Kansei Engineering for E-Commerce Cantonese Porcelain Selection in China

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Abstract. In online shopping experience of Cantonese Porcelain, customers are unable to touch, feel, take a close look at the details, and perceive the placement of the product. Therefore, the appearance of product is the most important factor to influence the users' buying decision. Increasing the emotional appeal or Kansei generated from the product appearance would encourage product sales. This paper uses Kansei Engineering to identify design elements of Cantonese Porcelain that are emotional appealing to porcelain products as a case of research and design in China. Multivariate analysis is performed on the data to identify the affecting Kansei words and corresponding design elements. Finally, sample Cantonese Porcelain which contains the most influential design elements are presented as recommendation, and it will improve customer selection of porcelain products effectively in e-commerce in China.

Keywords: Kansei engineering · E-commerce · Recommender system · Statistical kansei analysis · Cantonese porcelain

1 Introduction

Kansei is a Japanese word. When translated into English it represents 'consumer's psychological feeling and image' [1]. This means that Kansei is the impression that somebody gets from a certain artefact, environment or situation using all the senses of sight, hearing, feeling, smell, taste, as well as cognition. By Kansei words, the customers are guided to express their affective needs, their feelings, and their emotional states. These emotional and sensory wants are then translated into perceptual design elements of the product [2]. While Kansei words excel in describing affective needs, the mapping relationships between Kansei words and design elements are often not clearly available in practice. Some designers are not aware of the underlying coupling and interrelationships among various design elements with regard to the achievement of customers' affective satisfaction [3]. Clausing (1994) discerns customer needs and product specifications, and points out that the mapping problem in between is the key issue in 'design for customers' [4].

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E-commerce and Internet-based sales transaction has become more and more popular through the years [5]. Benefits for online shopping includes convenience, time and cost savings, and greater choices without geographical constraints [6]. The experience of shopping online is different than shopping at conventional stores. During conventional shopping, the customer is able to take a close look, feel the product, and even play it with their hands depending on the product before purchasing it [7]. This process helps the customers on their decision process while comparing with different products on choosing their most satisfied one. Seller of conventional stores also makes a difference on success rate of sales transaction, which is influenced by the interaction between the seller and customer, which depends on how well the trust is built between them.

See Fig. 1, Cantonese Porcelain [8], also known as "Guangzhou zhijin colored porcelain", is a unique glazed porcelain handicraft with strong Oriental characteristics produced in Guangzhou. Its production technology is one of the most important intangible cultural heritages of China [9]. Since the beginning of the 21st century, the traditional customized market of Cantonese Porcelain handicrafts is facing an unprecedented survival crisis and development opportunity [10, 11]. How to better adapt to the consumer demand of the market, inherit and promote the cultural connotation of Cantonese Porcelain will be a problem which Cantonese Porcelain and most intangible cultural heritages needs to face [12].

Fig. 1. Cantonese Porcelain

The objective of this study is to identify the design elements of Cantonese Porcelain through pure visual presentation that are emotional appealing to customers, and ultimately, increase success rate of sales transaction through e-commerce system. Therefore, we chose a popular type of Kansei Engineering called of Kansei Engineering Type I [13], see Table 1, which translates emotional appeal into words that relates to design elements using item/category classification [14].

Table 1. Types of Kansei Engineering (Nagamachi 2001)

Type I	*Category classification*—Identifying the design elements of the product to be developed, translated from consumer's feelings and image
Type II	*Kansei Engineering System*—A computer aided system with an so called interference engine and Kansei databases
Type III	*Hybrid Kansei Engineering System*—The combined computer system or Forward ansei, which goes from the user's impressions to design specifications and vice versa
Type IV	*Kansei Engeering modelling*—Mathematical modelling with an interference engine and databases
Type V	*Virtual Kansei Engineering*—An integration of virtual reality technology and Kansei Engineering in a computer system
Type VI	*Collaborative Kansei Engineering designing*—Group work design system utilizing intelligent software and databases over the internet.

This study is composed of three major stages. For the first stage, selection of Kansei words, which were collected through different sources [15], then verified by Cantonese Porcelain experts. In the second stage, we construct a 5-point semantic differential scale of Kansei words for evaluating Cantonese Porcelain products. In the third stage, survey results, which are finished by participants, are evaluated to identify the most influential Kansei words of Cantonese Porcelain in e-commerce selection. In the last stage, a case design of Cantonese Porcelain based on relevant Kansei words be explored.

2 The Situations of Cantonese Porcelain in E-Commerce

Cantonese Porcelain is an art of glazed decorative porcelain in Guangzhou, which dates back to Kangxi and Qianlong reign (1662–1796) [16]. Since 1700s, European merchants brought in patterns of decorative porcelains and the finished products were exclusively for export [8]. With the development of market economy and cultural consumption, the production situation of Cantonese Porcelain has become less and less optimistic. Since Cantonese Porcelain has no use in modern times and is mostly used for collection and appreciation, it is difficult to increase sales volume and attract new practitioners. Ultimately, it is about the economics of the industry [17]. In addition, with the continuous development of e-commerce in the Internet industry, online shopping malls have increasingly become a way of shopping for consumers [18]. Undoubtedly, this has become a normal state of shopping mode today, which has

penetrated into the life of consumers [19]. For example, China's online shopping platform Taobao, today almost all Chinese Internet users will use shopping, and consumers can freely choose and buy products based on their preferences [20, 21]. However, in order to adapt to consumers' habits, Cantonese Porcelain merchants have started to sell products on e-commerce platforms. However, the online orders have not exceeded the offline orders, which makes the majority of Cantonese Porcelain merchants confused. Through the investigation, it is found that the problem faced by the e-commerce platform of Cantonese Porcelain is that the product display fails to match the emotional needs of consumers, which will be the problem discussed in this paper.

3 Kansei Engineering Method in Cantonese Porcelain Selection

The experimental process of Kansei Engineering method in Cantonese Porcelain selection can be divided into three stages. Stage 1 is structuring semantic differential (SD) scale for the Kansei words and Collection of samples, stage 2 is Classification of item/category, stage 3 is evaluation experiment.

3.1 Collection and Selection of Kansei Words

A 5-point semantic differential scale with several Kansei words is constructed as shown in Table 7 in appendix. These words are sourced from relevant books, magazines, journal, advertisements, news and report of artworks.

In order to suit adapt to the evaluation standard of Cantonese Porcelain products, in this study, see Table 2, fifteen pairs of kansei words were verified by Cantonese Porcelain experts to secure the words' suitability before designing the survey for next step experiment.

Table 2. Selected Kansei words group (KWG) of Cantonese Procelain

N	KWG	N	KWG	N	KWG
1	Modern & Tradition	2	Abstract & Concrete	3	Decorative & Utility
4	Tech & Handmade	5	Round & Sharp	6	Public & Selfhood
7	Nature & Man-made	8	Streamline & Tough	9	Reason & Sensibility
10	Grace & Coarse	11	Fashion & Simple	12	Coordinate & Abrupt
13	Implicit & Publicity	14	Gorgeous & Frugal	15	Lightweight & Bulky

3.2 Collection and Selection of Samples

Furthermore, sample products of Cantonese Porcelain are collected from relevant market, advertisements and book. A total of 100 samples of Cantonese Porcelain in different forms were collected, see Fig. 5 in appendix.

In order to better classify 100 pieces of samples, in this experiment, 18 specimens of Cantonese Porcelain are selected with the help of craftsman from different Cantonese Porcelain Inheritance Base in Guangzhou, based on the distinctiveness of pattern, model, and color from form of natural, geometry, human. See Fig. 2.

Fig. 2. Schematic diagram of semantic differential

3.3 Classification of Item/Category

Sample products of Cantonese Porcelain were collected and classified into different categories. This is required due to the nature of e-commerce system, which the product can only affect visual emotional appeal, therefore, the classification of product is limited to the physical trait visually. Table 3 shows the partial list of the forty-eight item/category classification that we used:

Table 3. Selected Kansei words group (KWG) of Cantonese Procelain

	Physical trait	
	Item	Category
Natural form	Model	Bowl, Cup, Kettle, Plate, Tank, Vase, Case, Other
	Pattern	Animal, Badge, Flower, Landscape, Character, Ship, Modern
	Color	Blue, Cyan, Gold, Black, Purple, Red, White, Yellow, Other
Geometry form	Model	Bowl, Cup, Kettle, Plate, Tank, Vase, Case, Other
	Pattern	Animal, Badge, Flower, Landscape, Character, Ship, Modern
	Color	Blue, Cyan, Gold, Black, Purple, Red, White, Yellow, Other
Human form	Model	Bowl, Cup, Kettle, Plate, Tank, Vase, Case, Other
	Pattern	Animal, Badge, Flower, Landscape, Character, Ship, Modern
	Color	Blue, Cyan, Gold, Black, Purple, Red, White, Yellow, Other

3.4 Evaluation Experiment Survey

To conduct the evaluation experiment, Fig. 3, we created a survey website using the SO JUMP system and invited twenty subjects (aged between 18 and 34) to evaluate Kansei words appeal for each of our eighty samples on a 5-point SD scale. The SO JUMP is a professional platform for the online questionnaire survey, evaluation, voting, focused on providing users with powerful, humanized design online questionnaires, collect data, custom reports, and results of the survey analysis. It is an established research gathering tool widely used for user research in industrial ergonomics and website assessment in China. This is the first study whereby SO JUMP was used in an optometry and health science field to gather survey feedback from respondents. The subjects are recruited from Guangdong University of Technology student population and Guangzhou citizen in China.

Fig. 3. Screen-shot of survey website used to evaluate the appeal of Kansei words of Cantonese Porcelain on 5-point SD scale

4 Statistical Analysis and Interpretation

4.1 Questionnaire Survey and Analysis

This stage is mainly carried out by questionnaire. Firstly, fifteen groups of Kansei words obtained through cluster analysis were combined with eighteen representative samples of the morphology of Cantonese Porcelain. Secondly, a questionnaire was compiled with the statistical analysis method of 5-point semantic difference, and 20 subjects were subjectively evaluated. Because of the tea set of the scope of widely used participants range is very wide in the crowd of different status and age, such as amateur and professional personnel, white-collar workers, consumers, manufacturers, sellers.

4.2 Interpretation of the Analyzed Data

Data analysis and statistics at this stage were based on the data of twenty valid questionnaires. By the average value algorithm calculates and obtains the results of Tables 4 and 5 (e.g. S1 means Samples 1, K1 means Kansei words group 1). The data represents the average evaluation value of the adjectives corresponding to the sample on the –2 2 scale. Negative values correspond to the left adjectives and positive values to the right adjectives.

Table 4. Relationship of samples and Kansei words

	S1	S2	S3	S4	S5	S6	S7	S8	S9
K1	–0.10	0.35	1.55	0.75	1.20	0.45	1.45	0.10	1.15
K2	1.35	0.95	1.00	0.50	1.10	1.20	1.60	0.55	1.35
K3	0.95	0.80	–1.40	0.05	0.05	–1.25	–1.40	–0.80	–1.10
K4	0.65	0.35	0.65	0.55	0.90	0.65	0.60	0.50	0.25
K5	–1.15	–0.90	–0.30	–0.65	–0.50	–1.35	–0.50	–1.25	–0.30
K6	0.45	–0.15	0.15	0.35	–0.20	0.85	–0.05	0.60	–0.40
K7	0.35	0.15	0.45	0.30	0.55	–0.10	0.50	0.50	0.10
K8	–0.95	–0.90	–0.40	–0.80	–0.25	–1.05	–0.15	–0.90	–0.05
K9	0.45	0.60	0.60	0.50	0.20	0.85	0.65	0.15	–0.20
K10	–0.95	–0.75	–0.20	–0.85	–0.30	–0.75	0.10	–1.15	–0.05
K11	–0.15	0.35	0.55	0.45	0.90	–0.30	0.75	–0.05	0.65
K12	–0.15	0.20	–0.15	–0.05	0.40	–0.70	0.15	–0.60	–0.20
K13	–0.40	0.15	0.05	–0.25	–0.10	0.25	0.50	0.40	0.05
K14	–1.05	–0.85	0.00	–0.85	–0.10	–0.65	0.15	–0.85	0.00
K15	–1.15	–0.60	0.45	–0.45	1.00	–0.90	1.00	–0.10	0.55

Table 5. Relationship of samples and Kansei words

	S10	S11	S12	S13	S14	S15	S16	S17	S18
K1	0.65	0.10	0.75	1.20	0.75	1.75	0.10	0.10	0.25
K2	0.70	0.70	1.20	1.25	0.85	1.20	1.05	0.75	0.85
K3	–1.40	–1.25	–0.75	–0.95	–0.15	–0.95	0.05	0.55	–0.70
K4	0.80	0.95	0.35	0.80	0.55	0.95	0.50	0.65	0.65
K5	–0.85	–0.90	–0.60	–0.85	–0.50	–0.65	–0.85	–1.05	–1.00
K6	1.00	0.35	0.30	0.00	0.30	–0.20	0.60	0.55	0.65
K7	0.20	0.25	0.85	0.20	0.60	0.35	0.30	0.25	0.10
K8	–1.05	–0.45	–0.15	–0.55	–0.75	–0.45	–0.60	–1.10	–0.80
K9	0.30	0.10	0.10	0.45	0.20	0.35	0.25	0.40	0.40
K10	–1.10	–0.10	0.35	–0.40	–0.50	–0.40	–0.55	–1.05	–1.00

(*continued*)

Table 5. (*continued*)

	S10	S11	S12	S13	S14	S15	S16	S17	S18
K11	–0.10	–0.15	0.20	0.25	0.60	0.60	–0.25	–0.30	–0.45
K12	–1.15	–0.70	–0.60	0.25	–0.05	0.05	–0.90	–0.35	–0.90
K13	0.45	0.35	0.30	–0.25	0.20	–0.40	0.65	–0.50	0.10
K14	–0.90	0.20	0.15	–0.75	–0.55	–0.10	–0.40	–0.85	–0.70
K15	–1.25	–0.45	1.15	–0.45	–0.05	–0.15	–0.75	–1.05	–0.60

4.3 Identification of Influential Product Selection Elements of Cantonese Porcelain

Mean Analysis is done by using the data from Kansei words survey and the Item/Category Classification of Cantonese Porcelain. Relationship between the four chosen Kansei words and the design elements describe in the item/category is obtained. Table 6 shows summary of the Mean analysis results.

Table 6. S Summary of Kansei words group in samples

K	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mean	0.70	1.01	–0.54	0.63	–0.79	0.29	0.33	–0.63	0.35	–0.54	0.20	–0.30	0.09	–0.45	–0.21

From our Mean analysis (and Table 6), we picked the product selection elements that have the highest influence to the Kansei words as our recommended customer requirements list. From Tables 4 and 5 we can see in highest between –2 with 2, each sample had 2–4 preference Kansei words. For example, Kansei words of Sample 1 is concrete (1.35), round (–1.15), lightweight (–1.15) based on Table 2. In addition, data shows that Kansei words (concrete and decorative) are the most popular among 20 subjects, and then, there are tradition (1.75), handmade (0.8), round (–1.25), selfhood (0.6), streamline (–0.9), grace (–1.05), gorgeous (–0.85), lightweight (–1.5). From Table 6 we can see in highest between –2 with 2, Kansei words (concrete (1.01) and round (–0.79)) are the highest Mean grade among all the selected samples. Furthermore, Kansei words group 1, 2, 4, 6, 7, 9, 11, 13 are more to the right adjectives, and Kansei words group 3, 5, 8, 10, 12, 14, 15 are more to the left adjectives from the Kansei words of the fifteen groups. In the end, this study proposes e-commerce Cantonese Porcelain selection list based on item/category classification list based on Cantonese Porcelain and statistical analysis: Geometry form. Model: Plate, Bowl, Vase. Pattern: Animal, Flower, Landscape. Color: Blue, Cyan, Gold. Samples of Cantonese Porcelain that could contains our recommended product elements are shown in the Fig. 4:

Fig. 4. Proposed Cantonese Porcelain that based on recommended product element

5 Conclusions

This study collected twenty participants' emotional appeal of different Cantonese Porcelain product. Basic information regarding Cantonese Porcelain, cultural heritage, usage of e-commerce system, gender, age, and major of study are also gathered. After statistical analysis of the survey results, we are able to identify how the Kansei words influence different category and what design elements affect customers' emotional appeal the most. In the next step, we aim to do a case study on designing Chinese Porcelain based on our previous research related to relevant Kansei words. In addition, the database obtained through quantitative research can not only be used as a tool to assist the selection of e-commerce products in terms of the semantics of Cantonese Porcelain, but also provide designers with diversified ideas through the data. Furthermore, designers can modify the perceptual vocabulary and design elements in the database according to the needs to facilitate the design progress.

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Appendix

Table 7. Kansei words of artworks

1	Modern & Tradition	2	Rhythm & Disorder	3	Decorative & Utility	4	Impatient & Placid
5	Vivacious & Dull	6	Technology & Handmade	7	Unique & Ordinary	8	Fresh & Stale
9	Soft & hard	10	Safety & Danger	11	Coordination & Abrupt	12	Solemnly & Unbending
13	Smooth & Rough	14	Deceny & Low	15	Gorgeous & Frugal	16	Excited & Steady

(*continued*)

Table 7. (*continued*)

17	Succinct & Complexity	18	Genial & Fishlike	19	Fashion & Nostalgia	20	Quiet & Lively
21	Lightweight & Bulky	22	Thick & Thin	23	Female & Male	24	Excitement & Silence
25	Bright & Dark	26	Masculine & Feminine	27	Classic & Modern	28	Nobleness & Scoundrels
29	Natural & Artificial	30	Solidity & Fragility	31	Public & Selfhood	32	Open & Constraint
33	Formal & Informal	34	Fun & Boring	35	Elegance & Vulgar	36	Novelty & Plain
37	Nobility & Mediocrity	38	Abstract & Concrete	39	Stimulus & Softness	40	Rustic & Affected
41	Warm & Cold	42	Luxury & Simplicity	43	Streamline & Tough	44	Fashion & Simple
45	New & Old	46	Richness & Monotony	47	Stability & Variability	48	Pleasure & Sadness
49	Dynamic & Static	50	Warmth & Indifference	51	Beauty & Ugliness	52	Impassion & Soberness
53	Sprightly & Gloom	54	Positive & Negative	55	Creativity & Imitation	56	Dullness & Cheerfulness
57	Young & Experienced	58	Thinness & Roughness	59	Freedom & Bondage	60	Sedate & Lightness
61	Romance & Reason	62	Sven & Wild	63	Conservative & Radical	64	Depression - Brisk
65	Rules & Rebellion	66	Exaggerate & Introversion	67	Sedate & Frivolous	68	Implicit & Publicity
69	Handsome & Rustic	70	Expensive & Cheap	71	Professional & Amateur	72	Bright & Unadorned
73	Tightness & Loose	74	Boldness & Formality	75	Maturity & Childishness	76	Melancholy & Joy
77	Round & Sharp	78	Seriousness & Easy	79	Fancy & Quiet	80	Refined & Coarse
81	Reason & Sensibility	82	Style & Shabby	83	Innovation & Conservatism	84	Orderliness & Disarray
85	Purity & Dirt	86	Conventional & Alternative	87	Fashion & Out	88	Honor &Inferiority
89	Nature & man-made	90	Hope & Despair	91	Quiet & Noise	92	Grace & Coarse
93	Dexterity & Clumsiness	94	Tension & Relaxation	95	Passion & Calmness	96	High & Low
97	Comfort & Discomfort	98	Cute & Hateful	99	Magic & Wateriness	100	Harmony & Conflict

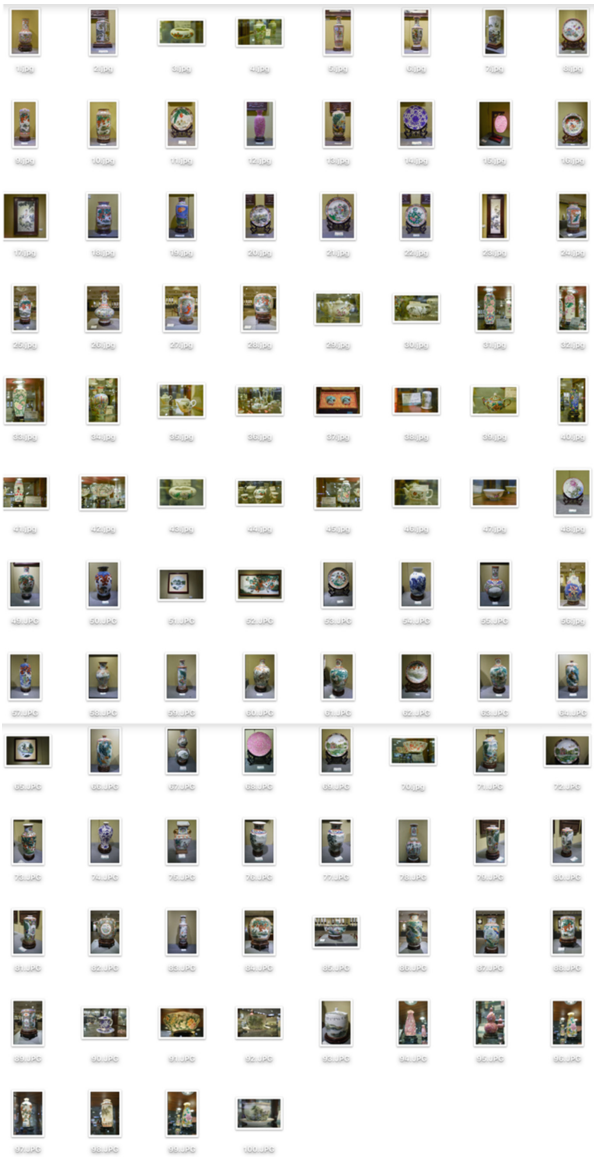

Fig. 5. Sample products of Cantonese Porcelain

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