

# CUSTOMER SATISFACTION AND CHOICE TOWARDS MOBILE BRANDS AND ITS FEATURES: A STUDY IN DELHI REGION

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## ABSTRACT

*The mobile phone when invented was used for voice communication as well as sending text messages while moving across various geographical areas. However, today, mobile phone has moved beyond its primary role of voice communication and is used for other purposes such as surfing the internet, listening to music, watching videos, etc. In this era of technology, the invention of mobile phone has contributed in many ways for the various developments of our nation and the world. The mobile phone has made the communication fast and helped in expediting business operations, organizational activities and the activities in our daily life. Modern mobile telephone services use a cellular network architecture and, therefore, mobile telephones are called cellular telephones or cell phones, in North America. In 1993, the world's first smart phone IBM Simon was introduced. Thereafter, many mobile brands came into the market. At this moment, Samsung brand is popular and Apple brand is gradually earning popularity in our country. In this context, this research work was carried out in Delhi to find out which attributes of mobile phone are most attractive to customers? What combination of different features of iPhone is best preferred by the customers? Is there any difference between Samsung brand and Apple brand in attaining customers' satisfaction? The Kano model designed by Noriaki Kano and the conjoint analysis were used as methodology for conducting this research work. It has been found from the study that (i) the water resistant feature, wireless charging option, finger print sensor, 64GB storage and voice controller facility are most attractive attributes; (ii) the camera is most attractive attribute; (iii) the iPhone combination with ios11, 5.5inch plus Touch screen, 32GB storage, 2900mAh battery, 7MP front camera, 8MP rear camera and price less than 26,000 is the best preferred combination; and (iv) there is significant difference in customer's satisfaction between Samsung and Apple mobile brand.*

**Keywords:** Conjoint Analysis, Customer Preference, Feature, iPhone, Kano Model, Mobile Phone

## INTRODUCTION

The mobile phone plays very important role in the life of the people irrespective of any profession, gender, age group, and income group. Today, we have stepped on to a situation where we find it extremely difficult to survive without a mobile phone. The first handheld mobile phone was demonstrated by John F. Mitchell and Martin Cooper of Motorola in 1973. The Nippon Telegraph and Telephone launched the world's first cellular network in Japan in 1979. The DynaTAC 8000x was the first commercially available handheld mobile phone in the market in 1983. From 1983 to 2014, worldwide mobile subscriptions grew to over seven billion, penetrating virtually 100% of the global population and reaching even the bottom of the economic pyramid. In first quarter of 2016, the top smartphone developers worldwide were Samsung, Apple, and Huawei. The smartphone sales registered 78% of total mobile phone sales. For feature phones (or 'Dumbphones') as of 2016, the largest were Samsung, Nokia, and Alcatel.

India's telecommunication network is the second largest in the world by number of telephone users (both fixed and mobile phone) with 1.206 billion subscribers as on 30 September 2017. Major sectors of the Indian telecommunication industry are

telephone, internet and television broadcast Industry in the country which is in an ongoing process of transforming into next generation network, employs an extensive system of modern network elements such as digital telephone exchanges, mobile switching centres, media gateways and signalling gateways at the core, interconnected by a wide variety of transmission systems using fibre-optics or Microwave radio relay networks. The access network, which connects the subscriber to the core, is highly diversified with different copper-pair, optic-fibre and wireless technologies. Telecommunication has supported the socioeconomic development of India. It also has helped to increase the transparency of governance with the introduction of e-governance in India. The government has pragmatically used modern telecommunication facilities to deliver mass education programmes for the rural folk of India. In August 1995, the then Chief Minister of West Bengal, Mr. Jyoti Basu made the first mobile phone call in India to the Union Telecom Minister, Mr. Sukhram.

India is one of the world's largest and among the fastest growing smartphone markets. With sales slowing down in mature markets like US and Europe, the mobile phone makers are expanding their business in the Indian market, bringing in the

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best devices from their portfolio. In the year 2017, the market share of mobile phone manufacturers – Samsung, Xiaomi, Vivo, Lenovo, Oppo and others in India were 24.95%, 20.38%, 9.63%, 7.78%, 7.53% and 29.73% respectively. In India mobile phone users are growing up every year and to couple up with this, Samsung has planned to double the production capacity for mobile phones at its manufacturing factory in India. On the other hand, Apple has started assembling mobile phones in India meeting the Indian law that is 30% of the mobile components are sourced locally. The public in India are having many brands and options for purchasing a mobile phone. In this context, the researchers tried to find out which attributes of mobile phone are more attractive to customers and what combination of features of iPhone are preferred most by the customers. Since, Samsung is having maximum market share in the Indian market and Apple has entered in Indian market with much determination, so a comparison of customers' satisfaction towards Samsung mobile brand and Apple mobile brand has been carried out in this study.

## LITERATURE REVIEW

In today's business environment, how to satisfy customers and to stay in the competition becomes the ultimate concern of most of the companies. Therefore, understanding customer satisfaction (CS) dimensions and measuring it and taking advantage from these measurements becomes the urgent need for marketing managers to stay in the competitive market. There are different methods that have been applied by the researchers in the past for finding out customers' satisfaction (CS) towards products/services of an organization. Kano (1984) developed two-way model by adapting the work of Herzberg *et al.*'s (1959) "Motivation-Hygiene Theory" which was effectively used to measure customer's perceptions about different attributes by identifying 'customers delight' and 'customers disgust when an attribute is present in the offerings or absent from the offerings. Matzler *et al.* (2004) applied Kano model to evaluate employee satisfaction in high-tech industry.

Lin F-H *et al.* (2017) stated that the products are now developed based on what customer's desire and thus the attractive quality creation has become crucial. In studies on customer satisfaction, methods for analyzing quality attributes and enhancing customer satisfaction have been proposed by the authors to facilitate product development. In this context, research was conducted that quantitatively calculated the odds of customer satisfaction for the Kano classification, fitting a nonlinear relationship between attribute-level performance and customer satisfaction. The researchers also determined the odds of customer satisfaction to identify the classification of quality attributes and took customer psychology into account to suggest how decision makers should prioritize the allocation of resources.

Kano's model has previously been integrated with other tools to clarify the requirements of customers; these tools include PZB's gap theory (Basfirinci *et al.*, 2015) and quality function deployment (Yeh, T.M. *et al.*, 2015; Lo, S.M. *et al.* (2016). The

conventional Kano model can only present the results of classifying quality attributes.

There are other models that have been used by the researchers to find out the customer's satisfaction. Sweden was the first country to establish a national economic indicator reflecting customer satisfaction. Fornell (1992) proposed a method for measuring customer satisfaction in more than 30 industries and for more than 100 corporations. After the first national customer satisfaction was developed in Sweden, a number of both national and international customer satisfaction barometers and indices have been introduced such as the American Customer Satisfaction Index (Fornell *et al.*, 1996), European Customer Satisfaction Index, and Norwegian Customer Satisfaction Barometers (Andreassen & Lindestad, 1998).

Grigoroudis and Siskos (2002) introduced Multicriteria Satisfaction Analysis (MUSA) to measure the customer satisfaction. The MUSA method defines customer satisfaction as the aggregation of individual judgements into a collective value function assuming that the client's global satisfaction depends on a set of criteria representing service/product characteristic dimensions. According to Clemes *et al.* (2010) the Probit and Logit model can be used to rank the factors associated with customer's satisfaction with respect to their impact on customer behavior. Probit and Logit model are widely used in marketing and other fields using artificial neural networks (Grigoroudis & Siskos, 2010).

Bayraktar *et al.* (2012) used Data Envelopment Analysis (DEA) model for analyzing and comparing customer satisfaction and loyalty efficiency for mobile phone brands in an emerging telecommunication market in Turkey. In DEA model for customer satisfaction, a Decision Making Unit is a customer which expresses judgments. The inputs are usually the attributes of overall customer satisfaction which are pre-defined from the literature. The outputs are usually customer behaviors such as: overall customer satisfaction, customer loyalty, customer repurchase intention, etc.

To gain an insight into customer's preference, a technique called conjoint analysis is used by marketing managers for products and services (Macro Vriens, 1994). After development of this technique, researchers reviewed this technique and made use of it (Green and Srinivasan, 1978; Timmermans, 1984; Louviere, 1988; Green and Srinivasan, 1990).

Ruben *et al.* (2016) proposed an experimental design called 'Plackett-Burman' in choice-based conjoint analysis for measuring preferences that accommodate large numbers of options. In choice-based conjoint analysis, profiles are randomly organized in blocks, but the authors proposed a manually statistical arrangement because its design takes into account all the factors in the same number that are equally distributed. According to the authors, Plackett-Burman can be an efficient design, if a tradeoff is considered between the number of stimuli in each choice set and the number of choice sets used in the assessment process. To illustrate its uses the

authors described an empirical application measuring preferences for shocking warning messages on cigarette packages described in 11 pictures and estimated the distribution of these on tobacco products to optimise impact on teenagers.

Ze'ev *et al.* (2017) applied conjoint analysis to measure student's preferences regarding various attributes that affect their decision process while choosing a higher education area of study. The paper exhibits two different models which throw lights on the perceived value of each examined area of study: conjoint analysis and clustering k-means algorithm. The findings of the used methods exhibit not only which of the attributes have the greatest influence on students' decision-making process, but also shed light on which types of study areas are most preferred by respondents.

### OBJECTIVES OF THE STUDY

- (a) To find out the attributes of the smart phone that attains high level of satisfaction of customers.
- (b) To study the difference between Apple and Samsung mobile brand with respect to customer satisfaction.
- (c) To find out the combination of features of iPhone those are most preferred by customers.

### SCOPE OF THE STUDY

The level of customers' satisfaction was studied with respect to two mobile brands i.e., Samsung and Apple in Delhi region. The questionnaire survey was conducted in East Delhi, West Delhi, South Delhi and North Delhi to collect the opinion of respondents from all parts of Delhi. In the selected population for data collection, both male and female were included. The population comprised of different age groups, different profession and different income levels.

### RESEARCH METHODOLOGY

#### Methodology for Data Collection

The primary data was collected through questionnaire survey and the secondary data was collected from the websites.

#### Methodology for Data Analysis

The data was analysed by using Kano model to determine the level of satisfaction of the customers for different features of smart phones. The Conjoint analysis was used to find out the most preferred combination of features of iPhone.

#### About Kano Model

Kano model is the user satisfaction model based on product quality feature, using a nonlinear (two dimensional) way to measure customer's perceptions, mainly to identify customers delight and customer dissatisfaction when an attribute is present and absent respectively. This model was proposed by Professor Noriaki Kano. It uses an orthogonal axis system to describe the relationship between customer satisfaction (delight) and

product function and features as shown in Figure 1. Kano requirement models are divided into the following four categories based on user requirements:

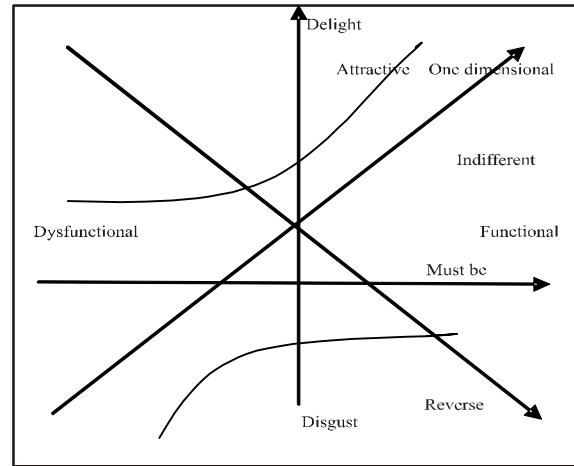


Figure .1 : Kano Model

#### Kano Questionnaire

- (a) **Must-be (M):** Attributes categorized under this category consists of the preliminary criteria of product since customers will be extremely unhappy, if it is not provided. However, provision of these attributes doesn't increase satisfaction rate of customers. It is taken as a granted attribute.
- (b) **One-Dimensional (O):** Attributes categorized under this category will increase satisfaction level and its absence will lead to increase dissatisfaction level. This type of attribute gives loyalty of customers.
- (c) **Attractive (A):** Attributes that comes under this category are basically the differentiator of services to be provided. Its functional presence will be loved by customers and their absence will not cause any harm to satisfaction. These are the true delighters.
- (d) **Reverse (R):** Attributes that falls in this category must be removed as these attributes are harmful to the customer satisfaction and its dysfunctional absence will be appreciated.
- (e) **Indifferent (I):** Attributes within this category neither contribute in satisfaction nor in dissatisfaction of customer.
- (f) **Questionable (Q):** this outcome indicates that either the question is wrong or response is illogical.

The questionnaire is constructed through pairs of customer requirement questions. Each question has two parts: How do you feel, if that attribute is present (This is a functional form of question) and how you do feel, if this attribute is absent (This is dysfunctional form of question). Five alternatives are provided out of which one alternative is to be selected by customer. The alternatives are "I like it", "It must be there",

“Neutral”, “I can live with it” and “I dislike it”.

### About Conjoint Analysis

Conjoint analysis is a statistical marketing research technique that helps to measure what the customers’ value most about combination of different attributes and predicts the value of each combination of attributes and predicts the value of each combination of attributes. The principles behind conjoint analysis start with breaking a product or service down into its attributes and levels. The first stage in conjoint analysis is to create a set of product profiles with the possible combinations of attributes and levels to produce a set of options from which customers or respondents are then asked to rank those combinations as per their preference. There may be more than 20/30 preferences ranked by customers. The conjoint analysis is done to work out the utility score of each preference in terms of its contribution to the customer’s decision. The highest utility value of a particular combination is chosen as the best acceptable design.

### Customer Satisfaction Coefficient

The Customer Satisfaction Coefficient indicates the extent to which satisfaction increases, if a customer’s requirement is met or the extent to which satisfaction decreases, if a customer’s requirement is unmet. The customer satisfaction coefficient can be calculated using formula given below.

$$\text{Customer satisfaction} = (A + O)/(A+M+O+I)$$

Coefficient (CS)

$$\text{Customer dissatisfaction} = (O+M)/(-1)(A+O+M+I)$$

Coefficient (DS)

A positive Customer Satisfaction (CS) ranges in value from zero to one. When the estimated value is closer to one, it indicates higher influence on customer satisfaction. The negative customer’s satisfaction operates in similar manner. A zero value indicates that this feature does not cause dissatisfaction, if it is not met. The customer satisfaction and dissatisfaction coefficient of each attribute have been estimated and furnished in Table 3. The customer satisfaction coefficients are also plotted in Kano diagram (refer Figure 2) which helps to know the influence of each attribute on customer satisfaction and dissatisfaction so that consideration is given to each attribute accordingly at the time of planning for the design of products.

The diagram is divided into four quadrants according to the four types of requirements: Attractive, Must be, Indifferent and one dimensional. In this research, it has been found that five attributes such as water resistance, Wireless Charging, Finger print sensor, 64GB Storage, Voice controller facility come under “attractive category”. The Colour options, Bluetooth, Payment System apps comes under “Indifferent category” as these attributes neither contribute to satisfaction nor to dissatisfaction of customers. The only one “must be attribute” extracted from this study is Camera. The customers will be extremely unhappy, if it is not provided. The one dimensional attribute will increase satisfaction level and its absence will lead to increased dissatisfaction level. The one-dimensional attribute in this study is GPS.

**Table 1: Evaluation Dimension**

Customer Requirements		Dysfunctional (Negative questionnaire)				
		Like	Must be	Neutral	Live	Dislike
Functional (Positive Questionnaire)	Like	Q	A	A	A	O
	Must be	R	I	I	I	M
	Neutral	R	I	I	I	M
	Live	R	I	I	I	M
	Dislike	R	R	R	R	Q

**Table 2 : The Result of Kano Questionnaire Survey**

S. No	Attributes	A	O	M	I	R	Q	Total	Category
1	Water Resistance	24	15	8	16	3	0	66	A
2	Wireless Charging	40	14	1	10	0	1	66	A
3	Finger print sensor	19	16	16	13	1	1	66	A
4	Colour options	19	8	8	25	3	3	66	I
5	64 GB Storage	24	16	12	8	5	1	66	A
6	GPS	10	24	16	14	2	0	66	O
7	Bluetooth	8	20	12	24	2	0	66	I
8	Camera	17	10	27	9	1	2	66	M
9	Voice controller facility	26	18	1	20	0	1	66	A
10	Payment Systems	22	10	2	29	3	0	66	I

**Table 3: Customer Satisfaction and Dissatisfaction Coefficients**

S. No	Attributes	Category	Customer Satisfaction Coefficient (CS) = $(A + O)/(A+O+M+I)$	Customer's Dissatisfaction Coefficient (CD) = $(O+M)/(-1) * (A+O+M+I)$
1	Water Resistance	A	0.619	-0.365
2	Wireless Charging	A	0.83	-0.231
3	Finger print sensor	A	0.546	-0.5
4	Colour options	I	0.45	-0.267
5	64 GB Storage	A	0.666	-0.467
6	GPS	O	0.531	-0.625
7	Bluetooth	I	0.438	-0.5
8	Camera	M	0.428	-0.587
9	Voice controller facility	A	0.676	-0.292
10	Payment Systems	I	0.508	-0.191

**RESULTS AND DISCUSSION**

The data was collected using Kano questionnaire to find out the attributes of the smart phone that attains high customer’s satisfaction. The feedback received from the respondents against each attribute is furnished in Table 2 under six dimensions (A, O, M, I, R, and Q) as explained above.

**TESTING OF HYPOTHESIS**

To find out, if there is any difference between the satisfaction of customers towards Samsung mobile phone and Apple mobile phone, the following hypothesis was considered and tested.

**H<sub>1</sub>:** There is significant difference in customer satisfaction towards Samsung mobile and Apple mobile brand.

The reliability of the questionnaire used for testing the hypothesis was verified by calculating the value of Cronbach’s Alpha. The reliability statistics of the questionnaire is furnished in Table 4. Since the value of Cronbach’s Alpha was more than 0.7, the questionnaire appeared to be highly reliable for use. For testing this hypothesis, the paired t-test was conducted in SPSS and the result of the test is shown in Table 5 and 6.

The Table 5 shows that the value of correlation coefficient is – 0.020. This represents absolute inverse relationship which means that at the event customer’s Satisfaction towards Samsung mobile brand goes up the same towards Apple mobile brand goes down. The Table 6 shows a t-statistics of -3.478 with 99 degree of freedom. The two-tailed p-value is 0.001, which is less than 0.05 at 5% significance level, which means that there is significant difference in customer’s satisfaction between Samsung mobile brand and Apple mobile brand.

**Most Desired Combination of Features of iPhone**

To fulfill one of the objectives of this research work, conjoint analysis was used to explore the desired combination of the features of iPhone which are preferred most by the customers. In order to do the market survey, the different features of iPhone that were considered for design are given in Table 7. From Table 7, we see that there are 288 (3 x 2 x 2 x 2 x 2 x 2 x 3) number of combinations of iPhone that can be developed. But, if all these 288 combinations are given to the customers to rank these as per their preference, it will be a very difficult exercise for the customers.

To overcome this problem, SPSS supports “Orthogonal Design” which means that out of 288 cases, on a random basis, the system will identify and generate some number of cases which will have good representation of all the features across different combinations. That means the ‘Orthogonal Design’ will reduce these 288 cases into much less number of cases so that customers can give their preference conveniently against each combination.

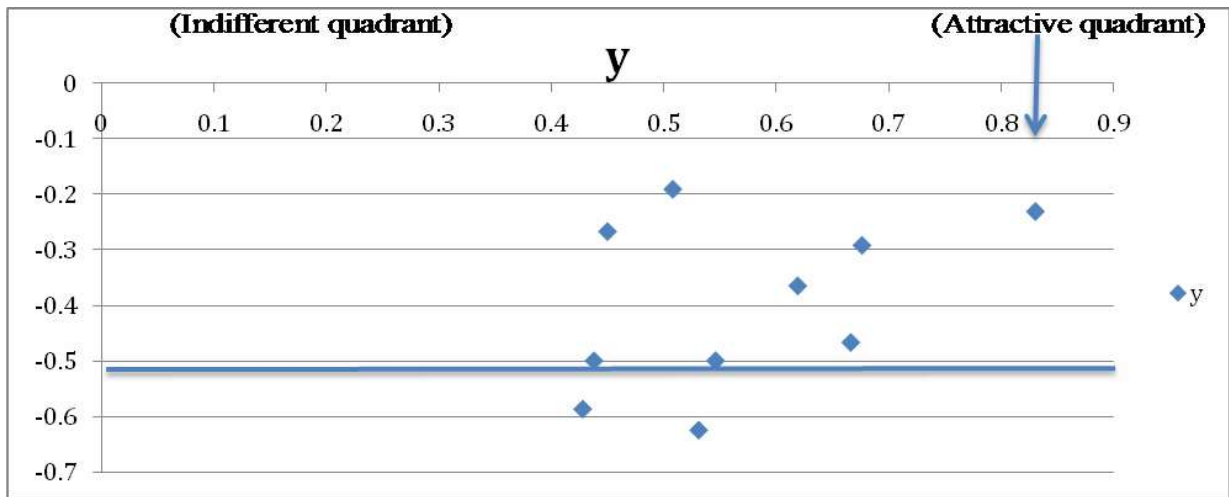
The data was entered and processed in SPSS and the result of ‘Orthogonal Design’ is furnished in Table 8. We see from Table 8 that 32 design combinations (Refer to Card\_ in Table 8) and five holdout cases have been generated by conjoint analysis in SPSS. Holdout cases are those which are not to be pursued. However, all 37 design combinations were distributed to the customers for ranking their preferences for each design combination. The feedback from customers were collected and stored in Customers Preference file. Now, two files: (1) Mobile combinations and (2) Customers Preference were used to run conjoint analysis in SPSS. The output is shown in Table No. 9, 10, 11 and 12.

**Table 4: Reliability Statistics**

Cronbach's Alpha	N of items
0.847	13

**Table 5: Paired Samsung and Apple Correlation**

		N	Correlations	Sig.
Pair 1	Samsung customer satisfaction and Apple customer satisfaction	100	-0.020	0.840



(Must be Quadrant) (One Dimensional Quadrant)

**Figure 2: Kano Diagram**

**Table 6: Paired Test of Samsung and Apple Customer Satisfaction**

		Paired Differences				T	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Samsung customer satisfaction and Apple customer satisfaction	-.26308	.75632	.07563	-.41315	-.11301	-3.478	99	.001

**Table 7: Features for Design of iPhone**

Operating System	Display	Storage	Battery	Front Camera	Rear Camera	Price
ios 8	4.7inch+Touch	32 GB	1810 mAh	1.2 MP	8 MP	Less than Rs.26000
ios 10	5.5inch+Touch	64 GB	2900 mAh	7 MP	12 MP	Rs.43000 – 58000
ios 11						Rs.62000 - 73000

**Table 8: Mobile Combination Resulted from Orthogonal Design**

Operating System	Display	Storage	Battery	Front camera	Rear camera	Price	Status	Card_
ios8	5.5inch+Touch	32GB	2900mAh	1.2MP	8MP	62000-73000	Design	1
ios11	4.7inch+Touch	64GB	1810mAh	1.2MP	8MP	Less than 26000	Design	2
ios8	4.7inch+Touch	32GB	2900mAh	1.2MP	12MP	Less than 26000	Design	3
ios8	5.5inch+Touch	32GB	2900mAh	1.2MP	8MP	Less than 26000	Design	4
ios8	5.5inch+Touch	64GB	1810mAh	7MP	12MP	Less than 26000	Design	5
ios10	5.5inch+Touch	32GB	2900mAh	7MP	8MP	62000-73000	Design	6
ios8	5.5inch+Touch	64GB	2900mAh	7MP	8MP	43000-58000	Design	7
ios10	4.7inch+Touch	32GB	2900mAh	7MP	12MP	43000-58000	Design	8
ios10	4.7inch+Touch	32GB	1810mAh	7MP	8MP	Less than 26000	Design	9
ios11	4.7inch+Touch	32GB	1810mAh	7MP	8MP	62000-73000	Design	10
ios10	5.5inch+Touch	32GB	1810mAh	7MP	12MP	Less than 26000	Design	11
ios11	5.5inch+Touch	32GB	2900mAh	7MP	8MP	Less than 26000	Design	12
ios10	5.5inch+Touch	64GB	2900mAh	1.2MP	8MP	Less than 26000	Design	13
ios8	5.5inch+Touch	64GB	1810mAh	7MP	12MP	62000-73000	Design	14
ios10	4.7inch+Touch	64GB	2900mAh	1.2MP	12MP	Less than 26000	Design	15
ios8	4.7inch+Touch	32GB	1810mAh	1.2MP	8MP	Less than 26000	Design	16
ios11	4.7inch+Touch	32GB	2900mAh	7MP	12MP	Less than 26000	Design	17
ios8	5.5inch+Touch	32GB	1810mAh	1.2MP	12MP	Less than 26000	Design	18
ios8	4.7inch+Touch	32GB	1810mAh	1.2MP	8MP	62000-73000	Design	19
ios11	5.5inch+Touch	32GB	1810mAh	7MP	12MP	43000-58000	Design	20
ios8	5.5inch+Touch	32GB	1810mAh	1.2MP	12MP	43000-58000	Design	21
ios8	5.5inch+Touch	64GB	2900mAh	7MP	8MP	Less than 26000	Design	22
ios8	4.7inch+Touch	64GB	1810mAh	7MP	8MP	Less than 26000	Design	23
ios10	5.5inch+Touch	64GB	1810mAh	1.2MP	12MP	62000-73000	Design	24
ios11	5.5inch+Touch	64GB	1810mAh	1.2MP	12MP	62000-73000	Design	25
ios10	4.7inch+Touch	64GB	1810mAh	1.2MP	8MP	Less than 26000	Design	26
ios11	5.5inch+Touch	64GB	2900mAh	1.2MP	8MP	Less than 26000	Design	27
ios8	4.7inch+Touch	64GB	1810mAh	7MP	8MP	Less than 26000	Design	28
ios8	4.7inch+Touch	64GB	2900mAh	7MP	12MP	Less than 26000	Design	29
ios11	4.7inch+Touch	64GB	2900mAh	1.2MP	12MP	62000-73000	Design	30
ios8	4.7inch+Touch	32GB	2900mAh	1.2MP	12MP	43000-58000	Design	31
ios8	4.7inch+Touch	64GB	2900mAh	7MP	12MP	43000-58000	Design	32
ios8	4.7inch+Touch	64GB	1810mAh	1.2MP	12MP	Less than 26000	Holdout	33
ios8	4.7inch+Touch	32GB	2900mAh	1.2MP	8MP	62000-73000	Holdout	34
ios8	5.5inch+Touch	64GB	2900mAh	1.2MP	8MP	Less than 26000	Holdout	35
ios8	5.5inch+Touch	32GB	2900mAh	7MP	12MP	Less than 26000	Holdout	36
ios10	5.5inch+Touch	32GB	2900mAh	7MP	8MP	Less than 26000	Holdout	37

### Interpretation of Outputs of Conjoint Analysis

The values in Table 9 indicates that the customers importance towards battery, price, rear camera, operating system, storage, front camera and display are 15.10%, 14.71%, 14.50%, 14.37%, 14.29%, 14.20% and 12.80% respectively.

**Table 9: Importance of Values**

OS	14.371
Display	12.806
Storage	14.298
Battery	15.108
Front camera	14.200
Rear camera	14.501
Price	14.716

The Table 10 shows the utility (part-worth) scores and their standard errors for each factor level. Higher utility values indicate greater preference. There is an inverse relationship between price and utility. The higher are the prices the lower is the utility value. Since, the utilities are all expressed in a common unit, they can be added together to give the total utility of any combination and this is how the best preferred combination of iPhone is to be computed.

When specifying linear models for different attributes, we chose an expected direction (Less or More) for the linear relationship between the value of the variable and the preference for that value. The Conjoint procedure keeps track of the number of subjects whose preference showed the opposite of the expected relationship. For example, a greater preference for higher prices, or a lower preference for a money-back guarantee. These cases are referred to as reversals.

**Table 10: Utilities**

	Utility Estimate	Std. Error
OS	ios8	.355
	ios10	.709
	ios11	1.064
Display	4.7inch+Touch	.017
	5.5inch+Touch	.033
Storage	32GB	-1.542
	64GB	-3.083
Battery	1810mAh	-.204
	2900mAh	-.408
Front camera	1.2MP	-.308
	7MP	-.617
Rear camera	8MP	-.221
	12MP	-.442
Price	Less than 26000	-.506
	43000-58000	-1.012
	62000-73000	-1.518
(Constant)	20.153	2.733

In our study, the Table 11 displays the number of reversals for each factor and for each subject. For example, 14 subjects showed a reversal for price. That is, they preferred iPhone with higher prices. Table12 displays two statistics, Pearson’s R and Kendall’s tau, which provides measures of the correlation between the observed and estimated preferences. The Table also displays Kendall’s tau for just the holdout profiles. The holdout profiles (five in our study) were rated by the subjects but not used by the conjoint procedure for estimating utilities. Instead, the conjoint procedure computes correlations between the observed and predicted rank orders for these profiles as a check on the validity of the utilities. In our case the correlation is 46.60%.

**Table No.11 : Number of reversals**

		No. of reversals
Factor	Storage	20
	Rear camera	18
	Display	16
	Battery	15
	Price	14
	Front camera	13
	Operating System	13
Subject	1. Subject 1	4
	2. Subject 2	4
	3. Subject 3	3
	4. Subject 4	4
	5. Subject 5	3
	6. Subject 6	3
	7. Subject 7	4
	8. Subject 8	4
	9. Subject 9	4
	10. Subject 10	3
	11. Subject 11	3
	12. Subject 12	5
	13. Subject 13	4
	14. Subject 14	5
	15. Subject 15	3
	16. Subject 16	3
	17. Subject 17	4
	18. Subject 18	5
	19. Subject 19	3
	20. Subject 20	4
	21. Subject 21	5
	22. Subject 22	4
	23. Subject 23	6
	24. Subject 24	3
	25. Subject 25	1
	26. Subject 26	5
	27. Subject 27	4
	28. Subject 28	1
	29. Subject 29	3
	30. Subject 30	2



**Table 12 : Correlation between observed and estimated preferences**

	Value	Sig.
Pearson's R	.466	.004
Kendall's tau	.319	.005
Kendall's for Holdouts	.000	.500

### Finding Out the Best Preferred iPhone Combination

Based on the Utility estimate of each iPhone feature given in Table 10, the Utility of each iPhone combination (Refer Table 8) has been estimated. The value of Utility for Card\_12 has been obtained as 17.956 [Utility = 1.064 + 0.033 – 1.542 – 0.408 – 0.617 – 0.221 – 0.506 + 20.153 = 17.956] which is the highest among all the combinations.

Therefore, the most preferred combination is:

Operating system: ios11; Display: 5.5inch + Touch; Storage: 32 GB; Battery: 2900 mAh; Front camera: 7 MP; Rear camera: 8 MP; Price: Less than Rs.26000.00

### CONCLUSION

The customers' satisfaction for different attributes of smart phone was found out by using Kano model which categorises four types of attributes. These are 'Attractive', 'Must be', 'Indifferent' and 'One dimensional'. In this research, it has been found that five attributes such as 'water resistance', 'wireless charging', 'finger print sensor', '64GB storage', 'voice controller facility' comes under "attractive category". The 'colour options, 'bluetooth', 'payment system apps' comes under "Indifferent category" as these attributes neither contribute to satisfaction nor to dissatisfaction of customers. The only one "Must be attribute" extracted from this study is camera. The customers will be extremely unhappy, if it is not provided. The "One dimensional attribute" will increase satisfaction level and its absence will lead to increase dissatisfaction level. The "One-dimensional attribute" in this study is GPS. The conjoint analysis was done to find out the best preferred iPhone combination out of 30 combinations generated by orthogonal design. Based on the utility estimate of each iPhone feature, it has been found that the most preferred combination is Operating system : ios11, Display : 5.5inch + Touch, Storage : 32 GB, Battery : 2900 mAh, Front camera : 7 MP, Rear camera : 8 MP and Price : Less than Rs.26000.00.

The outcome of testing of hypotheses reveals that there is significant difference between customer satisfaction towards Apple mobile brand and Samsung mobile brand.

### MANAGERIAL IMPLICATION

The customers' choice and their level of satisfaction towards a product are two important points that are always taken care of by marketing manager to stay in the competition. More the company's product meet the customers' choice more is the possibility to capture reasonably good market share. In this context, this research paper will provide some insight as to

how the customers' satisfaction can be measured and the most preferred choice of customers can be identified and used in the design stage to make the product much interesting to the customer.

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