

## **KANSEI ENGINEERING: A CASE STUDY ON IRANIAN YOUTH PEOPLE PREFERENCES IN DIFFERENT CLASSES OF AVAILABLE AUTOMOBILES**

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### **ABSTRACT**

The aim of this study is to establish a new design database for redesigning the current Iranian national automobile (Samand). In order to carry out this study, kansei engineering method was used. It is an appropriate method for linking users' emotions and product properties. Samand is the only national car in Iranian Automobile market. Although there are several models of this car, all of the current models are designed and produced in Sedan class. However, it seems there are some interests among Iranian youth in SUV and the other classes of cars. In order to perform the study, sixty women and sixty men between 18-35 years of age were selected randomly among young people. The six most popular classes of automobiles in Iran's market, including Sedan, Hatchback, SUV, Mini, Van and Coupe were presented as image boards in a showroom. Firstly the participators were asked to rank the six different car classes according to their interests. Then people explained their feelings about each board considering forms, sizes and comfort of use. The participators' reactions closely observed and their kansei words were gathered. By analyzing gathered data, the Iranian youth people feelings about each class of automobiles were identified and their preferences were obtained as design characteristics. The results showed that both women and men were more interested in SUV car class. They had special feelings about this class due to its design characteristics. The results of this study became a new design database for redesigning the national Iranian automobile.

**Keywords:** *Kansei Engineering, feelings, preferences, car classifications, Automotive Design*

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## 1. INTRODUCTION

Design is a powerful and important process that has a strong influence on society. It could be as a competitive “weapon” for visualizing a business strategy. Design is like a bridge between a company and a user which could build a trustworthy and reliable relationship. Although design brings function to our everyday life, it also creates desire [1]. A great design is founded on a social, aesthetical and cultural perspective. A successful design always looks through the lens of humanity. It creates life enriching products that speak both to humans’ hearts and brains. Users are people of flesh and blood with dreams and hopes of good lives [2].

The understanding of social and cultural trends and incorporating them into products and services are becoming more and more important during the last few years. The condition of post capitalistic markets with global competition, market saturation and fast product obsolescence have given new importance to users and their needs as a source for the construction of product values. Today the competitive advantage in design business is based on the ability to embed users’ values into products and create new ideas according to social and cultural custom. Trends as a reflection of 'zeitgeist'-the spirit of the age-have become a strategic tool for new product planning. Nowadays High competition, market complexity and technological advancement have enabled the trend process to develop rapidly. In developed countries where trend research has long been established, workers are skilled, budgets are larger and new approaches are easy to develop. But, in developing countries where the meaning of trend research is not well known, people are not skilled and budgets are low. Therefore, alternative ways for gathering information are used to survive in a competitive market [3].

The information phase is a crucial phase of the design activity. Product and engineering designers have to search for inspirational materials such as images, textures, colors, etc. and collect them in order to enrich the creative process. The trends improve this information process and help designers to find suitable design information [4]. Due to its impact on creativity, the design information phase attracts increasing attention. This is demonstrated by studies of the design process, design expertise, sources of inspiration, Kansei Engineering and trend boards. The availability of inspirational materials as a data base is crucial to the design process. A core activity of a designer in selecting data base is the use of semantic adjectives which link words with images. This activity is very specific and could be compared to a hybrid search on both words and images [5]. Kansei oriented methods include various approaches for translating these semantic words (Kansei words) into design parameters. It measures semantics and shows the correlations of them with some design properties [6].

The term of kansei implies psychological feeling and needs. Before purchasing a passenger car, every one imagines “powerful engine”, “easy operation”, “beautiful and premium exterior”, “cool and relaxed interior” and so on. These words express the kansei, and the consumers willingly want to have such a vehicle. The kansei engineering is able to grasp the consumers’ kansei and convert it to the design domain [7].

In Iran there is not any design data base supported by systematic research. In the field of automobile design, Samand is the only national car in Iranian automobile market. It is designed and manufactured without considering the design data base. More than thirty five percent of populations of Iran are young people, between 10 to 30 years old [8]. It seems there is serious interest in cars brands and models among young people in Iran. Although there are several models of this car, there is no variety in the class of them. All of the current models are designed and produced in Sedan class. In order to find out if there is any interest among Iranian youth in other classes of cars, this study was carried out. To perform this study Kansei Engineering method was used.

## **2. KANSEI ENGINEERING**

Collecting the voice of customer in design process is not something new. The challenge is to identify the necessary information and find a way to transmit them into design elements. One of the design methods, which is able to capture the customer's feelings and translate them into concrete design is Kansei Engineering [9].

In design based on Kansei, qualitative information which is gained by interview and observation will be translated to quantitative information. This information can be used as image icons in design. Words are useful tools in understanding users' desire in Kansei Engineering. In this methodology, emotion can be expressed by psychological function such as behavior, facial and body language, physiological response such as heart rate. There are different methods to measure Kansei but the most common way of measuring the Kansei is through the words [10]. Kansei Engineering shows how Kansei is translated into design of a product [11].

### **2.1. Kansei Engineering Method**

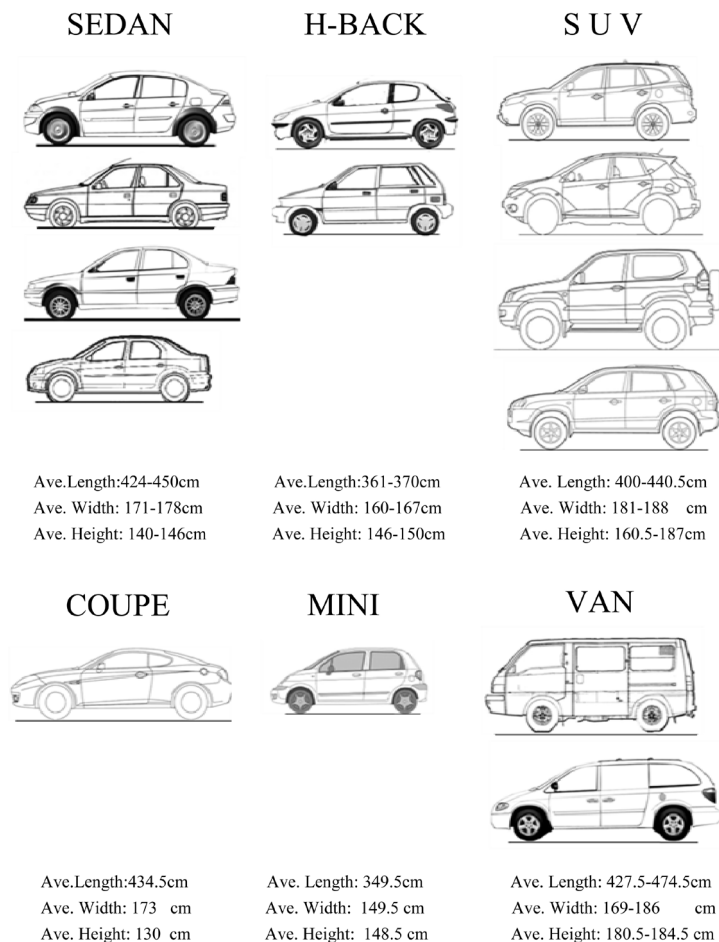
Kansei Engineering can be performed in different ways by using different types of this methodology [12]. As input data the 'Kansei' or psychological feeling is measured, conditioned and subsequently is processed, using one type of Kansei Engineering. The resulting information tells how this Kansei is related to the product, which can be tangible, intangible or a combination of both. According to a general model on Kansei Engineering procedure, the basic idea is to focus on the product from two different perspectives. These perspectives are the semantic description space and the description of product properties space. Subsequently these spaces are merged in with each other in synthesis phase. This phase indicates which of the product properties evokes which semantic impact.

From this model an experiment design was derived, which interconnected the relations between customer's Kansei and design elements. This procedure basically contains four different steps. The first step is to assess the customer's perception about the specific product. Therefore the customer feelings and desires have to be identified and expressed with Kansei words. In second step, those Kansei words would be arranged on a Semantic Differential Scale to be able to measure the customer's perception. The product of concern has to be defined in the

next step and its design elements have to be classified to items and categories. Finally, these data would be analyzed with Category Classification to determine the contribution of each design element on the user perception [13].

## 2.2. Applying Kansei Engineering Method

In order to apply Kansei engineering method for obtaining the Iranian youth people preferences in the specific classes of automobiles, the role of words for describing their emotions was considered. At first the Iranian youth kansei words were collected. Sixty women and sixty men between 18 to 35 years of age were selected randomly among people who agreed to participate in this study. The six most popular classes of automobiles in Iran's market, including Sedan, Hatchback, SUV (Sports Utility Vehicles), Mini, Van and Coupe were selected. In each class the available brands and models in Iran identified. A showroom was prepared and six different image boards from these different classes of cars presented to the people. These images which presented in black and white are shown in Figure 1.

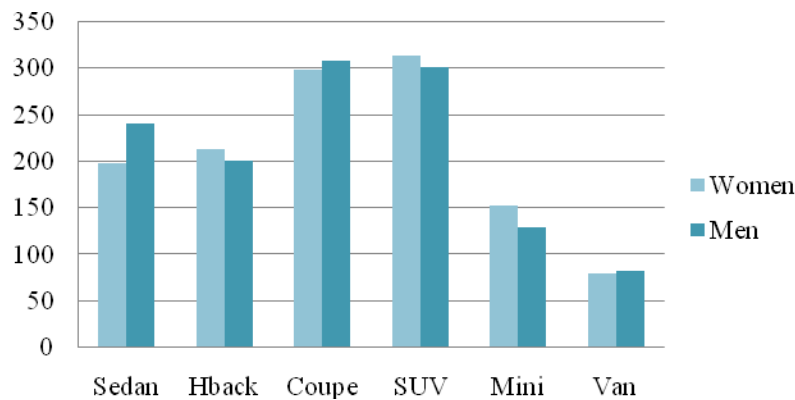


**Figure1:** The six image boards from the six different classes of cars with their dimensions

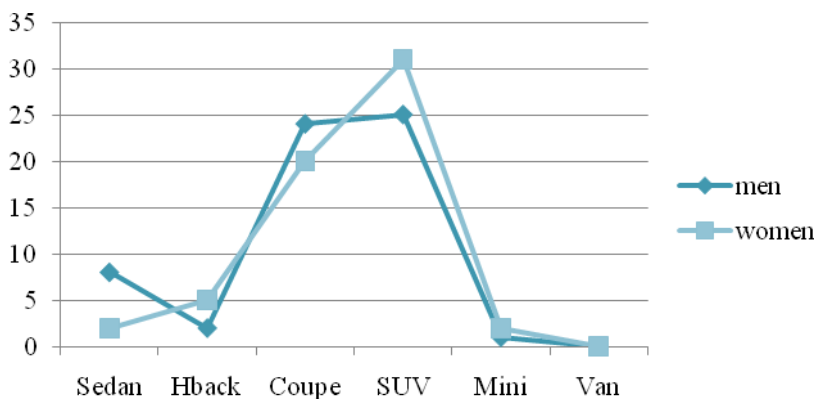
As Figure 1 shows, for Sedan group (from top to bottom) Renault Megane, Peugeot 405 GLX, Samand and Renault Logan L90 were selected. Peugeot 206 and Pride from Kia were

represented of Hatchback class. Four different models of automobile were selected for SUV board. They were Hyundai Santa Fe, Nissan Murano, Hyundai Tucson and Toyota Land Cruiser. In Coupe class, Hyundai Coupe was chosen and presented in showroom. Daewoo Matiz was represented of Mini automobiles group. Finally the Van image board was included of Delica Mitsubishi Van and Carvan from Iranian Saipa Automotive group. The brands of automobiles were hidden and only their blueprints and overall dimensions were shown in the showroom.

Firstly the participators were asked to rank the six different car classes from 6 to 1 score according to their interests. The interests of the users regarding each of these classes of automobiles were analyzed statistically with Excel software. These results are shown in Figure 2 and 3.



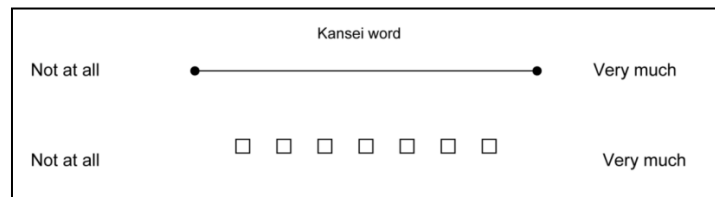
**Figure 2:** The participators' interests in six different classes of automobile



**Figure 3:** The participators' first choices in six different classes of automobiles

Then people explained their feelings about each board considering forms, sizes and comfort of use. Also the participators' reactions closely observed and their Kansei words were gathered. Totally 557 adjectives as Kansei words were collected (step1). In second step the Semantic Differential Scale was used to reduce the collected Kansei words and make people's desires and

feelings measurable. So, firstly the collected words for each board were analyzed and categorized. From each category a word or a group of words were chosen as a representative. One hundred seventy one words were selected as higher-level Kansei words in six car classes groups. Then in order to arrange these Higher-level Kansei words, ten volunteers, five men and five women, from participators were selected. Then they were asked to rate the higher-level Kansei words on paper according to Seven- Point Scale rating. Seven point scale rating consists of seven scales from “Not at all” to “Very Much”. Figure 4 shows the example of Seven-Point Scale Rating questionnaire.



**Figure4:** The example of Seven-Point Scale Rating questionnaire

The participators ranked each Higher-Level Kansei word in relation with the classes of automobile. Forty eight Higher-Level Kansei words were selected by Seven-Point Scale Rating. These Kansei words are shown in Table 1.

**Table 1:** The Rated Higher-Level Kansei Words

| Car Classes | Men  | Women  |
|-------------|--|--|
| Sedan       | Family type - Reliable - Classic<br>Popular - Balanced | Public - Masculine - Sober – Classic                 |
| H-Back      | Young - Incomplete - Easy to use                       | Young - Useful - Compact - Neutral                   |
| Coupe       | Romantic - Prestigious- Unique Young                   | Romantic - Prestigious- Unique – Creeper<br>Exciting |
| Mini        | Feminine - Minimal – cool - Weak shy                   | Feminine- Playful - Tiny - Funny                     |
| SUV         | Powerful - Safari- Large - Off road<br>Safe            | Powerful - Safari - Sport – Bulky                    |
| Van         | Slow - Wormy   | Social - Uncomfortable - Boring                      |

After rating the Higher-Level Kansei words and determining the related ones, the design elements of automobiles in each class were identified. These design elements were categorized as form, size and comfort of use (step 3).

In final step, the Higher-Level Kansei words were analyzed and connected to the design elements of automobiles in six classes of cars by Category Classification (Kansei Engineering Type 1). In this step the Semantic Space and the Space of Properties were linked together. In order to synthesis of these two spaces, each Higher-Level Kansei word were analyzed to the specific sensation that sensed by participators. Then for every Kansei word a number of automobiles properties were found. Each car’s property was linked to the design elements, due to the consultation with volunteers. The summery of these results has been shown in Table 2.

**Table 2:** The summary of results of the Category Classification analysis

| Car Classes | Kansei Words  | Design Elements |      |                |
|-------------|---------------|-----------------|------|----------------|
|             |               | Form            | Size | Comfort of use |
| Sedan       | Classic       | *               |      |                |
|             | Family type   |                 | *    | *              |
|             | Reliable      | *               | *    | *              |
|             | Popular       |                 |      | *              |
|             | Balanced      | *               |      |                |
|             | Masculine     | *               | *    |                |
|             | Sober         | *               |      |                |
| H-Back      | Young         | *               |      | *              |
|             | Incomplete    | *               |      |                |
|             | Easy to use   |                 | *    |                |
|             | Compact       |                 | *    |                |
|             | Useful        |                 |      | *              |
|             | Neutral       | *               |      |                |
| Coupe       | Romantic      |                 | *    |                |
|             | Prestigious   | *               |      |                |
|             | Unique        | *               | *    |                |
|             | Young         | *               |      |                |
|             | Exciting      | *               |      |                |
|             | Creeper       |                 | *    |                |
| Mini        | Feminine      | *               |      | *              |
|             | Minimal       |                 | *    |                |
|             | Cool          | *               |      |                |
|             | Weak          |                 | *    |                |
|             | Shy           | *               |      |                |
|             | Playful       | *               | *    |                |
|             | Tiny          |                 | *    |                |
|             | Funny         | *               |      |                |
| SUV         | Powerful      |                 | *    |                |
|             | Safari        |                 | *    | *              |
|             | Large         |                 | *    |                |
|             | Off-road      |                 | *    |                |
|             | Safe          |                 | *    | *              |
|             | Sport         | *               |      |                |
|             | Bulky         |                 | *    |                |
| Van         | Slow          | *               |      |                |
|             | Wormy         | *               |      |                |
|             | Social        |                 | *    |                |
|             | Uncomfortable |                 |      | *              |
|             | Boring        | *               |      |                |

As Table 2 shows the rated Kansei words were analyzed to three design elements. In order to categorize these Kansei words, firstly each kansei word was analyzed due to human sensations like vision, hearing, tactile, smell and taste. Then the automobiles properties which stimulated the specific Kansei were identified. Finally the automobiles properties were related to three design elements. Therefore, each Kansei word was categorized regarding form, size and comfort of using of the related class of automobile. According to the results, some of the Kansei words are related to only one element. For example, the word Classic that sensed by vision were referred to body of the automobiles in Sedan class. Then it categorized to the form of the automobiles in this class. However some other words like Safe were related to more than one design element. As Table 2 shows the word "Safe" is referred to the size of SUVs and also the comfort of seats and the interior of the automobiles.

### 3. DISCUSSION

As Figure 2 shows Coupe and SUV classes have got the highest scores (307 and 301) as the most popular classes of automobiles among Iranian men who participated in this study. Also Sedan (240), H-back (200), Mini (129) and van (83) were their next choices. However, as it is shown in Figure 3, twenty five people of these men selected SUV as their first choices, while Coupe was chosen by twenty four people. These results show that although, SUV was chosen by more people as the first choice, totally Coupe has got more scores as a popular class of automobiles among men's group. Romantic, Prestigious, Unique, Creeper and Young were the Kansei words which were related to the Coupe class by men's group (Table 1). Table 2 shows that these adjectives except Romantic were results of having double seats (in 434.5cm length and 173cm width). They were related to the narrow form and deformed lines of the automobile in this class. For SUVs, the Kansei words are Powerful, Safari, Off-road, Large and Safe. These adjectives were mostly related to the size of the SUVs, their large interior space, their maximum height (187cm) and bigger dimensions (440x188cm<sup>2</sup>).

In women's group SUV with 313 scores were chosen as the first popular class. Also, Coupe (298), H-back (213), Sedan (198), Mini (153) and Van (80) were the next choices (Figure 2). Figure 3 shows that 31 people of women (more than 51.6%) selected SUV as their first choice. It seems that SUV is the most popular car class among the Iranian women in this study. Table 1 shows the women's kansei words for SUV class of automobiles. Powerful, Safari and bulky were the adjectives that deeply related to the bigger size of the SUVs. Also the Sport adjective is related to the curved forms and heights which make the tiers bigger than any other cars (Table 2).

Therefore it seems that Coupe was chosen as a popular car class in men's group, due to its unique form. However, women selected SUV class as a result of its height and bigger dimensions.

As figure 2 and 3 show Sedan was selected as the third choice of men's Group. However in Women's group Sedan was chosen as a fourth class. Among Kansei words for Sedan class Masculine is related to the both classic form and the ordinary sizes of its automobiles (Table 2).



The Mini class was selected as the fifth choice by both men and women (Figure 2). The Kansei words in Table 1 show that Mini has brought Feminine feeling in participators because of its tiny size and comic form of automobiles.

The H-Back automobiles as fourth choice of men and third choice of women are mostly contributed on Neutral and Young Kansei words. According to the Table 2, these feelings are linked to the flexible form of automobiles and being user friendly.

According to the Figure 3, no one selected Van class as the first choice. Therefore, Van was situated as the last class of automobiles that people wanted to choose. As Table 1 shows, people think that Vans are Slow, Wormy (in men's group), Social, Uncomfortable and boring (in women's group). As presented in Table 2, these feelings are related to the fat form, the long and large size and the hard seats and doors of vans.

#### 4. CONCLUSION

The availability of inspirational materials as a data base is crucial to the design process. A main activity in selecting data base is the use of semantic adjectives which link words with images. In this study Kansei Engineering Method was used to apply the Iranian youth people's words to identify their preferences in car classes. Also their Kansei words were analyzed to identify the reasons of their choices in classes of automobiles as design elements.

The results of the study showed women are more interested in SUV class, while men preferred the Coupe automobiles. According to these results, although the total score shows men have chosen Coupe class as their favorite car class, Coupe as the first choice had very tight competition with SUV. Therefore it seems it would be required to repeat the study with more people to acquire the more accurate result.

Also the study shows women like SUVs because of their big sizes and heights. However, men are interested in Coupe, due to its different form as design characteristics. These results show that there is different taste in classes of automobiles among male and female groups in Iranian youth people.

This study shows that Iranian automotive industry needs to change the class of the national automobile (Samand) to achieve more satisfaction in Iran's market and become more successful. The results of the study can be useful as a design data base for redesigning the national Iranian automobile.

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