bring the highest utility to consumers compare to Samsung and Huawei*
>
> *H1b: The price of a smartphone negatively affect consumers' purchase intention*
>
> *H1c: The screen size of a smartphone positively affects consumers' purchase intention*
>
> *H1d: The storage size of a smartphone positively affects consumers' purchase intention*
>
> *H1e: Consumers are significantly more inclined to smartphones with more intelligent cameras*

On the basis of the above hypothesis, in order to make the survey results more practical, it is necessary to compare which factors have greater influence on the customer's choice of smartphones. Based on the above purpose, I continue to put forward the following hypothesis:

H2: The brand of the smartphone is the most important attribute which influences the consumer's purchase intention.

In addition, previous studies mentioned that both brand image and advertising have a significant impact on consumers' buying behavior. In order to answer the second research question related to Huawei's market strategy, we need to understand the brand image of the Huawei brand in the

minds of European smartphone consumers and which advertising format is most effective in this market environment. So I put forward the following hypothesis:

H3: According to the impression of European consumers, compared with Apple and Samsung, Huawei performs better in the selected aspects

  H3a: According to the impression of European consumers, compared with Apple and Samsung, Huawei performs better in affordable

  H3b: According to the impression of European consumers, compared with Apple and Samsung, Huawei performs better in innovation

  H3c: According to the impression of European consumers, compared with Apple and Samsung, Huawei performs better in simplicity

  H3d: According to the impression of European consumers, compared with Apple and Samsung, Huawei performs better in smooth

H4: Social media is the most important channel for European smartphone users to receive promotional information

2. Method and Data

After the desk research based on previous studies, a field research is necessary to understand the smartphone market specifically in Europe. In this paper, two kinds of research will be included. First, I will do some interviews as a qualitive research in order to predict what kind of factors might have effect on consumer's purchase intention when buying a new smartphone as well as collect some general impression about smartphone brands. Due to the impact of the covid-19 epidemic, the interview was conducted online through the zoom conference. The time period is from May 17 to June 1, 2020. All interviewees have been informed that the interview content will be used for academic purposes and will not be arbitrarily disseminated.

Secondly, the survey will be design based on the result of the interview, which used to measure to what extend the specific factors could affect consumer's purchase intention as a quantitative research. The quantitative research also including a choice based conjoint test in order to

measure the effect of each attribute on consumer's utility level. The questionnaire survey and data analysis use sawtooth software as the carrier, and the time period is from July 16th to August 15th, 2020. During the data collection period, each participant was asked whether he or she would like to take a questionnaire about your impressions and preferences on smartphones. They were told that the entire questionnaire survey process would take 3-5 minutes, and clearly understood that all the data will be collected anonymously, and the information you offered will be used only for academic analysis. When the audience agrees to accept the survey, they will receive a web link to access the survey page. On the first page of the survey page, there is a brief introduction about the topic selection of the paper, and on the home page I once again emphasized in the form of text that the questionnaire will only be used for academic purposes and will not spread personal information without the interviewee's permission. If the respondent fully understands and agrees, they can click "Next" to start the survey.

2.1 Participant

An amount of 6 audience participating in the interview. Table 1 shows the information of the respondents of Interview. The target group of the interview covered the nationality of Chinese, Netherlander, Belgian, and German. To make the sample more representative, the audience also including students in school, middle-age people working in Europe, and eldering people after retirement, which combine the respondent from all age range.

Table 1 - Social demographic features of respondents of interviews

NO.	Age	Gender	Nationality
1	64	female	Chinese
2	32	male	Chinese
3	22	male	Belgian
4	23	male	Netherlander
5	37	female	Netherlander
6	45	male	German

Table 2 records the information of the participants of the questionnaire survey. The links to the questionnaire were randomly distributed in European student group chats and community group

chats. The questionnaire received a total of 188 responses and 121 valid responses, of which 18-34-year-old middle-aged and young people accounted for the main part of the sample.

Table 2 - Social demographic features of participants (N=121)

Question	Options	Response	Proportion
System	IOS	60	61.22%
	Android	35	35.71%
	Laptop	26	26.53%
Gender	Male	47	47.96%
	Female	73	74.49%
	Other	1	1.02%
Age	<18	5	5.10%
	18-24	59	60.20%
	25-34	30	30.61%
	35-44	11	11.22%
	45-54	13	13.27%
	55-64	3	3.06%
	>=65	0	0.00%

2.2 Measures

The brand loyalty of the interviewees will be measured by their answers to the question "When you buy the next smartphone, will you continue to choose your current brand?" If the respondents firmly choose to continue to use the same brand, the brand loyalty is higher, on the contrary, the brand loyalty is lower.

The brand image is measured by four-items scale questions in the survey which including the items that measure whether the product of the brand is affordable, whether the brand is innovative, whether the smartphone is simple to use and whether the using is smooth. All the items are measured in a 7-point scaling with ordinal scale from the least preferred to the most preferred. This measurement method takes the Yanhui Mao (2020) questionnaire survey on brand image as a reference, and on this basis, the company's image is specialized in four aspects I mentioned above.

The purchase intention is measure by a choice based conjoint test with 11 questions, which we offer 3 kinds of smartphone with different attribute which include the brand, price, screen size, storage size and camera function of the smartphone. The audience of the survey could choose

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the smartphone with the attribute combinations that they prefer the most, or they could either choose "I prefer none of the choice above". In the smartphone choices there are 5 attributes including the brand, price, storage size, screen size and camera mode.

The attribute value of the questionnaire will be introduced as follow. The attributes value of the brand I chose the three mobile phone brands with the largest market share in the smartphone market: Apple, Samsung and Huawei. The attribute value of the price is based on the selling prices of the mainstream products of the above three smartphone manufacturers, and four price tags at equal distances are worked out: 500 Euros, 600 Euros, 700 Euros and 800 Euros. The attribute values of the screen size and storage size are also selected based on the values of the most mainstream models of the three brands. The attribute values of the screen storage are 6.5 inches, 6.2 inches and 5.8 inches. The attribute values of the storage size are 64GB, 128GB and 258GB. The attribute values of the smart camera mode cover the different camera functions included in the three brands of different price phones, namely Night view mode, Professional mode and AI portrait mode. These functions are decremented to obtain 4 attribute values. The selection of all the above attributes is based on previous research and interview results.

2.3 Data analysis strategy

This paper analyzes the collected data based on the logit function of the binary choice model. By analyzing the collected data, we can calculate the probability of each attribute combination being selected, where each of the probability is the proportion of times when a concept containing that attribute level occurs that the concept is selected by respondents. After calculating the probability, we can get the influence of each attribute on the selected probability by performing regression operations on the probability and the attribute value. In order to prevent linear regression from causing probability overflow, in other words the probability may be greater than 100% or less than 0% due to the linear regression equation, we choose logit model instead of linear regression.

The logit model uses a logistic function to express the possibility. First, we set up a parameter L and use linear regression to find the linear relationship between the attribute value and the parameter L. Then we use a logistic function to express the relationship between probability and parameter L to ensure that the value of probability is between 0 and 1. The model formula is as follows:

$$
\begin{aligned}
L = 0 &+ \beta_{a1} * Apple + \beta_{a2} * Samsung + \beta_{a3} * Huawei + \beta_{b1} * Price_{500} + \beta_{b2} \\
&* Price_{600} + \beta_{b3} * Price_{700} + \beta_{b4} * Price_{800} + \beta_{c1} * storagsize_{64GB} \\
&+ \beta_{c2} * storagsize_{128GB} + \beta_{c3} * storagsize_{256GB} + \beta_{d1} * cameramode_1 \\
&+ \beta_{d2} * cameramode_2 + \beta_{d3} * cameramode_3 + \beta_{d4} * cameramode_4 \\
&+ \beta_{e1} * screensize_{6.5} + \beta_{e2} * screensize_{6.2} + \beta_{e3} * screensize_{5.8} + \beta_f \\
&* None + e
\end{aligned}
$$

$$
Pr(selected) = \frac{1}{1 + e^{-L}}
$$

All the attributes are present in the form of category attributes. In order to show the difference between different attributes more intuitively, we use an attribute value equal to 1 to represent an attribute group and have a certain attribute, and use an attribute value equal to 0 to indicate that the combination does not have this attribute. When the participant selects the "I prefer none of the choice above" option, the attribute value None is equal to 1, and the other attribute values are all 0. For example, for an Apple smartphone with a storage size of 256GB, the attribute of Apple and the storage size of 256GB will be 1, and other attributes will be 0.

Through the logit model, we can calculate the contribution of each attribute to the probability of the smartphone being selected. In other words, we can understand the influence of each attribute on consumers' purchasing propensity for smartphones, from which we can derive

customer preferences in the European smartphone market and the most important product factors in this market environment.

3. Result

3.1 result of interview

3.1.1 Features of smartphone

According to the responses from the interview, the most frequently used feature is social media. However, this feature depends on the internet rather than on the smartphone itself. The second feature is the video/music play. To have a good experience of watching a video, the audiences expect a clear and smooth display, which has a requirement on the processing speed and screen size of the smartphone. Moreover, when talking about the attribute that might affect their choice when purchasing a new smartphone, all of the audiences mentioned that brand name and price are the most important attributes they would focus on. Almost all the audiences except the older generation reflect that the operation fluency also largely affects the user experience, they suggest that large storage size might be more favorable to have a smooth user experience. Last but not least, four of the users mentioned that the feature of the current smartphone's camera is strong enough for their daily use, but the feature of smart camera based on AI computing as well as the professional mode is considered only as a beneficial feature in their daily use.

3.1.2 Attitude to the smartphone brand

According to the interview, all smartphone brand users have a certain degree of brand loyalty. The users of Apple have the highest level of brand loyalty as most of them indicate that they would keep using the iPhone without considering other brands due to the system's ecology and product ecology. The system of ios records all the user data and useful information that could easily transfer to the next iPhone. The convenience of interaction between Macbook, Airpods, iWatch, and iPhone enhances the brand loyalty of Apple. The user of Huawei might keep using

Huawei's smartphone because she came from China and she wants to support the Chinese brand. Besides, the brand concept of innovation as an added value also motivates her to stay in this brand. Moreover, audiences reflect that brand awareness might affect their impression of the brand. Brands with higher awareness like Apple and Samsung stand for good quality, albeit some smartphones having good quality (e.g. One Plus), they would still be less willing to buy it if the brand is unheard of.

3.2 Result of Choice Based Conjoint test

We conducted a choice based conjoint test on the audience through a questionnaire survey to analyze the attribute preference of European consumers for smartphones. A total of 188 people participated in the questionnaire survey, of which only 121 people completed the questionnaire. Therefore, the results of the CBC test are based on the answers of the 121 participants who completed the questionnaire.

3.2.1 The main effect

Table 2 shows the effect of attributes on consumers' purchasing intention. The effect column refer to the coefficient of each factor, t ratio refer to the t score of each attribute. The P-value was computed based on the t score.

The data in Table 2 shows that the difference between the effects of Apple and Huawei brands is statistically significant, which means that in the European market, consumers are significantly more inclined to choose Apple than Huawei's smartphones. The difference between the effects of Samsung and Huawei is also statistically significant, which points out that European consumers prefer less Samsung branded smartphones. From this we can conclude that European consumers' preference for mobile phone brands is that Apple is the most popular, Samsung is the least preferred, and Huawei mobile phones are somewhere in between.

Regarding the price of smartphones, according to the data in Table 2, we found that the price difference between 500 euros and 600 euros cause a significant increase in the purchase

intention of European consumers. However, the impact of the price of 700 euros is not statistically significant, which means that there is not enough evidence to prove that the price of around 700 euros has an impact on consumers' purchasing intention. The price of 800 euros has a significant negative impact, which also means that prices of around 800 euros and more than 800 euros will negatively affect consumers' purchase intentions

The effects of the three storage sizes are significant within the 95% confidence interval, and their coefficients increase with the increase in size, which means that in the European smartphone market, consumers are significantly more inclined to Large memory size. The coefficient of the 64GB storage size is negative, which means that storage of this size is almost a disadvantage for European consumers. For the smart camera functions of mobile phones, the result shows that effects of the four camera modes are significant. In addition, the richer the camera mode, the larger the coefficient, which means that European smartphone users are significantly more inclined to the richer camera mode. Finally, in the bottom area of Table 2, we can observe that the difference in the effects of the three attribute values of the screen size is not statistically significant. In other words, the purchase intentions of consumers in the European smartphone market are not sensitive to the screen size of smartphones.

Table 3 - The effect of attributes on consumer's purchase intention

Attributes	Effect	Std Error	t Ratio
Apple	0.69***	0.05	13.47
Samsung	-0.65***	0.06	-10.66
Huawei	-0.04	0.05	-0.79
500	0.23***	0.07	3.54
600	0.23***	0.06	3.62
700	-0.07	0.07	-1.00
800	-0.40***	0.07	-5.48
64GB	-0.56***	0.06	-9.34
128GB	0.11*	0.05	2.15
256GB	0.44***	0.05	8.57
Night view mode + Professional mode + AI portrait mode	0.50***	0.06	7.72
Night view mode + Professional mode	0.28***	0.06	4.32
Night view mode	-0.22***	0.07	-3.19
NO AI smart camera	-0.55***	0.07	-7.43
6.5 inches	0.00	0.05	0.07
6.2 inches	0.04	0.05	0.67
5.8 inches	-0.04	0.05	-0.72
NONE	-0.67***	0.09	-7.16

Note: * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001

3.2.2 Utility

After calculating the main effects, to more intuitively display the influence of each attribute value in the same attribute on the customer's purchase intention, and compare the difference in the influence of different attributes on the customer, it is necessary to calculate the utility of each attribute value. Thus the zero-centered differences scaling is used, which puts the raw utilities on a normalized scale, where for each respondent the utilities are zero-centered within each attribute and the sum of the differences between best and worst utilities across attributes is equal to the number of attributes times 100. The result of the utility scaling and the importance of the smartphone attribute are shown as table 3 and figure 1 below.

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Table 4 - Utility values of smartphone attributes

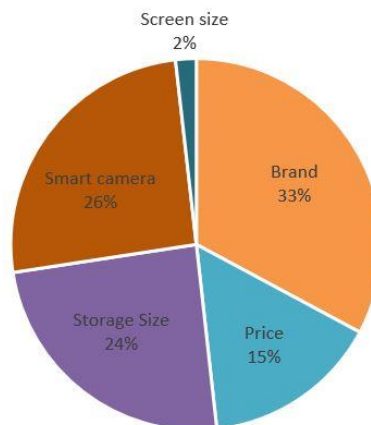| Label	Utility
Apple	84.67
Samsung	-79.48
Huawei	-5.20
500	28.12
600	28.55
700	-8.20
800	-48.48
64GB	-67.81
128GB	13.87
256GB	53.94
Night view mode + Professional mode + AI portrait mode	60.54
Night view mode + Professional mode	34.09
Night view mode	-27.11
NO AI smart camera	-67.52
6.5 inches	0.43
6.2 inches	4.29
5.8 inches	-4.72
None	-81.40

Figure 1 - The importance of smartphone attributes

The data in table 4 can intuitively show us the quantitative impact of each attribute value on the consumer's utility. First of all, we can observe that the difference in utility brought by

smartphone brands is huge. People are significantly more inclined to the Apple brand, which brings consumers up to 84.67 utility gains. Unexpectedly, data shows that European consumers are unwilling to pay for Samsung-branded mobile phones, which brings a loss of utility of 79.48. The possible limitations of this result will be mentioned in the following section. While the Huawei brand is in a relatively neutral position with -5.2 utility. This result is consistent with the importance we observed in Figure 1. The significant difference in utility brought about by Samsung and Apple brands means that the brand is particularly important to European consumers, with an importance of 33%.
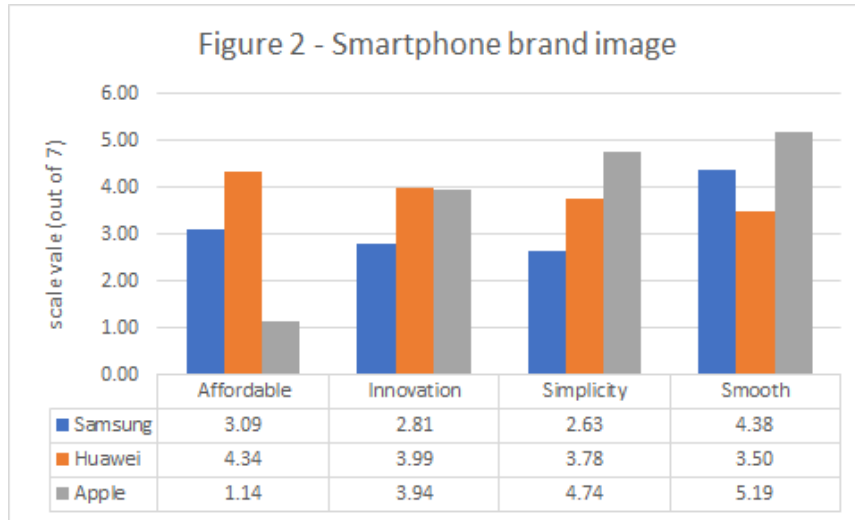
The price of mobile phones is opposite to the trend of storage size. The higher the price, the lower the utility level of customers, and the higher the storage size, the higher the utility level of customers. When the price is less than or equal to 600 euros, the price is a gain for the customer. Consistent with our previous analysis of the main effects, the price difference between 500 and 600 euros is not significant for the difference in purchase intention, and the difference in their utility gains is also very small. When the price is greater than or equal to 700 euros, the price will cause a loss to the consumer's utility. Storage size is the second most important attribute, and the utility difference is significant, which can also be observed from Figure 1. 64GB of storage space caused a utility loss to consumers of 67.81, while 128GB and 256GB brought considerable utility benefits to customers, namely 13.87 and 53.94.

The utility difference of the screen size is also consistent with the previous logistic regression results. The utility difference caused by the three attribute values is very small, only 9.01. The importance of the attribute of screen size is also the lowest, only 2%. However, contrary to our expectations, according to the response of European consumers, it is not that the larger the screen size, the more utility.

3.3 Result of brand image research

The questionnaire survey on the European market also collected consumers' impressions of smartphone brands. We use 7-point scaling to measure the performance of smartphone brands

in each item. 1 represents the least preferred, such as the most expensive or the least innovative, and 7 represents the most preferred, such as the smoothest use experience. Figure 2 shows the results of the survey.

Figure 2 - Smartphone brand image

	Affordable	Innovation	Simplicity	Smooth
Samsung	3.09	2.81	2.63	4.38
Huawei	4.34	3.99	3.78	3.50
Apple	1.14	3.94	4.74	5.19

The information in Figure 2 shows that the difference in product prices between the three brands is significant. Huawei scored 4.34 on this item, which means that consumers generally believe that Huawei's smartphone prices are affordable. . Apple's score on this item is only 1.14, indicating that Apple's mobile phone pricing is relatively high in the impression of European consumers. In terms of innovation, the difference between the three brands is not obvious. Apple and Huawei score close, giving customers a better image of innovation, while Samsung is slightly below the average, indicating that consumers believe that Samsung's smartphones are not as good as Apple and Huawei on the subject of innovation. In terms of product simplicity, Apple performed best with a score of 4.74. In the customer's impression, Apple's products are easy to use. Huawei is close to neutral, and customers think that Samsung's products are not easy to use in comparison. Last but not least, Apple still performed outstandingly with a score of 5.19 on the fluency of use, followed by Samsung with a score of 4.38. In comparison, the operating fluency of Huawei's mobile phones is not outstanding in the customer's impression, but the score of 3.5 is not lower than the median value, which shows that at least in the customer's impression, Huawei does not mean that it is not smooth and stuck.

3.4 Result of promotion channel research

Figure 3- Promotion channels for consumers to obtain information count
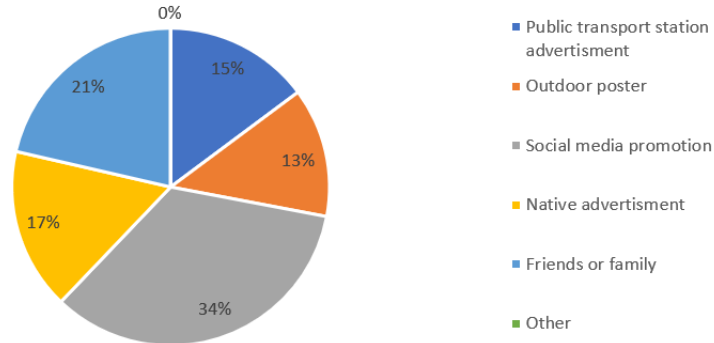
The questionnaire survey also counted the channels through which consumers most frequently obtain smartphone promotion information. The promotion channels given in the options are based on the information obtained from the interview. The results of the survey are presented through figure 3. Data shows that social media promotion is the most common channel for users to obtain smartphone promotion information, accounting for 34%. 21% of users use friends and family to obtain information about their smartphones. Native advertisement, public transportation station advertisement and outdoor advertisement accounted for 17%, 15% and 13% respectively.

4. Discussion

4.1 Conslusion

This paper analyzes the European smartphone market environment and the preferences of European consumers through interviews and questionnaire surveys, and uses a choice based conjoint test to predict the utility level of each smartphone attribute. Based on the above results, we found that not all selected attributes have a significant impact on European consumers' purchasing propensity. The results of quantities research show that the influence of screen size

on consumers' purchasing propensity is not significant, so we have sufficient evidence to reject our hypothesis 1. Regarding the sub-hypothesis of Hypothesis 1, the survey results show that brand, price, smart camera and storage size all have a significant impact on purchase intention. The Apple brand has the highest utility gain compared to Huawei and Samsung. At the same time, European consumers are significantly more inclined to smart phones with lower prices, richer camera models, and larger storage sizes. Therefore, there is insufficient evidence to reject Hypothesis H1a, H1b, H1d and H1e, but we have sufficient evidence to reject Hypothesis H1c.

Regarding the importance of each attribute to the European smartphone market, the previous chart shows that brand is the most important factor affecting consumers' purchasing intentions. Therefore, we do not have enough evidence to reject hypothesis 2. At the same time, the camera mode and storage size of smartphones are also important factors that deserve attention. Unexpectedly, price is not one of the most influential factors. This may be because smart phones have gradually become a necessity in people's lives and are less affected by price.

Regarding brand image, we can draw the following conclusions. Apple's mobile phone has excellent performance in smooth and simple operation, but it is expensive in people's impression. Samsung mobile phones give consumers the impression that they are not innovative and difficult to use, but they are still the largest market share holder in the European smartphone market. Finally, the brand image of Huawei mobile phones is positioned at low-end and cost-effective products, which perform well in all aspects and are affordable for people. This means that we have enough evidence to reject Hypothesis 3 and its sub-hypotheses H3c and H3d.

In the survey results of promotion channels, we found that social media is the most mainstream promotion channel, so we do not have enough evidence to reject hypothesis 4. In addition, friends and family are also important channels for consumers to obtain promotion information on smartphones, which means that word of mouth is still an important means of communication in this market.

4.2 Implication

This result is consistent with the literature, emphasizing the positive role of brand image effects in the market. The fact that purchase intention is relatively less affected by price also implies that smartphones have gradually become a rigid demand for people. Our results show that, within such a scenario, consumers' purchasing intentions are only slightly affected by the appearance of the smartphone, and more significantly affected by the customers' impression of the brand, that is, the company's brand image. At the same time, our results also point out that differences in practical functions that can be clearly distinguished have a significant impact on consumers' purchasing intentions, such as storage size and camera functions. These smartphone attributes are clear and easily recognized by consumers. Like many other markets, price is also an important attribute for the smartphone market. However, the influence of the price on the purchase intention of the smartphone market customers is discontinuous. Products in the same price range (e.g. low-end and medium-end smartphones below 600 euros) are not significantly affected by price differences. Products in different price ranges (e.g. low-range and mid-range smartphones with prices below 600 Euros and high-end smartphones with prices over 700 Euros) are significantly affected by price differences.

Our results suggest that Chinese smartphone brands must clarify their positioning in the European market. A clear market positioning can help marketers understand the relative advantages of their brands, thereby creating a simple and clear brand image, which is convenient for customers to understand to effectively convey the advantages and image of the brand to consumers. Meanwhile, our conclusion points out that it is more effective to make innovative investments in functions that users are easily aware of, such as increased memory space, increased camera pixels, or diversified functions, which can be quantified and have obvious differences in user experience. In our interview, a respondent mentioned that "compared to the processing speed which is 20% higher than the previous generation, the addition of two filters that come with the camera is more likely to pique my interest."

4.3 Limitation

This paper has certain limitations due to budget, human resources, time, and COVID-19 restrictions. I will mention these limitations below to explain the unreasonable results that may appear in the experimental results. First of all, the sample distribution of the questionnaire survey is not representative to a certain extent. Due to the quarantine requirements of COVID-19, the questionnaire survey is extremely dependent on the Internet and the channels of transmission are relatively limited. Therefore, we can see that the age distribution of the sample is mainly concentrated in the younger generation between 18-34 years old. This limitation will cause the sample of quantitative research to be unrepresentative, not only unbalanced in terms of age, but also may lack universality in fields such as nationality and occupation. This is also likely to be the cause of the unusually low utility value of the Samsung brand.

Secondly, the mobile phone portfolio of the questionnaire lacks practicality. In order to facilitate the audience to answer the questionnaire, the attribute values of all smart phones are presented in a relatively simple and intuitive way, and the actual products on the smartphone market are not covered by these simple combinations. For example, the price of a smart phone is not an integer of 600 Euros, 700 Euros, and the actual differences in cameras between products cannot be represented by camera functions alone. Finally, due to the large number of CBC test questions in the questionnaire, many respondents did not have the patience to answer all the questions. In fact, more than one-forth of the respondents did not complete the entire questionnaire, which may also cause samples Insufficiency or lack of representative answers to the following questions.

5. Appendix

Questionnaire of quantitative research:

Start

Hi! thank you for doing this research! I'm a student from the Erasmus University of Rotterdam and now doing my bachelor thesis. This survey is related to my thesis, *Chinese smartphone market status, and future market strategy in Europe*, which I would like to collect the consumer's general impression and preference about smartphone in order to analysis the smartphone market in Europe.

All the data will be collected anonymously, and the information you offered will be used only for academic analysis. Please click "Next" to start the survey

Next

Q1

Are you...

Q1=1 Male
○

Q1=2 Female
○

Q1=3 Other
○

Q2

How old are you?

Q2=1 <18
○

Q2=2 18-24
○

Q2=3 25-34
○

Q2=4 35-44
○

Q2=5 45-54
○

Q2=6 55-64
○

Q2=7 >=65
○

Back   Next

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Q3

What is your current field of work?

Q3=1
○ Agriculture, Food and Natural Resources

Q3=2
○ Architecture and Construction

Q3=3
○ Arts, Audio/Video Technology and Communications

Q3=4
○ Business Management and Administration

Q3=5
○ Education and Training

Q3=6
○ Finance

Q3=7
○ Government and Public Administration

Q3=8
○ Health Science

Q3=9
○ Hospitality and Tourism

Q3=10
○ Human Services

Q3=11
○ Information Technology

Q3=12
○ Law, Public Safety, Corrections and Security

Q3=13
○ Manufacturing

Q3=14
○ Marketing, Sales and Service

Q3=15
○ Science, Technology, Engineering and Mathematics

Q3=16
○ Student

Q3=17
○ Transportation, Distribution and Logistics

Q3=18   Q3_18_other
○ Other [   ]

Can you identify Apple's logo?

Q4=1
○

Q4=2
○

Q4=3
○

Q4=4
○

Q4=5
○

Q4=6
○

Q4=7
○ I don't know

28

Can you identify Samsung's logo?

○

○

○

○

○

○

○ I don't know

29

Can you identify Huawei's logo?

○

○

○

○

○

○

○ I don't know

Back   Next

30

Now I would like to ask several questions in order to do a choice-based conjoint test. In the following questions, you would be asked to make a choice in three smartphones with different attributes. **Please choose the smartphone that you're most willing to buy.**

Attributes list:
Brand: The brand name of the smartphone

Apple/Samsung/Huawei

Price: The selling price of the smartphone

500/600/700/800

Storage size: The data storage size of the smartphone

64GB/128GB/256GB

Smart camera: The AI-based camera function of the smartphone

Night view mode+Professional mode+AI portrait mode/
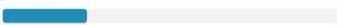Night view mode+Professional mode/
Night view mode/
No AI smart camera

Screen size: The size of the smartphone display

6.5 inches/6.2 inches/5.8 inches

Back   Next

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CBC_Random1

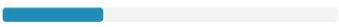If these were your only options, which would you choose?

(1 of 11)

Brand	Apple	Samsung	Huawei
Price	600	800	500
Storage Size	64GB	256GB	128GB
Smart camera	Night view mode + Professional mode	NO AI smart camera	Night view mode
Screen size	6.2 inches	6.5 inches	6.5 inches
	CBC_Random1 Select	CBC_Random1 Select	CBC_Random1 Select

NONE: I wouldn't choose any of these.

CBC_Random1

Select

Back   Next

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32
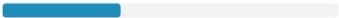
If these were your only options, which would you choose?

(2 of 11)

	Samsung	Huawei	Apple
Brand	Samsung	Huawei	Apple
Price	500	700	800
Storage Size	64GB	256GB	128GB
Smart camera	Night view mode	Night view mode + Professional mode + AI portrait mode	Night view mode + Professional mode
Screen size	6.2 inches	5.8 inches	6.2 inches
	CBC_Random2 Select	CBC_Random2 Select	CBC_Random2 Select

NONE: I wouldn't choose any of these.

CBC_Random2

Select

Back   Next

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33

If these were your only options, which would you choose?

(3 of 11)

Brand	Samsung	Apple	Huawei
Price	800	700	600
Storage Size	128GB	64GB	256GB
Smart camera	Night view mode	NO AI smart camera	NO AI smart camera
Screen size	6.5 inches	5.8 inches	5.8 inches
	CBC_Random3 Select	CBC_Random3 Select	CBC_Random3 Select

NONE: I wouldn't choose any of these.

CBC_Random3

Select

Back   Next

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34

CBC_Fixed1

If these were your only options, which would you choose?

(4 of 11)

	Samsung	Apple	Huawei
Brand	Samsung	Apple	Huawei
Price	600	800	600
Storage Size	128GB	128GB	256GB
Smart camera	Night view mode + Professional mode	Night view mode + Professional mode + AI portrait mode	Night view mode + Professional mode + AI portrait mode
Screen size	6.5 inches	6.2 inches	6.5 inches
	CBC_Fixed1 Select	CBC_Fixed1 Select	CBC_Fixed1 Select

NONE: I wouldn't choose any of these.

CBC_Fixed1
Select

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35

CBC_Random4

If these were your only options, which would you choose?

(5 of 11)

Brand	Huawei	Samsung	Apple
Price	700	600	500
Storage Size	64GB	256GB	128GB
Smart camera	Night view mode	Night view mode + Professional mode + AI portrait mode	Night view mode + Professional mode
Screen size	6.5 inches	5.8 inches	6.2 inches
	CBC_Random4 Select	CBC_Random4 Select	CBC_Random4 Select

NONE: I wouldn't choose any of these.

CBC_Random4

Select

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CBC_Random5

If these were your only options, which would you choose?

	Samsung	Huawei	Apple
Brand	Samsung	Huawei	Apple
Price	500	500	600
Storage Size	64GB	128GB	128GB
Smart camera	Night view mode + Professional mode + AI portrait mode	Night view mode + Professional mode	NO AI smart camera
Screen size	6.2 inches	5.8 inches	6.5 inches
	CBC_Random5 Select	CBC_Random5 Select	CBC_Random5 Select

NONE: I wouldn't choose any of these.

CBC_Random5

Select

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37

CBC_Random6

If these were your only options, which would you choose?

	Samsung	Apple	Huawei
Brand	Samsung	Apple	Huawei
Price	600	700	800
Storage Size	256GB	256GB	64GB
Smart camera	Night view mode + Professional mode	Night view mode	Night view mode + Professional mode + AI portrait mode
Screen size	6.5 inches	5.8 inches	5.8 inches
	CBC_Random6 Select	CBC_Random6 Select	CBC_Random6 Select

NONE: I wouldn't choose any of these.

CBC_Random6

Select

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38

CBC_Fixed2

If these were your only options, which would you choose?

(8 of 11)

	Samsung	Apple	Huawei
Brand	Samsung	Apple	Huawei
Price	800	600	700
Storage Size	128GB	64GB	256GB
Smart camera	Night view mode + Professional mode + AI portrait mode	Night view mode	Night view mode + Professional mode
Screen size	5.8 inches	6.5 inches	6.5 inches
	CBC_Fixed2 Select	CBC_Fixed2 Select	CBC_Fixed2 Select

NONE: I wouldn't choose any of these.

CBC_Fixed2
Select

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CBC_Random7

If these were your only options, which would you choose?

	Apple	Huawei	Samsung
Brand	Apple	Huawei	Samsung
Price	800	500	600
Storage Size	128GB	256GB	64GB
Smart camera	Night view mode + Professional mode + AI portrait mode	Night view mode + Professional mode	NO AI smart camera
Screen size	6.2 inches	6.2 inches	6.5 inches
	CBC_Random7 Select	CBC_Random7 Select	CBC_Random7 Select

NONE: I wouldn't choose any of these.

CBC_Random7

Select

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40

If these were your only options, which would you choose?

(10 of 11)

Brand	Apple	Huawei	Samsung
Price	800	600	700
Storage Size	64GB	128GB	128GB
Smart camera	Night view mode	NO AI smart camera	Night view mode + Professional mode + AI portrait mode
Screen size	5.8 inches	6.5 inches	6.2 inches
	CBC_Random8 Select	CBC_Random8 Select	CBC_Random8 Select

NONE: I wouldn't choose any of these.

CBC_Random8

Select

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41

CBC_Random9

If these were your only options, which would you choose?

(11 of 11)

	Apple	Samsung	Huawei
Brand	Apple	Samsung	Huawei
Price	700	700	500
Storage Size	128GB	256GB	256GB
Smart camera	Night view mode	Night view mode + Professional mode	NO AI smart camera
Screen size	5.8 inches	6.5 inches	6.2 inches
	CBC_Random9 Select	CBC_Random9 Select	CBC_Random9 Select

NONE: I wouldn't choose any of these.

CBC_Random9

Select

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Q7

Where you usually get promotion information about smartphones?

Q7_1
☐ Public transport station advertisment

Q7_2
☐ Outdoor poster

Q7_3
☐ Social media promotion

Q7_4
☐ Native advertisment

Q7_5
☐ Friends or family

Q7_6
☐ Other   Q7_6_other
[   ]

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How do you evaluate the overall quality of Samsung's smartphones?

Affordable	⃝	Expensive
Innovative	⃝	Nothing new
Simple to use	⃝	Hard to use
Smooth	⃝	Not smooth

How do you evaluate the overall quality of Huawei's smartphones?

Affordable	⃝	Expensive
Innovative	⃝	Nothing new
Simple to use	⃝	Hard to use
Smooth	⃝	Not smooth

How do you evaluate the overall quality of Apple's smartphones?

Affordable	⃝	Expensive
Innovative	⃝	Nothing new
Simple to use	⃝	Hard to use
Smooth	⃝	Not smooth

Back   Next

Q11

Which Chinese Smartphone brands have you heard?

Q11_1 Huawei
☐

Q11_2 Xiaomi
☐

Q11_3 Oneplus
☐

Q11_4 Oppo
☐

Q11_5 Vivo
☐

Q11_6 Q11_6_other
☐ Other [   ]

Back   Next

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45

finish

Thank you for taking this survey, we appreciate your feedback!

0% ▬▬▬▬▬▬▬▬▬▬▬▬ 100%

Transcript of interview:

	Question1: What is the most commonly used mobile phone function in your life?
1	Make a phone call, look at the time, start learning to use camera this year
2	Game, Social media, video and music display
3	Social media and picture, browse internet page
4	Social media and music play
5	Social media, payment and game
6	Social media and music play

	Question2: When you buy the next smartphone, will you continue to choose your current brand? What factors will affect your choice of the next phone?
1	Currently use Huawei, will not change the brand. Appearance, battery standby time and charging speed
2	Currently use Apple, will not change the brand. Price, smoothness of operation and network connection
3	Currently use Apple, might switch the brand if the quality is better. Simple to use, camera and added value
4	Currently use Apple, will not change the brand. Price, battery life and camera
5	Currently use Samsung, will not change the brand. Brand, price, using habit
6	Currently use Apple, will not change the brand. Processing speed, stroage size, screen quality

	Question3: What's your general impression on Apple, Huawei and Samsung?
1	Apple: I have never used it, but I heard it is expensive Huawei: Very powerful and easy to use Samsung: I haven't used it.
2	Apple: Smooth use, but users are forced to update iterations, and battery life is short. Huawei: Cost-effective, suitable for the elderly Samsung: The price is high, it will not be smooth after one year
3	Apple: easy to use, but lacks innovation Huawei: Never used it, but the price is cheap in my impression Samsung: Used it, but no special impression
4	Apple: The system is easy to operate Huawei: Never used it, but I know it is a Chinese brand Samsung: high quality
5	Apple: high price Huawei: A variety of models at different prices, with a wide range of target customers Samsung: cost-effective
6	Apple: high price, smooth operation, good product environment Huawei: An Android device, information security in doubt Samsung: never used

	Question4: What channels do you usually get the promotion information of your smartphone?
1	outdoor advertisement in shopping mall, family
2	social media, friends and family
3	social media, word of mouth, online advertisement
4	outdoor advertisement, public transport station advertisement
5	outdoor advertisement, public transport station advertisement, smartphone retailer
6	public transport station advertisement, smartphone retailer, youtube

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