

A STUDY ON THE EVALUATION OF CUSTOMERS' SATISFACTION - THE PERSPECTIVE OF QUALITY

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Abstract: As stated by the recent report published by Global Industry Analysts Inc. (GIA), driven by widespread consumer awareness, lifestyle trends and growing compatibility among equipments because of standardization, the world digital camera market is projected to reach 122 million units by the year 2010. The traditional one-way quality model is focused on one particular quality element; only when the element is present are customers satisfied, and vice versa. Using the traditional way to improve customer satisfaction, it is possible that the customer will not be satisfied with a certain quality element, or maybe the customer satisfaction target will be over-fulfilled (Tan & Shen, 2000). Kano's model provides an effective approach to categorizing the customer attributes into different types. Professor Kano has developed a methodology to identify which customer attributes are must-be, which are one-dimensional and which are attractive. Therefore, understanding the product quality attribute is beneficial to improvement of quality as well as product development. Therefore, the purposes of this article are 1. To classify customer attributes into Kano categories. 2. To apply IPA to analyze the correlation between importance and satisfaction toward product attributes. 3. To exam a significant difference between demographic characteristics and Kano's quality requirements. The findings are as follows: 1. Kano's model successful classifying product features of digital cameras. Kano's quality requirements are also correlated with importance and satisfaction of IPA analysis. 2. When quality have improved for all product features, after sales services, Image Stabilizer and Recording Mode will lead to most satisfaction for all users based on customer satisfaction coefficient. 3. Demographical characteristics have significantly influenced perceived quality requirement for digital camera users.

Keywords: Kano's Model, IPA, Customer Satisfaction

1. INTRODUCTION

As stated by the recent report published by Global Industry Analysts Inc. (GIA), driven by widespread consumer awareness, lifestyle trends and growing compatibility among equipments because of standardization, the world digital camera market is projected to reach 122 million units by the year 2010. Asia-Pacific is expected to offer strong growth backed by the growing affluence of the population in this region. With consumers fast replacing their conventional 35mms cameras with new digital variants, single-lens reflex (SLR) digital cameras are expected to score huge gains in the upcoming years.

Ease of use, compact design, size, style and convenience are few of the product features critical to commercial success in the marketplace. In addition, amplified digital photo improvement and management software, shorter shutter delays, partial image capturing, ability to modify scene backgrounds, high-end optical and storage features, also represent product features, which play an instrumental role in keeping demand alive and consumer enthusiasm sufficiently kindled.

Encouraged largely by rapidly falling prices, higher functionality and improvement in picture quality, consumer preferences are increasingly shifting towards medium and high-end models, thereby promising expanded market opportunities (GIA 2010). In a market with fierce competition, and rapid changes of customer-orientation, only the effective delivery of service quality can enhance corporate profit and competitiveness. Thus, how to use product quality to enhance customer value becomes an important issue in digital camera businesses.

The traditional one-way quality model is focused on one particular quality element; only when the element is present are customers satisfied, and vice versa. That is, the relationship between customer satisfaction and quality elements is treated as linear. However, the relationship is not that simple. For some quality elements, customer satisfaction can be greatly improved with only a small improvement in performance; while for some other quality elements, customer satisfaction can only be improved a little even when the performance of the service has been greatly improved. Using the traditional way to improve customer satisfaction, it is possible that the customer

will not be satisfied with a certain quality element, or maybe the customer satisfaction target will be over-fulfilled (Tan & Shen, 2000). Kano's model provides an effective approach to categorizing the customer attributes into different types such as must-be, one-dimensional and attractive quality requirements. Therefore, understanding the product quality requirement is beneficial to improvement of quality as well as product development.

In the past two decades, industries have implemented a range of quality management systems and standards, such as QCC, ISO 9000, TQM, and so on. The aims of these quality activities are to achieve customer satisfaction (Kano et al., 1996; Kondo, 2001) and to win their long-term trust by creating products and supplying services that fulfill customer requirements and exceed their expectations. Indeed, the pursuit of customer satisfaction and loyalty should be the main concern of all companies (Gorst et al., 1998). There are mainly three issues a digital camera producer must be confronted. 1. To classify customer attributes into Kano categories. 2. To apply IPA to analyze the correlation between importance and satisfaction toward product attributes. 3. To exam a significant difference between demographic characteristics and Kano's quality requirements.

2. LITERATURE REVIEW

2.1 Kano's model

Kano (1979) develops the 'M-H property of quality' by adapting the work of Herzberg et al.'s (1959) 'Motivation-Hygiene Theory'. Further, Kano et al. (1984) propose a two-way model on quality based on customers' perception and experience. Professor Kano and other researchers have developed a very useful diagram for characterizing customer needs. The Kano model divides product or service features into three distinct categories, each of which affects customers in a different way. The first, One-dimensional attributes: result in customer satisfaction when fulfilled and dissatisfaction when not fulfilled. The better the attributes are, the better the customer likes them. The second, Attractive attributes: their absence does not cause dissatisfaction because they are not expected by customers and customers are unaware of what they are missing. However, strong achievement in these attributes delights the customer. The third, Must-be attributes: Customers take them for granted when fulfilled. However, if the product or service does not meet the need sufficiently, the customer becomes very dissatisfied. Kano's model provides an effective approach to categorizing the customer attributes into different types. Professor Kano has developed a methodology to identify which customer attributes are

must-be, which are one-dimensional and which are attractive. The data needed in classifying customer attributes are obtained through a Kano questionnaire that consists of a pair of questions (one positive and one negative) (Kano et al., 1984 and CQM 1993). Kano's model is illustrated in Figure 1. The applications of Kano's model are including the followings. Schvaneveldt, Enkawa and Miyakawa (1991) applied Kano into four service oriented stores such as banks, laundries, restaurant and supermarkets. Matzler (1998) used Kano model for product development and integrated into quality function deployment. Zhang (2002) evaluated service quality for various types of websites. Tontini (2000) made some modification of Kano model and applied to an Italian restaurant for services improvement by adding very attractive and very must-be attributes. We choose a modified Kano's model which developed by Matzler et al. in 1996 in this study.

They are Attractive requirement, One-dimensional requirement, Must-be requirement, indifferent requirement, and reverse requirement. Sa Moura & Saraiva (2001) used Kano's analysis to develop an ideal kindergarten.

2.2 The customer satisfaction (CS) coefficient

The customer satisfaction (CS) coefficient states whether satisfaction can be increased by meeting a product requirement, or whether fulfilling this product requirement merely prevents the customer from being dissatisfied (Berger et al., 1993). Different market segments usually have different needs and expectations, so sometimes it is not clear whether a certain product feature can be assigned to the various categories; it is especially important to know the average impact of a product requirement on the satisfaction of all the customers. The CS coefficient is indicative of how strongly a product feature may influence satisfaction or, in the case of its non-fulfilment, customer dissatisfaction. To calculate the average impact on satisfaction it is necessary to add the attractive and one-dimensional columns and divide by the total number of attractive, one-dimensional, must-be and indifferent For the calculation of the average impact on dissatisfaction, add the must-be and one-dimensional columns and divide by the same normalizing factor (Berger et al., 1993). Customer satisfaction (CS) coefficient based on Kano's Model has described in detail as follows:

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

A: attractive;
M: must-be;
R: reverse;
O: one-dimensional;
Q: questionable;
I: indifferent.

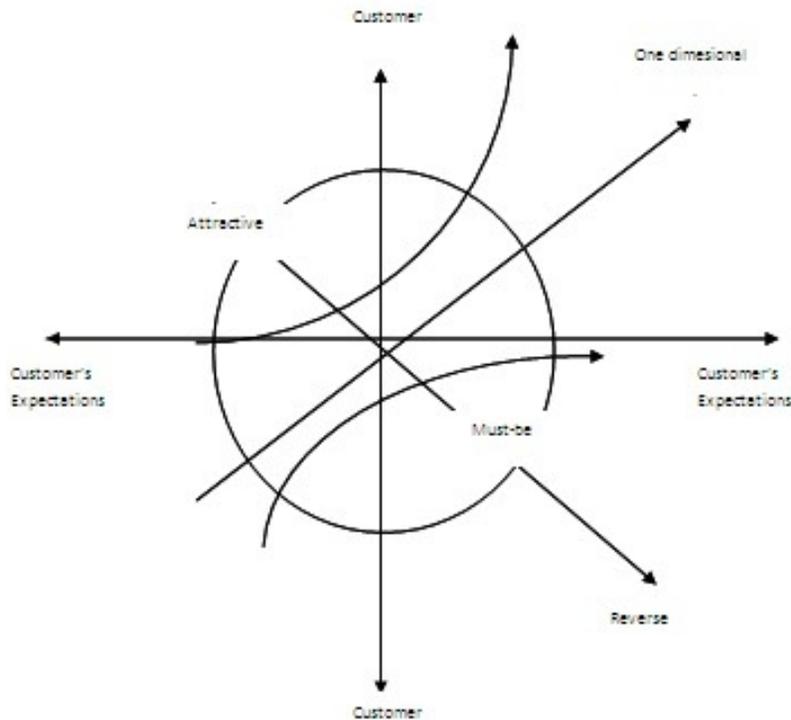


Figure 1: Kano's model of customer satisfaction (Berger et al., 1993)

2.3 Importance-Performance Analysis

The Importance - Performance Analysis (IPA) framework was introduced by Martilla and James (1977) in marketing research in order to assist in understanding customer satisfaction as a function of both expectations concerning the significant attributes and judgments about their performance. The Importance-Performance Analysis conceptually rests on multi-attribute models. The IPA technique identifies strengths and weaknesses by comparing

the two criteria that consumers use in making a choice: the relative importance of attributes and consumers' evaluation of the offering in terms of those attributes (Chapman 1993; Chu and Choi 2000).

Slack (1991) presented an IPA model that considered a relationship between importance and performance and theorized that target levels of performance for particular product attributes should be proportional to the importance of those attributes. In other words, importance is seen as viewed as a reflection of the relative value of the various quality attributes to consumers. According to Barsky (1995), lower importance ratings are likely to play a lesser role in affecting overall perceptions, while higher importance ratings are likely to play a more critical role in determining customer satisfaction. The objective is to

identify which attributes, or combinations of the attributes are more influential in repeat purchase behavior and which have less impact. The information is valuable for the development of marketing strategies in organizations (Ford et al., 1991).

In practice the importance-performance framework is best described as an absolute performance measure of customer perception. IPA also seeks to identify the underlying importance ascribed to the various service attributes/factors. The key application of IPA is to identify which attributes or combinations are more influential in the service exchange than others (Wright and O'Neill, 2002). For example, a set of attributes pertaining to a particular service are evaluated on the basis of how important each is to the customer, and how the service or goods is perceived to be performing relative to each attribute. This evaluation is typically accomplished by surveying a sample of customers. After determining those attributes that are worthy of subsequent examination, consumers are asked two questions. One relates to the salience of the attributes and the other to the company's own performance in terms of delivery of these attributes. IPA has been used in different research and applications, for example, Slack (1994) used it to study operations strategy while Sampson and Showalter (1999) evaluated customers. Ford, Joseph, and Joseph (1999) use IPA to formulate

marketing strategy cross-cultural comparisons between the USA and Australia. IPA is also applied to various industries, such as health (Skok, Kophamel, and Richardson, 2001), banking (Joseph, Allbrigh, Stone, Sekhon, and Tinson 2005), hotel (Weber, 2000), and tourism (Duke and Mont 1996).

3. RESEARCH METHOD

We ran an empirical analysis on a sample of 350 through on-line survey. The questionnaires sent out a total of 350 questionnaires for time period from March 1st to April 1st 2008. Among these questionnaires, 330 were returned, because of 20 questionnaires were filled-out incompletely. The effective questionnaires is accounting for 86.45% of total. We provide incentives when we conducting on-line survey to increase return rate.

3.1 Measurements

Questionnaire is divided by five sections: Section 1 measures product attributes based on functional (positive) questions statement. Section 2 is to measure product attributes according to dysfunctional (negative) questions statement. Section 1 and 2 are using Matzler, et. al's (1996) question design to construct Kano questionnaire which are I like it that way, it must be that way, I am neutral, I can live with it that way, I dislike it (Table1). Table 2 indicates two-dimensional quality matrix which converts from positive and negative questions in Table 1's statement of questionnaires to construct Kano's product requirements such as must-be, one-dimensional, attractive requirements as well indifferent and questionable requirement. Section 3 and 4 are using IPA analysis which measures importance and satisfaction level of digital cameras from users. Section 5 is demographical information of respondents.

Table 1 Functional and dysfunctional questions in the Kano questionnaire

| Questions | Answers |
|--|---|
| Functional form: If the digital camera is light, compact and easy to carry, how do you feel? | (1) I like it that way (2) It must be that way (3) I am neutral |
| Dysfunctional form: If the digital camera is heavy and not easy to carry, how do you feel? | (4) I can live with it that way (5) I dislike it that way |

Table 2. Kano's evaluation Matrix of product requirements
Source: Matzler et al. (1996: pp.6-18)

| Functional (positive) question | Dysfunctional (negative) question | | | | |
|--|-----------------------------------|---------|---------|-----------|---------|
| | Like | Must be | Neutral | Live with | Dislike |
| Like | Q | A | A | A | O |
| Must be | R | I | I | I | M |
| Neutral | R | I | I | I | M |
| Live with | R | I | I | I | M |
| Dislike | R | R | R | R | Q |
| Note: A: attractive; M: must-be; R: reverse; O: one-dimensional; Q: questionable; I: indifferent | | | | | |

4. RESULT

4.1 Exploratory Factor Analysis

Table 3 shows that eight items loaded on factor one, four on factor two, four on factor three, four on factor four, four on factor five, three on factor six and three on factor seven. Product attributes that loaded on factor one (Specification) related to the general service attributes provided by digital cameras. These include weight, body size, compatible saving device, duration of battery, flash added-in, lens replaceable, multi-use terminal and user interface of digital cameras. Factor two (System Compatibility) related to the system services provided by digital cameras. These included wireless connection, printer terminal, AV terminal and internet access. Factor three (Special Shot Options) related to various options in taking shot such as scene selection, continuous shot, close shot, self shot. The fourth factor (Picture Quality) related to quality of photo. These tend to be issues of Effective Pixels, photo size mode, photo quality mode and date add-in. The fifth factor (Advance Features) related to new technique features which are image stabilizer, time to start-up, recording mode, and instruction manual. The sixth factor (Other Feature) related to more general features

which are adjustable LCD, optical zoom and manual adjustment. The seventh factor (price) is related to price of digital camera which is consisted of brand, price and after sales service.

The internal consistency (reliability) using Cronbach’s α coefficient, for each of the factors, ranged from 0.81 (Price) to 0.9337 (Specification). Despite ranging largely in reliability, the basic internal consistency value required of an exploratory study was satisfied by the standards proposed by Hair et al. (2006). Total Cronbach α Coefficient is 0.9312 at 77.25 % of accumulate explained variance.

4.2 Quality Classification of Kano’s Model

An overview of the requirement categories of the individual product requirements is gained from the table of results (Table 4). The easiest method is evaluation and interpretation according to the frequency of answers. Thus, weight would be a must-be requirement (45.4 percent), brand a one-dimensional requirement (37.8 percent) and close shot an attractive requirement (30.9 percent). Product features can be further classified into Kano’s product requirement when respondents answer both functional and dysfunctional questions. We will explain in detail as follows when we evaluate consumers in total:

Table 3 Factor Analysis for Product criteria of Digital Camera

| | | | |
|------------------|---------------------|-------|--------|
| Quality Picture | Effective Pixels | 0.801 | 0.8988 |
| | photo size mode | 0.840 | |
| | photo quality mode | 0.847 | |
| | date add-in | 0.796 | |
| Advance Features | image stabilizer | 0.737 | 0.8644 |
| | time to start-up | 0.855 | |
| | recording mode | 0.862 | |
| | instruction manual | 0.522 | |
| Other Feature | adjustable LCD | 0.777 | 0.8725 |
| | optical zoom | 0.816 | |
| | manual adjustment | 0.851 | |
| Price | brand | 0.741 | 0.8106 |
| | price | 0.593 | |
| | after sales service | 0.837 | |

Table 4 classification of product requirement based on Kano's model for all users

| Product Features | Percentage of replies | | | | | | | Category |
|--------------------------|-----------------------|------|------|------|-----|-----|-------|----------|
| | A | M | I | O | R | Q | Total | |
| Weight | 11.8 | 45.4 | 18.7 | 22.7 | 0.4 | 1 | 100 | M |
| Body Size | 28.1 | 5.8 | 48 | 5.6 | 1.4 | 11 | 100 | I |
| Brand | 25.3 | 13.3 | 37.8 | 22.9 | 0.4 | 0.4 | 100 | I |
| Price | 14.5 | 18.5 | 45.8 | 15.9 | 4.6 | 0.8 | 100 | I |
| Effective Pixels | 8.8 | 19.7 | 27.3 | 43.4 | 0 | 0.8 | 100 | O |
| Duration of battery | 11.2 | 43.2 | 7.8 | 37.8 | 0 | 0 | 100 | M |
| Flash Added-In | 16.1 | 13.9 | 55.6 | 13.3 | 0.8 | 0.4 | 100 | I |
| Lens Replaceable | 14.5 | 13.3 | 50.6 | 20.1 | 0.8 | 0.8 | 100 | I |
| Multi-use Terminal | 17.9 | 20.7 | 48.4 | 12.2 | 0.8 | 0 | 100 | I |
| Adjustable LCD | 27.3 | 12.9 | 38.2 | 18.7 | 2.8 | 0.2 | 100 | I |
| Optical Zoom | 28.5 | 15.1 | 30.3 | 25.1 | 0 | 1 | 100 | I |
| Manual Adjustment | 20.1 | 13.5 | 51.6 | 13.5 | 0.4 | 1 | 100 | I |
| Photo Size Mode | 27.1 | 36.5 | 19.9 | 15.9 | 0.4 | 0.2 | 100 | M |
| Photo Quality Mode | 10 | 39.8 | 19.5 | 30.3 | 0.4 | 0 | 100 | M |
| Date Add-In | 7.2 | 39.6 | 44.4 | 8.8 | 0 | 0 | 100 | I |
| Continuous Shot | 18.5 | 15.1 | 37.3 | 29.1 | 0 | 0 | 100 | I |
| Close Shot | 42 | 11.2 | 30.9 | 15.5 | 0.4 | 0 | 100 | A |
| Self Shot | 32.5 | 19.5 | 20.7 | 25.9 | 0.4 | 1 | 100 | A |
| Scene Selection | 16.5 | 29.5 | 27.3 | 26.3 | 0 | 0.4 | 100 | M |
| Compatible saving device | 37.3 | 10 | 33.7 | 18.5 | 0 | 0.4 | 100 | A |
| Image Stabilizer | 27.5 | 12.9 | 28.7 | 29.9 | 1 | 0 | 100 | O |
| Time to Start-Up | 10.8 | 12.2 | 59.4 | 10.4 | 5.8 | 1.2 | 100 | I |
| Wireless Connection | 24.1 | 14.1 | 50.6 | 10.2 | 0 | 1 | 100 | I |
| Printer Terminal | 27.5 | 11.4 | 46.8 | 13.5 | 0.4 | 0.4 | 100 | I |
| AV Terminal | 22.3 | 12.9 | 56.4 | 7 | 0 | 1.7 | 100 | I |
| Internet | 33.9 | 12.9 | 43.4 | 11 | 0 | 1.4 | 100 | I |
| After Sales Services | 5.4 | 35.7 | 4.8 | 53.4 | 0 | 0.6 | | O |
| User Interface | 8.8 | 52.6 | 5.4 | 33.1 | 0 | 0 | | M |
| Instruction Manual | 12.2 | 25.1 | 36.1 | 25.3 | 0 | 1.2 | | I |

Note: A: attractive; M: must-be; R: reverse; O: one-dimensional; Q: questionable; I: indifferent

4.2.1 Attractive Requirement

There are three attractive requirement can be identified of total thirty product features. They are continuous shot, close shot and recording mode for most of customers.

According to Kano's model, product requirements are the product criteria which have the greatest influence on how satisfied a customer will be with a given product. Attractive requirements are neither explicitly expressed nor expected by the customer.

Fulfilling these requirements leads to more satisfaction. Even if they are not met, customers

do not feel dissatisfied (Matzler et al 1996, Cheng and Chiu 2007).

4.2.2 Must-be Requirement

Must requirement categorizes six product features as weight, duration of battery, photo size mode, photo quality mode, self shot and user interface. Matzler et al 1996 claim that must-be requirements are basic criteria of a product. If these requirements are not fulfilled, the customer will be extremely dissatisfied. On the other hand, as the customer takes these requirements for granted, their fulfillment will not increase his

satisfaction. Fulfilling the must-be requirements will only lead to a state of “not dissatisfied”. The customer regards the must-be requirements as prerequisites, he takes them for granted and therefore does not explicitly demand them. Must-be requirements are in any case a decisive competitive factor, and if they are not fulfilled, customers will be very dissatisfied (Cheng and Chiu 2007).

4.2.3 Indifferent Requirement

Most of product features are classified into indifferent requirement such as body size, brand, price, flash added-in, lens replaceable, multi-use terminal etc. These product features are accounted for seventeen items out of thirty in total. This category means that the customer is indifferent to these product features. Customers do not care whether they are fulfilled or not (Cheng and Chiu 2007). They are, however, not willing to spend more on this feature according to Berger al. in 1993.

4.2.4 One Dimensional Requirement

With regard to these requirements, customer satisfaction is proportional to the level of fulfillment – the higher the level of fulfillment, the higher the customer’s satisfaction and vice versa. One-dimensional requirements are usually explicitly demanded by the customer (Matzler et al. 1996). This category can be classified from product requirements of effective pixels, compatible saving device, image stabilizer and after sales services.

4.2.5 Reverse Requirement

Category reverse requirement, not only is this product feature not wanted by the customer but he/she even expects the reverse (Berger et al., 1993). There is no product feature belong to this category.

Finally, the classification of Kano’s model is not state of static but dynamic when new features added throughout product development. In particular, new technology breakthrough will lead an indifference requirement to attractive or even must-be requirement. For example, remote control has been classified into attractive requirement in Kano’ study in 1984 but nowadays it has become

a must-be requirement. Therefore, the information about customer’s perception of products feature needed to be update when product modification occurs.

4.3 Correlation of demographical factors and Kano’s Model

Different product requirements of Kano model and gender have significant correlation based on variance analysis at P value less than 0.05. For example, male consider weight of digital camera is indifferent requirement, but female consider it as a must be requirement according to Kano model. The similar phenomenon has found from the following product features such as compatible saving device, lens replaceable, flash added-in, scene selection, continuous shot, close shot, self shot and image stabilizer etc..Age and product requirements also have significant correlation based on variance analysis at P value less than 0.05. For example, age below 35 perceived weight of digital camera as must-be requirement, and age above 35 perceived as one-dimensional requirement. The similar phenomenon has found from the following product features such as body size, compatible saving device, multi-use terminal, photo quality mode, date add-in, brand and price etc..Education and product requirements also have significant correlation based on variance analysis at P value less than 0.05. For example, user interface is indifference for high school graduates, on education level higher than high school perceived as must-be requirement. A state also exists in the following product features such as duration of battery, lens replaceable, effective pixels, photo size mode, photo quality mode, scene selection, wireless connection and printer terminal etc..

Different product requirements and career also have significant correlation based on variance analysis at P value less than 0.05. For example, photo quality is perceived as must-be by service employee, on the contrast, employee of business industry perceived as one dimensional requirement. The similar phenomenon has found from the following product features such as compatible saving device, duration of battery, flash added-in, lens replaceable, multi-use terminal, effective pixels, photo size mode and scene selection etc..Income and product requirements also have significant correlation

based on variance analysis at P value less than 0.05. For example, higher income perceived self shot is must-be or attractive, on the contrast, lower perceived it as indifference. A state also exists in the following product features such as body size, compatible saving device, duration of battery, flash added-in, adjustable LCD, wireless connection and internet etc.. Therefore, demographical characteristics have significantly influenced perceived quality requirement for digital camera users.

4.3 IPA analysis

In this section we analysis importance and satisfaction level of product features to digital camera users. We also conduct correlation analysis between importance and satisfaction to quality requirements of Kano model. Duration of battery has most importance rated by users, followed by

after sales services and user interface. Duration of battery rated most importantly means that users' perceived longer time to shot is better. After sales services rated also importantly mean that users put more emphasis on it when they needed. User interface has been emphasized because of functional feature which concerns ease of use of digital cameras. Users perceived after sales services is most satisfactory product feature, followed by user interface and instruction manual. Satisfaction analysis indicates the current satisfactory level rated by users which provide snap shot to manufacturers as product improvement. A positive relationship has shown when conducting correlation analysis between importance and satisfaction which means if product features rated importantly has been satisfied the satisfaction level will become higher and vise versa (table 5 and P<0.000).

Table 5 Correlation Analysis of Product Features to Importance and Satisfaction

| Factors | Product Features | Correlation of Importance and Satisfaction | |
|----------------------|--------------------------|--|---------|
| | | Pearson Index | P Value |
| Specification | weight | 0.360** | 0.000 |
| | body size | 0.547** | 0.000 |
| | compatible saving device | 0.210** | 0.000 |
| | time of battery | 0.554** | 0.000 |
| | flash added-in | 0.362** | 0.000 |
| | lens replaceable | 0.464** | 0.000 |
| | multi-use terminal | 0.543** | 0.000 |
| Picture Quality | user interface | 0.560** | 0.000 |
| | Effective Pixels | 0.480** | 0.000 |
| | photo size mode | 0.478** | 0.000 |
| | photo quality mode | 0.538** | 0.000 |
| Other Feature | date add-in | 0.402** | 0.000 |
| | adjustable LCD | 0.416** | 0.000 |
| | optical zoom | 0.449** | 0.000 |
| Special Shot Options | manual adjustment | 0.517** | 0.000 |
| | scene selection | 0.615** | 0.000 |
| | continuous shot | 0.562** | 0.000 |
| | close shot | 0.621** | 0.000 |
| System Compatibility | self shot | 0.767** | 0.000 |
| | wireless connection | 0.438** | 0.000 |
| | printer terminal | 0.531** | 0.000 |
| | AV terminal | 0.605** | 0.000 |
| Price | Internet access | 0.584** | 0.000 |
| | brand | 0.424** | 0.000 |
| | price | 0.440** | 0.000 |
| Advance Features | after sales service | 0.325** | 0.000 |
| | image stabilizer | 0.582** | 0.000 |
| | time to start-up | 0.384** | 0.000 |
| | recording mode | 0.503** | 0.000 |
| | instruction manual | 0.621** | 0.000 |

Note: **indicate significant at P< 0.01two-tail)

Kano's quality requirements are correlated with importance and satisfaction from Table 6. Nineteen of Kano's quality categories are correlated with importance (Table 6). They are including weight, compatible saving device, Duration of battery, Multi-Use Terminal, User Interface, Photo Quality, Date Add-in, Adjustable LCD and Optical Zoom etc.. There are eighteen quality categories of Kano's model are correlated with satisfaction (Table 6). The following product features are correlated with satisfaction as follows: body size, compatible saving device, Duration of battery, Multi-Use Terminal, Photo Size Mode, Photo Quality Mode, Date Add-in and Optical Zoom.

coefficient we will detect most satisfaction level and least dissatisfaction level when we make product improvement or adjustment. When quality have improved for all product features, after sales services, Image Stabilizer and Recording Mode will lead to most satisfaction for all users. User Interface will reduce most dissatisfaction. We also find that after sales service is the item need to improve most of dissatisfaction across all demographic variables, which means that if after sales services can be delivery in good manner can lead to increase satisfaction and reduce dissatisfaction at same time (Table 7). We suggest manufactures may satisfy first for must-be and one dimensional quality requirement of Kano's classification, followed by decreasing those dissatisfaction products features. Lastly, they may improve product development according to customer satisfaction coefficient.

4.4 The customer satisfaction (CS) coefficient

If we calculate customer satisfaction

Table 6 Correlation Analysis of Kano's Quality requirements to Importance and Satisfaction

| Factors | Category | Product Features | Correlation of Importance | | Correlation of Satisfaction | |
|----------------------|----------|--------------------------|---------------------------|---------|-----------------------------|---------|
| | | | Spearman Index | P Value | Spearman Index | P Value |
| Specification | M | weight | -0.128** | 0.004 | -0.019 | 0.665 |
| | I | body size | -0.062 | 0.165 | -0.112* | 0.012 |
| | A | compatible saving device | 0.185** | 0.000 | 0.136** | 0.002 |
| | M | Duration of battery | 0.246** | 0.000 | 0.258** | 0.000 |
| | I | Flash Added-in | -0.046 | 0.306 | 0.154 | 0.001 |
| | I | Lens Replaceable | 0.072 | 0.109 | -0.066 | 0.142 |
| | I | Multi-Use Terminal | -0.127** | 0.005 | -0.170** | 0.000 |
| Picture Quality | M | User Interface | -0.126** | 0.005 | -0.013 | 0.709 |
| | O | Effective Pixels | -0.015 | 0.733 | -0.020 | 0.660 |
| | M | Photo Size Mode | 0.083 | 0.065 | -0.141** | 0.002 |
| | M | Photo Quality Mode | -0.202** | 0.000 | -0.257** | 0.000 |
| Other Feature | I | Date Add-in | -0.149** | 0.001 | -0.327** | 0.000 |
| | I | Adjustable LCD | 0.316** | 0.000 | -0.031 | 0.489 |
| | I | Optical Zoom | 0.121** | 0.007 | 0.111* | 0.013 |
| Special Shot Options | I | Manual Adjustment | 0.050 | 0.266 | 0.283** | 0.000 |
| | M | Scene Selection | 0.224** | 0.000 | 0.063 | 0.158 |
| | I | Continuous Shot | 0.140** | 0.002 | -0.038 | 0.392 |
| | A | Close Shot | 0.500** | 0.000 | 0.278** | 0.000 |
| System Compatibility | A | Self Shot | 0.126** | 0.005 | 0.025 | 0.580 |
| | I | Wireless Connection | -0.148** | 0.001 | -0.153** | 0.001 |
| | I | Printer Terminal | 0.159** | 0.000 | -0.099* | 0.027 |
| | I | AV terminal | 0.067 | 0.133 | -0.047 | 0.291 |
| Price | I | Internet access | -0.026 | 0.570 | -0.283** | 0.000 |
| | I | Brand | 0.275** | 0.000 | 0.345 | 0.000 |
| | I | Price | -0.062 | 0.166 | -0.203** | 0.000 |
| Advance Features | O | After Sales Service | 0.001 | 0.977 | 0.112* | 0.012 |
| | O | Image Stabilizer | 0.369** | 0.000 | 0.294** | 0.000 |
| | I | Time to Start-Up | 0.092* | 0.039 | -0.092* | 0.040 |
| | A | Recording Mode | 0.157** | 0.000 | -0.06 | 0.180 |
| | I | Instruction Manual | -0.065 | 0.151 | -0.169 | 0.000 |

Note: 1. *indicate significant at P< 0.05(two-tail),
 2. **indicate significant at P< 0.01(two-tail)
 3. A: attractive; M: must-be; R: reverse; O: one-dimensional; Q: questionable; I: indifferent

5. CONCLUSION

There are three attractive requirement can be identified of total thirty product features. They are continuous shot, close shot and recording mode for most of customers. Must requirement categorizes six product

features as weight, duration of battery, photo size mode, photo quality mode, self shot and user interface. Most of product features are classified into indifferent requirement such as body size, brand, price, flash add-in, lens replaceable, multi-use terminal etc. There is no product feature belong to this category.

Table 7 Customer Satisfaction Coefficient of Product Features among Demographic Variables

| Demographic Variables | Users' Profile | Greatest Satisfaction | Greatest Dissatisfaction |
|--|------------------|--------------------------|--------------------------|
| | All users | after sales service | after sales service |
| | | image stabilizer | user interface |
| | | recording mode | duration of battery |
| Sex | M | continuous shot | after sales service |
| | F | image stabilizer | after sales service |
| Age | Under 19 | effective pixels | duration of battery |
| | 20-34 | after sales service | after sales service |
| | 35-49 | compatible saving device | user interface |
| | Above 50 | weight | after sales service |
| Education | High school | wireless connection | after sales service |
| | College | close shot | after sales service |
| | Post graduate | image stabilizer | after sales service |
| Career | Public Servant | image stabilizer | after sales service |
| | Service Industry | effective pixels | after sales service |
| | Freelancer | after sales service | after sales service |
| | Blue Collar | optical zoom | after sales service |
| | White Collar | weight | after sales service |
| | Student | price | after sales service |
| Income | Under 10K\$NT | image stabilizer | after sales service |
| | 10-20 \$NT | effective pixels | after sales service |
| | 20-30 \$NT | image stabilizer | after sales service |
| | 30-40 \$NT | optical zoom | after sales service |
| | 40-50K\$NT | image stabilizer | after sales service |
| | Above50 K\$NT | compatible saving device | after sales service |
| Note: First three highest for all users Highest for each demographic variable | | | |

Moreover, different product requirements according to Kano's model and demographical variables have significant correlation based on variance analysis. For example, male consider weight of digital camera is indifferent requirement, but female consider it as a must-be requirement of Kano model.

Duration of battery has most importance rated by users, followed by after sales services and user interface. Duration of battery rated most importantly means that users' perceived longer time to shot is better. After sales services rated also importantly mean that users put more emphasis on it when they needed. User interface has been emphasized because of functional

feature which concerns ease of use of digital cameras. Users perceived after sales services is most satisfactory product feature, followed by user interface and instruction manual. Kano's quality requirements are

correlated with importance and satisfaction. Nineteen of Kano's quality categories are correlated with importance. They are including weight, compatible saving device, Duration of battery, Multi-Use Terminal, User Interface, Photo Quality, Date Add-in, Adjustable LCD and Optical Zoom etc.. There are eighteen quality categories of Kano's model are correlated with satisfaction. The following product features are correlated with satisfaction as follows: body size, compatible saving device, Duration of battery, Multi-Use Terminal, Photo Size Mode, Photo Quality Mode, Date Add-in and Optical Zoom.

When quality have improved for all product features, after sales services, Image Stabilizer and Recording Mode will lead to most satisfaction for all users based on customer satisfaction coefficient. On the other hand, after sales services, duration of battery and

User Interface will reduce most dissatisfaction. We also find that after sales service is the item need to improve most of dissatisfaction across all demographic variables,

which means that if after sales services can be delivery in good manner can lead to increase satisfaction and reduce dissatisfaction at same time.

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