METHOD OF ANALYZING IMAGES OF CLOTHES BASED ON KANSEI ENGINEERING

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Abstract: Fashion, in contemporary world is becoming more sophisticated day by day. Its implications on general public are dramatically increasing in the cultural level that divides community into different subcultures. Hence, the emotional aspect of people towards ‘Fashion Industry’ is rising at a rapid rate. The most important component of customer’s impression must be considered in terms of garment design in order to maintain leadership on the market.

This paper aims to evaluate the emotional component of the garment with semantic differential. The process of evaluating consumer’s emotional experience consists of steps that provide an ability to classify the Kansei attribute of clothes. They are considered as key issues for the concept of recognition of images, and particularly emotions.

Method based on Kansei Engineering model is used to develop the full range of emotional keywords and their affinity cluster. The result shows that this method will be a good reference to design studies that involved with user’s personal emotional experience in the field of clothing design. This research intends to seek the psychological and emotional parameters that influence the selection of a particular dress and colour for female. The research involves the results of a designed survey.

Keywords: fashion, Kansei, visual images, semantic differential.

1. INTRODUCTION

Nowadays, the product development is changed from product-oriented to consumer-oriented; namely for manufacturers, the consumer’s feeling and needs are recognized more valuable in product development than ever before.

Fashion in contemporary world is becoming more sophisticated day by day. Its implications on general public are dramatically increasing in the cultural level that divides community into different subcultures. Hence, the emotional aspect of people towards “Fashion Industry” is rising at a rapid rate.

The most important component of customer’s impression must be considered in terms of garment design in order to maintain leadership on the market.

Although clothing design could be considered as united process, it includes at least two steps. Firstly, information about fashion trends, end use of clothing styles, image clothing, etc., must be explored. Next step includes selection of the specific information about silhouettes, materials and colours that would be recommended for specific groups of consumers.

Such information can be gathered with means of Kansei Engineering (KE) that develops methods of translating and embedding perceptual and emotional qualities into the features of product design [6, 7]. In terms of clothing design, emotion could be considered as a means for achieving the aesthetic quality of the garment. KE is a comprehensive human-centered technology for developing new products. It has been widely used in different fields of research and industry sectors [9-12]. However, at the time, the application of KE on clothing design is at the primary stage and little research has been reported yet.

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This research intends to seek the psychological and emotional parameters that influence the selection of a particular dress and colour for female consumer. There are several well-known methods and tools, which are used to assist the process of evaluating user’s emotional experience with products [11, 12]. However, the basic method of image analysis in KE is the method of semantic differential (SD) in the classification of Kansei attributes [6-8]. The method is the most popular way of the assessment of consumers’ emotional impressions. Therefore, it is chosen to be applied in current research.

2. METHODS

The method of SD includes research of words that express the emotions of consumers from clothing, formation of word pairs that form the semantic differential, and scaling of SD [8]. Collection of Kansei words (KW) – typical emotional keywords that reflect physiological impression from any models of clothes – is a database of KW [2, 3, 5]. Grouping of the typical keywords forms a new database of KW that is represented in the table 1.

Table 1. Grouping of words - Database of formed Kansei words to match clothes style with a basic colour

| Clothing style | Base colour | Red | Orange | Yellow | Green | Blue | Violet | Achromatic |
|----------------|-------------|-----|--------|--------|-------|------|--------|------------|
| Classic        | Respectable | Ruling | Bold   | Bohemian | Gullible | Creative | Energetic | Classic | Restrained |
|                | Luxurious  | Luxurious | Exquisite | Natural | Calm | Elegant | Practical | Chic | Intellectual |
|                | Solid      | Strong | Natural | Attractive | Energetic | Emancipated | Luxurious | Refined | Cold |
| Romantic       | Female     | Charming | Flirtatious | Delicate | Luxurious | Carefree | Open | Female | Creative |
|                | Fine       | Calm | Fresh | Spectacular | Relaxed | Benevolent | Playful | Relaxed | Elegant |
|                | Exquisite  | Delicate | Calm | Fresh | Spectacular | Relaxed | Playful | Luxurious | Fine |
|                | Delicate   | Carefree | Female | Energetic | Strong | Hard | Aggressive | Stylish | Enigmatic |
|                | Stylish | Strong | Hard | Aggressive | Stylish | Free | Energetic | Sport Chic | Intangible |
|                | Dynamic | Strong | Hard | Aggressive | Strong | Decisive | Sturdy | Strong | Mystical |
|                | Practical | Direct | Youthful | Flirtatious | Emotional | Carefree | Strong | Hard | Aggressive |
|                | Functional | Emotional | Excitable | Active | Female | Energetic | Stylish | Free | Energetic |
|                | Comfortable | Carefree | Female | Energetic | Strong | Hard | Aggressive | Sport Chic | Free |
|                | Dynamic | Strong | Decisive | Stydy | Strong | Decisive | Sturdy | Strong | Decisive |
|                | Ethnic | Restrained | Mature | Reliable | Youthful | Fresh | Traditional | Careful | Relaxed |
|                | Natural | Youthful | Fresh | Traditional | Worthful | Decorative | Ethnic | Careless | Relaxed |
|                | Ecological | Relaxed | Careless | Youthful | Cheerful | Active | Decisive | Natural | Active |
|                | Native | Natural | Striking | Original | Careful | Relaxed | Decisive | Natural | Cool |
|                | Relaxed | Careless | Youthful | Relaxed | Careful | Relaxed | Decisive | Natural | Cool |
|                | Cool | Relaxed | Careless | Youthful | Careful | Relaxed | Decisive | Natural | Cool |
|                | Exotic | Exotic | Dramatic | Innovations | Emotional | Excitable | Active | Carefree | Costly |
|                | Creative | Creative | Unusual | Extraordinary | Beautiful | Luxurious | Spectacular | Spectacular | Majestic |
|                | Unusual | Emotional | Excitable | Active | Beautiful | Luxurious | Spectacular | Splendid | Notable |
|                | Extraordinary | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |
|                | Outrageous | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |
|                | Variety | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |
|                | Dramatic | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |
|                | Innovations | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |
|                | Outrageous | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |
|                | Creative | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |
|                | Unusual | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |
|                | Extraordinary | Spectacular | Bright | Dynamical | Costly | Majestic | Splendid | Provoking | Notable |

Next step of the method includes the selection of words from a common database of KW with the opposite meaning and interpretation. Each pair of KW is the SD poles for a particular attribute of an investigated fashion model: style, shape, colour, material and so on. Search is performed in order to achieve the positive correlation between each word from the SD (column 2 and 3 of Table 2) and words that express the emotions of consumers from clothing (column 6 and 7 of Table 2). The KWs are coded by using the first letters of words with opposite meaning [4].
Table 2. Consolidated results for semantic differential impressions from clothes

| Pair code | KW 1 Meaning | KW 2 Meaning | Positively correlated to |
|-----------|---------------|---------------|--------------------------|
| CS        | Casual clothes | Smart clothes | Comfortable Practical Rational |
| RS        | Romantic style | Sports style   | Style that adapts sportswear for everyday wear |
| CA        | Classic style  | Avant-garde style | Impressive style that uses unusual fashion ahead of time |
| FM        | Folk clothes   | Modern clothes | Style is not sustainable within the long period of time |
| RO        | Rectangular shape | Oval shape  | Practical Dynamic Persistent |
| TdTu      | Trapezoid shape (long base down) | Trapezoid shape (long base up) | Creative Starry-eyed Impulsive |
| MP        | Mono colour    | Poly colours  | Sophisticated colour palette: two-, three - four-, colours and more |
| BS        | Bright         | Soft          | Colour with a black hue |
| LD        | Light          | Deep          | Colour contains 70 % of the white hue |
| WC        | Warm           | Cool          | Colour with a golden hue |
| MtPt      | Mono texture   | Poly texture clothes | Many textures |
| MS        | Matte texture  | Shiny texture | The fabric absorbs light |
| TN        | Transparent texture | Non-transparent texture | Fabric that does not pass through a beam of light |
| SA        | Symmetry       | Asymmetry     | The garment is composed of equal parts |

3. EXPERIMENTAL

For the study the material of fashion mega-portal “first VIEW” [1] was used which makes it possible to work with digitized photographs the whole collection show. The size of samples is 12 most frequently appearing outfits over the investigated period in press releases of designers and fashion houses namely Alexander McQueen (UK), Elie...
Saab (Lebanon), Oscar de la Renta (USA), Roberto Cavalli (Italy), Valentino (Italy), Emanuel Ungaro (France), Jason Wu (USA). As the object of study is women's dresses, from the collection of hits models by these houses in the period of spring-summer 2016 all models of women's dresses were picked up. Thus, a general collection was formed which amounted to 66 photos of fashion dresses for subsequent questionnaire.

The expert group consisted of 10 experts and 16 consumers. In a survey, photos of clothes were valued using valuation factors in bipolar scales defined by verbal antonyms of KW from each end of the scale (Fig. 1, Table 3).

![Image of a fashion model]

Figure 1. Example of answers for the questionnaire (outfit 28, expert 1 within group of professionals)

| Code | Professionals – 10 people | Kp | Consumers – 16 people | Kc | K |
|------|--------------------------|----|-----------------------|----|---|
| CS   | 1 2 3 4 5 6 7 8 9 10    |    | 1 2 3 4 5 6 7 8 9 10 |    |   |
| RS   | -2 -1 -2 -1 -2 -3 -1 -2 -3 -3 |    | -2 -1 -2 -1 -2 -3 -1 -2 -3 -3 |    |   |
| CA   | -2 -1 -1 -1 -2 -2 -1 -2 -1 -2 | -1.7 | -2 -1 -2 -2 -1 -1 -1 -1 -2 -3 | -2 -3 -2 -2 | -2 -3 -2 -2 | -2 -3 -2 -2 |
| FM   | 1 -1 -1 -1 -1 -1 -1 -1 -3 -3 | -0.4 | 1 1 1 1 1 1 -1 -1 -1 -1 | 1 1 1 1 1 1 | 0.5 0.45 |   |
| RO   | -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 | 0.3 | -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 | 1 1 1 1 1 1 | -0.3 -0.30 |   |
| TdTu | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0.0 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0.0 | 0.0 | 0.00 |
| MP   | 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 | 3.0 | 3 3 3 3 3 3 3 3 3 3 3 3 | 3 3 3 3 3 | 3 3 3 3 3 | 3.0 3.00 |
| BS   | 0 1 1 1 0 1 1 1 1 1 0 1 1 1 1 1 0 1 1 1 0 | 0.8 | 1 1 1 1 1 1 0 1 1 1 0 1 1 1 1 0 1 1 1 0 | 0.8 0.80 |
| LD   | 0 1 1 1 3 1 2 2 2 2 2 1.5 | 0 1 3 1 1 1 2 2 2 2 1 | 0 1 1 1 1 | 1 1 | 1.1 1.31 |
| WC   | 0 0 0 0 0 0 0 0 0 0 | 0.0 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0.0 0.00 |
| MtpT | -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 | -2.8 | -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 | -3 -3 -3 -3 | -2.8 | -2.90 |
| MS   | 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 | 3.0 | 3 3 3 3 3 3 3 3 3 3 3 3 | 3 3 3 3 3 | 3.0 3.00 |
| TN   | 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 | 2.5 | 2 3 3 3 3 3 3 3 3 3 3 3 | 3 3 3 3 3 | 2.5 2.55 |
| SA   | -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 | -0.0 | -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 | -3 -3 -3 -3 | -0.0 | -3.00 |

Table 3. Example of filling the form of evaluating consumer’s impression with SD (outfit 28)
4. RESULTS

The consistency degree of photo evaluation results by experts using SD scales is confirmed by concordance coefficients and Pearson criteria. Table 4 presents the consolidated results of the evaluation level coordination of expert opinions of the 66 models.

Table 4. The consolidated results of the evaluation degree of coordination of expert opinions (professionals – 10 people)

| № | \( \omega \) | \( \chi^2_p \) | № | \( \omega \) | \( \chi^2_p \) | № | \( \omega \) | \( \chi^2_p \) | № | \( \omega \) | \( \chi^2_p \) | № | \( \omega \) | \( \chi^2_p \) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.734 | 95.42 | 12 | 0.849 | 110.41 | 23 | 0.852 | 110.84 | 34 | 0.792 | 102.96 | 45 | 0.853 | 110.91 | 56 | 0.953 | 123.96 |
| 2 | 0.600 | 77.37 | 13 | 0.847 | 110.07 | 24 | 0.804 | 104.47 | 35 | 0.932 | 121.12 | 46 | 0.856 | 111.23 | 57 | 0.974 | 126.66 |
| 3 | 0.884 | 114.92 | 14 | 0.732 | 95.12 | 25 | 0.911 | 118.43 | 36 | 0.962 | 125.04 | 47 | 0.928 | 120.70 | 58 | 0.830 | 107.95 |
| 4 | 0.653 | 84.92 | 15 | 0.826 | 107.44 | 26 | 0.942 | 196.01 | 37 | 0.897 | 116.55 | 48 | 0.969 | 125.93 | 59 | 0.894 | 116.26 |
| 5 | 0.828 | 107.65 | 16 | 0.771 | 100.17 | 27 | 0.931 | 120.97 | 38 | 0.880 | 114.38 | 49 | 0.834 | 108.44 | 60 | 0.920 | 119.65 |
| 6 | 0.705 | 91.71 | 17 | 0.817 | 106.21 | 28 | 0.930 | 120.90 | 39 | 0.973 | 126.54 | 50 | 0.928 | 120.60 | 61 | 0.981 | 115.46 |
| 7 | 0.678 | 79.28 | 18 | 0.827 | 107.54 | 29 | 0.893 | 116.04 | 40 | 0.970 | 126.12 | 51 | 0.929 | 120.82 | 62 | 0.959 | 124.63 |
| 8 | 0.675 | 87.78 | 19 | 0.950 | 123.47 | 30 | 0.963 | 125.17 | 41 | 0.960 | 124.75 | 52 | 0.860 | 111.76 | 63 | 0.877 | 114.04 |
| 9 | 0.851 | 110.65 | 20 | 0.898 | 116.76 | 31 | 0.942 | 122.40 | 42 | 0.927 | 120.48 | 53 | 0.885 | 114.99 | 64 | 0.794 | 103.24 |
| 10 | 0.864 | 112.37 | 21 | 0.885 | 110.45 | 32 | 0.948 | 123.25 | 43 | 0.745 | 96.88 | 54 | 0.861 | 111.97 | 65 | 0.901 | 117.08 |
| 11 | 0.789 | 102.60 | 22 | 0.930 | 120.89 | 33 | 0.929 | 120.79 | 44 | 0.833 | 108.32 | 55 | 0.855 | 111.11 | 66 | 0.890 | 115.70 |

Tabular value of Pearson criterion for 5 percent of the weight level and the corresponding number of freedom degrees \((\chi^2_{tabl} = 22.36)\) is less than the estimated value criterion. Therefore, it is possible to state with 95-percent probability that the frequency of evaluation ratios of KW pairs in different experts is coordinated in accordance with the calculated rate of concordance. Thus, each clothes model can be described with the help of the rating pairs of KW that were described in the Table 2.

As the results of the factor analysis that was described in previously published work [5], six factors (components) were highlighted, which can combine all pairs of words of SD that reflect consumer’s impressions from clothes. That is why the number of descriptors of SD that must be considered for any outfit can be restricted to 6 pairs of words.

Since these evaluations are subjective, as a result of the survey psychographic profile of one dress pattern was constructed (Fig. 2). This profile reflects the average amount of evaluation coefficients for each pair of KW.

![Figure 2. Examples of psychographic profiles](Image)

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As shown in Figure 2, the psychographic profile of an outfit visually practically does not differ for different groups of experts. That is why a two-sample location test of the null hypothesis such that the means of two populations are equal, was performed. Each population was represented by values of the same number of rating pairs of KW, but obtained by different groups of experts those are designers and consumers.

The results of the T-test that are shown in the table 5 confirm the null hypothesis. Therefore, in order to evaluate the consumer’s impression with semantic differential only one group of experts is needed. Moreover, the group may consist of designers as well as consumers. The number of experts was determined as the maximum value of sample size for each descriptor of SD given that the sample size was calculated for each outfit (Table 5).

Table 5. Sample size determination

| Outfit | Sample size for the descriptor | T-test | Outfit | Sample size for the descriptor | T-test |
|--------|---------------------------------|--------|--------|---------------------------------|--------|
|        | CS  | FM  | TdTu | BS  | TN  | SA  | CS  | FM  | TdTu | BS  | TN  | SA  |        |
| 1      | 10  | 21  | 1    | 12  | 2   | 1   | 0.633 | 34  | 17  | 19  | 19  | 9   | 21  | 28  | 0.644 |
| 2      | 8   | 1   | 1    | 41  | 9   | 1   | 0.199 | 35  | 21  | 24  | 1   | 30  | 1   | 1    | 0.204 |
| 3      | 1   | 23  | 1    | 23  | 1   | 1   | 0.567 | 36  | 1   | 21  | 24  | 1   | 1   | 30  | 0.339 |
| 4      | 1   | 2   | 7    | 28  | 1   | 1   | 0.881 | 37  | 5   | 21  | 1   | 24  | 3   | 1    | 0.836 |
| 5      | 16  | 17  | 1    | 28  | 1   | 1   | 0.721 | 38  | 1   | 21  | 1   | 17  | 1   | 19   | 0.063 |
| 6      | 17  | 14  | 1    | 6   | 1   | 1   | 0.243 | 39  | 4   | 21  | 24  | 1   | 1   | 1    | 0.086 |
| 7      | 7   | 21  | 1    | 21  | 7   | 5   | 0.810 | 40  | 10  | 14  | 1   | 1    | 26  | 26   | 0.982 |
| 8      | 1   | 16  | 1    | 19  | 13  | 24  | 0.539 | 41  | 14  | 14  | 1   | 1    | 21  | 28   | 0.046 |
| 9      | 6   | 8   | 1    | 1   | 14  | 1   | 0.306 | 42  | 83  | 9   | 1   | 58  | 1   | 1    | 0.378 |
| 10     | 4   | 8   | 1    | 30  | 14  | 1   | 0.214 | 43  | 7   | 12  | 1   | 28  | 12  | 1    | 0.059 |
| 11     | 26  | 14  | 24   | 17  | 13  | 28  | 0.885 | 44  | 26  | 1   | 1   | 16  | 30  | 1    | 0.027 |
| 12     | 1   | 2   | 8    | 21  | 2   | 1   | 0.138 | 45  | 10  | 8   | 26  | 26   | 1   | 0.743 |
| 13     | 9   | 21  | 17   | 16  | 10  | 28  | 0.816 | 46  | 17  | 2   | 1   | 28  | 26   | 1   | 0.641 |
| 14     | 4   | 14  | 1    | 14  | 2   | 30  | 0.156 | 47  | 24  | 14  | 1   | 24  | 3   | 1    | 0.046 |
| 15     | 16  | 10  | 1    | 1   | 2   | 1   | 0.754 | 48  | 14  | 23  | 13  | 1   | 1   | 1    | 0.151 |
| 16     | 1   | 4   | 1    | 26  | 21  | 1   | 0.771 | 49  | 21  | 21  | 1   | 7   | 1   | 1    | 0.638 |
| 17     | 16  | 16  | 1    | 10  | 14  | 1   | 0.638 | 50  | 1   | 21  | 1   | 28  | 1   | 1    | 0.433 |
| 18     | 17  | 10  | 1    | 24  | 16  | 1   | 0.788 | 51  | 21  | 24  | 9   | 1    | 24  | 6    | 0.053 |
| 19     | 24  | 12  | 1    | 1   | 12  | 1   | 0.283 | 52  | 14  | 13  | 2   | 28  | 24  | 24   | 0.181 |
| 20     | 7   | 13  | 3    | 13  | 26  | 24  | 0.666 | 53  | 5   | 12  | 1   | 1    | 26  | 0.170 |
| 21     | 24  | 17  | 23   | 17  | 6   | 30  | 0.882 | 54  | 24  | 9   | 24  | 23   | 10  | 1    | 0.539 |
| 22     | 6   | 5   | 1    | 30  | 1   | 1   | 0.585 | 55  | 10  | 10  | 28  | 2   | 10   | 1    | 0.234 |
| 23     | 24  | 10  | 1    | 26  | 16  | 21  | 0.174 | 56  | 23  | 5   | 1   | 1   | 1    | 0.243 |
| 24     | 1   | 1   | 26  | 26   | 10  | 5   | 0.557 | 57  | 21  | 17  | 16  | 1   | 1    | 1    | 0.608 |
| 25     | 17  | 1   | 1    | 19  | 1   | 1   | 0.008 | 58  | 6   | 21  | 23  | 24  | 8   | 1    | 0.039 |
| 26     | 13  | 1   | 30  | 24  | 1   | 0.734 | 59  | 13  | 12  | 1   | 1   | 1    | 1    | 0.102 |
| 27     | 2   | 21  | 1    | 17  | 26  | 30  | 0.879 | 60  | 21  | 16  | 1   | 13  | 1   | 1    | 0.543 |
| 28     | 23  | 1   | 1    | 2   | 30  | 1   | 0.833 | 61  | 30  | 13  | 1   | 24  | 23  | 10   | 0.804 |
| 29     | 28  | 24  | 8    | 3   | 1   | 28  | 0.463 | 62  | 10  | 14  | 4   | 1    | 24  | 0.551 |
| 30     | 5   | 8   | 16   | 1   | 28  | 1   | 0.648 | 63  | 10  | 21  | 1   | 24  | 21  | 1    | 0.589 |
| 31     | 1   | 10  | 1    | 1   | 1   | 1   | 0.869 | 64  | 1   | 16  | 1   | 21  | 24  | 1    | 0.839 |
| 32     | 28  | 10  | 24   | 1   | 1   | 30  | 0.329 | 65  | 12  | 1   | 24  | 1   | 1    | 1    | 0.308 |
| 33     | 23  | 7   | 16   | 1   | 19  | 1   | 0.843 | 66  | 7   | 30  | 1   | 23  | 1   | 1    | 0.454 |
Descriptive statistic was calculated for the dataset of sample sizes. Statistical parameters for each descriptor of SD are shown in the table 6.

Table 6. Descriptive statistic

| Parameter        | CS   | FM   | TdTu | BS   | TN   | SA   |
|------------------|------|------|------|------|------|------|
| Mean             | 12.43| 13.14| 6.55 | 15.15| 10.42| 9.22 |
| Standard Error   | 1.09 | 0.92 | 1.12 | 1.52 | 1.25 | 1.48 |
| Median           | 10.00| 14.00| 1.00 | 17.00| 8.00 | 1.00 |
| Mode             | 1.00 | 21.00| 1.00 | 1.00 | 1.00 | 1.00 |
| Standard Deviation| 8.77 | 7.43 | 9.01 | 12.34| 10.09| 11.89|
| Kurtosis         | -1.20| -0.85| 0.00 | 0.55 | -1.15| -1.15|
| Skewness         | 0.26 | -0.11| 1.29 | 0.56 | 0.60 | 0.88 |
| Range            | 29.00| 29.00| 27.00| 57.00| 29.00| 29.00|
| Minimum          | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Maximum          | 30.00| 30.00| 28.00| 58.00| 30.00| 30.00|
| Sum              | 808.00| 854.00| 426.00| 1000.00| 677.00| 599.00|
| Count            | 66.00| 66.00| 66.00| 66.00| 66.00| 66.00|

As a result of the calculation, it was determined that the number of experts in the group is the maximum value in the range. The descriptor BS has the maximum value that is 58. However, it is not advisable to increase the sample size to such an extent. The descriptor BS is the pair of KW that is the description of the colour characteristics. Such characteristics must be estimated with software such as GIMP or Photoshop. Therefore, the descriptor was deleted from the overview and the number of experts is 30.

In the figure 3 the improved version of questionnaire is shown. The descriptor BS must be evaluated according to the value of brightness that is provided with tools of chosen software. In the figure 3 it is presumed to be Colour Picker of Adobe Photoshop.

![Figure 3. Example of the improved questionnaire](https://sites.google.com/a/trakia-uni.bg/ictte-2017/)

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5. CONCLUSIONS

As a result of the current research, analysis of photographs from clothes’ collection shows by 12 famous Fashion Houses was conducted and photographic images of women’s dresses were selected. The selected material was sampled for the next general assessment of impressions that are caused by outfits.

With the help of the developed bipolar scales of SD the description of artistic and design solutions of clothes in the form of psychographic profiles was made. Each profile is a list of the average meanings of the estimated coefficients of SD for six pairs of KW: SA, BS, CS, TN, FM, TdTu.

It was determined that only one group of experts is needed and the number of experts that can be designers as well as consumers was determined. The descriptor BS was removed from the original survey in order to decrease the number of experts in the group. Therefore, the number of experts is 30 and evaluation of the colour characteristics of outfit must be performed with tools of raster graphics editors.

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