

The application of Kansei vocabulary in product form innovation development

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ABSTRACT – With the rapid social changes and the flow of electronic information, the buying pattern of the product preferences becomes complex and difficult to grasp, thus research would underline the trend in terms of product design in order to meet different customer needs. The smartphone shape design has been chosen to be the case study. The key features of the product and the combination of the emotional vocabulary adjectives for the selected products will be explored. The result found for smartphones are more close to the ideal shape of the minds of the consumers. This is to know the closest adjectives vocabulary towards consumer products in terms of the shape, content, product innovation, and development. Through this method, designers can quickly find an appropriate product shape type as well as shorten product development time.

1. INTRODUCTION

Recent years, with the rapid changes in technological progress and the changing consumer lifestyles and the consumers' demand has become very diverse and difficult to grasp. To this end, the organizations must face the rapid changes in shortening the product life cycle issues, while maintain and need to strengthen the product development and design procedures and accurately grasp the needs of the consumers. The successful introduction of the new product penetration in the market will have a more positive response from the consumer in terms of needs and preferences.

2. METHODOLOGY

The development of this study can be divided into four stages. The first stage is the data collection and the second stage is to establish the customer requirement towards the product design features through vocabulary. The third stage is the vocabulary of imagery analysis and the fourth stage is integrated the Grey Relational Analysis with Analytic Hierarchy Process method in the evaluation of the product shape phase.

The targeted product adjectives derived from the relevant research paper, market data, network data, and product catalogs were then selected and extracted. The collection of adjectives vocabulary derived total is 216. From that number, it is narrow down to 121 for the final selected vocabulary by removing the part of the meaning that overlap or have the same meaning.

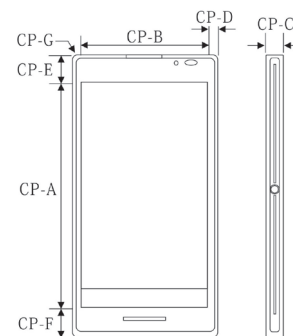


Figure 1 Smartphone Structure Parameters Diagram

- CP-A Screen Length (mm)
- CP-B Screen Width (mm)
- CP-C The phone thickness (mm)
- CP-D The frame spacing of left and right screen (mm)
- CP-E Between Top part Screen and frame spacing (mm)
- CP-F Between Bottom part of the screen spacing (mm)
- CP-G The Corner Radius (mm)

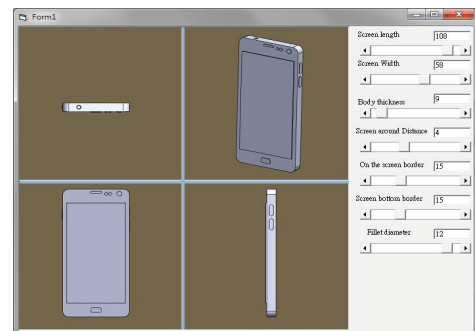


Figure 2 Interactive interface design on sample no.10

Here use the Taguchi method to defining the development scope and make a selection associated with the design concept, to generate the minimum value of the orthogonal array from the testing sample. Based on the product structure data in Figure 1, 7 factors of the shape sizes have been determined, the Taguchi Orthogonal Arrays calculation is used to calculate the smartphone sample. Based on the computing result a 32 tested sample. So The characteristic attributes of the orthogonal array are L32(4⁷). Based on the vocabulary image analysis data result, a targeted product emotional vocabulary database and imagery library can be established. From there, a 3D CAD design software program of SolidWorks is used to portray the characteristic parameters according to the orthogonal projection table model of the product formed. This can be illustrated in Table 1.

After the completion of the product design features and the corresponding data, the model is built. The questionnaire is used to achieve two targets, where the first is to assess the level of importance of the vocabulary adjective combinations in the design process. The other is to determine the shape of the product that meets the consumers' needs.

Table 1 Smartphone clustering results table

Group s	Sample No. (arranged sequentially)	Sample image (arranged sequentially)
The first group	4、12、13、15、16、25、26、27、29、31	
The second group	20、24	
The third group	2、10、23	
The fourth group	6	
The five group	5、11、14、19、30	
The six group	1、3、7、8、9、17、18、21、22、28、32	

3. RESULT AND DISCUSSION

3.1 Analytic Hierarchy Process of Modelling

After the comparison pairing of each adjective vocabulary depending on the various levels, the first in the overall appearance of the proportion part is depicted in Table 2, which the geometric mean expression will be put abbreviation as GM and the weight results as W.

Table 2 The AHP of the overall appearance proportion

	PMT	PSC	PBL	GM	W
PMT	1	0.58	3.70	1.29	0.32
PSC	1.73	1	7.69	2.37	0.59
PBL	0.27	0.13	1	0.33	0.08
	TOTAL			3.99	
	λ	CI	RI	CR	
	3.0037	0.0019	0.58	0.0032	

3.2 Evaluation Shape of Smartphone

After the completion of the calculation process of the weight of the product shape adjectives, the grey relational analysis (GRA) is applied to represent the grade of correlation between the two sequences so that

the distance of two factors can be measured discretely. Upon confirmation of the completion data received by the user who answered the questionnaires, the data then will be organized accordingly by excluded the invalid questionnaires. For mobile devices, the total valid questionnaires that derived are 51. The average score is calculated to proceed to the next steps of Grey analysis. 32 groups of sample products are derived for the mobile devices and 11 vocabulary sets have been allocated for the product model and vocabulary. Therefore, in the case of the smartphone, according to the survey of adjectives vocabulary inference, the weight adjectives of "Modern vs Traditional" shows 0.32, whilst the "Simple vs Complex" adjectives is 0.59. This can be set to determine the main adjectives vocabulary for the groups. According to the results of the Grey-analytic hierarchy process analysis (GRA-AHP), the smartphone sample number 13 is the closest to the ideal patterns of favorable of consumers' preferences, and to simplify the result from the clustering analysis, the top-ranking out of 10, 6 scores the highest and belongs to the first group. This means that if the designers want to make a decision, they have more choices of the samples to perform. The first visible sample of the group representing the shape that is closer to the consumers' needs. Furthermore, the characteristic shape that has been identified for the smartphone of the first group of samples is generally long and narrow screen. And the left and right screen spacing only experience fewer changes. The major changes are the upper and the lower part of the frame screen spacing. This means that, the consumers preferred the lengthy wide phone with big screen size. Therefore, the first group of product samples can be a good reference for designers to design the smartphone.

4. SUMMARY

Through this study, emotional adjectives vocabulary is used to determine the preference of the customers' needs on selected products. A grey theory and combination of the principles of design together with the analytic hierarchy process helped the designers to evaluate the model or propose an innovative product shape in the production and development stage. The designers can understand the customers' needs in terms of the product shape design and help speed the product innovation and development.

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