A slow fashion design model for bluejeans using house of quality approach

B Nergis, C Candan, S Sarsalı, N Seneloglu, R Bozuk and K Amzayev
Istanbul Technical University, Textile Technologies and Design Faculty, Department of Textile Engineering, İnönü cad. No 65, Beyoğlu-Istanbul, Turkey

Email: candance@itu.edu.tr

Abstract. The purpose of this study was to develop a slow fashion design model using the house of quality model (HOQ) to provide fashion designers a tool to improve the overall sustainability of denim jeans for Y generation consumers in Turkish market. In doing so, a survey was conducted to collect data on the design & performance expectations as well as the perception of slow fashion in design process of denim jeans of the targeted consumer group. The results showed that Y generation in the market gave the most importance to the sustainable production techniques when identifying slow fashion.

1. Introduction

The harmful consequences, especially stemming from fast fashion products, have evoked concern among some people in the fashion world. They have started to think about how to design and develop apparel products that may have the fewest possible adverse effects on human beings, other living creatures, and the planet Earth during their entire life cycle. This type of product generally refers to “sustainable fashion”. Based on the World Commission on Environment and Development’s (1987) perspective on “sustainability”, the concept of sustainable fashion is confined to apparel products that maximize positive and minimize negative environmental, social, and economic effects along their supply and value chain [1]. A single definition of sustainable fashion is difficult to pinpoint as there is no industry standard. The concept of sustainable fashion encompasses a variety of terms such as organic, green, fair trade, sustainable, slow, eco and so forth [2], each attempting to highlight or correct a variety of perceived wrongs in the fashion industry including animal cruelty, environmental damage and worker exploitation [3-5]. Studies into purchasing behaviour have also suggested that consumers have been showing increasing levels of ethical concern in the context of fashion consumption [6]. In that respect, knowledge of Generation Y’s purchasing habits may enable fast-fashion retailers to produce sustainable garments with similar levels of trend. Additionally, younger consumers are more likely to be fashion leaders of the future [7].

Thus, targeting this group with sustainable products could quicken the dissemination of sustainability as a fashion trend through fashion leaders. Accordingly, the objective of this study was to create denim jeans for Generation Y with slow fashion qualities using House of Quality (HOQ). In doing so, design and manufacturing specifications that represented slow fashion for the products were also identified.

2. Material and Method

For the study, a survey was conducted online through www.surveey.com as well as several social media platforms to establish a simple random sampling for the targeted consumer profile. The data collected from the participants were carefully examined to prevent the inclusion of computer generated responses. Finally, 444 surveys were deemed for the study; however, only 302 of them which represented the age range for Generation Y given in the literature (22 to 37) were included in the research. The survey was composed of three sections which were identifying consumers’

- Section 1: demographic characteristics (13 questions asked),
Section 2: design & performance expectations for denim jeans (17 questions asked), and
Section 3: perception of slow fashion in design process of denim jeans (18 questions asked).

The data obtained from Section 2 and 3 were assessed using a nine-point Likert-type scale, ranging from strongly disagree (1) to strongly agree (9). IBM SPSS Statistics 21 was used to analyse the survey results.

3. Results and Discussion
3.1. Demographic Characteristics
The data regarding the demographic characteristics of the participants are given in Table 1. Nearly 61% of the participants was female whereas 39% of them was male. The majority were single and university students.

| Gender      | 60.9 % Female - 39.1 % Male |
|-------------|-----------------------------|
| Marital Status | 86.4 % Single - 13.6 % Married (92.4 % of those without children, 5.6 % of those with “single” child) |
| Education Level | 83.4 % BSc or BFA, 11.6 % MSc or MA, 2.0 % PhD, 3.0 % High School |
| Employment Status | 53.0 % Student, 37.1 % Private Sector, 5.6 % Unemployed, 4.3 % Public Sector |
| Monthly Income | 37.7 % 330 USD and below, 26.5 % 330-650 USD, 15.6 % 650-1000 USD, 11.5 % 1,000-1,500 USD, 8.6 % 1,500 USD and over |

They did mostly online shopping (% 90.4), and in doing so they generally preferred to visit shopping malls more than once a week (46.4 %). Almost 50% of the participants did have more than 5 pairs of denim jeans.

3.2. Performance & Design Expectations for Denim Jeans
The participants pointed out the parameters fit, quality, design, and price as the most important factors influencing their buying decisions. In relation to gender and education level, the mean relevant importance values of these parameters are given in Table 2. As may be seen from the table, for both educated male and female participants, the fit had the highest importance among the parameters discussed. The price however, became the least important factor for the same group. So far as the design expectations were concerned, 62% of the participants preferred “skinny” jeans (female participants), which was followed by “straight” ones (male participants). The data also revealed that Y generation liked washed/stone washed jeans most (45.7 %) (Table 3).

| Gender | Education Level | Freq. | Mean (design) | Mean (comfort) | Mean (price) | Mean (fit) | Mean (quality) |
|--------|-----------------|-------|---------------|----------------|--------------|------------|----------------|
| Female | Bachelor        | 153   | 8.07          | 7.93           | 6.89         | 8.33       | 7.08           |
|        | Master          | 22    | 7.50          | 8.27           | 6.82         | 8.41       | 7.05           |
|        | Phd             | 4     | 7.50          | 8.00           | 5.50         | 8.50       | 8.50           |
|        | HSchool         | 5     | 8.80          | 8.20           | 7.60         | 8.60       | 7.20           |
| Male   | Bachelor        | 99    | 7.35          | 7.69           | 6.45         | 7.70       | 7.25           |
|        | Master          | 13    | 6.77          | 7.38           | 5.00         | 7.38       | 6.85           |
|        | Phd             | 2     | 9.00          | 8.50           | 4.00         | 7.00       | 8.00           |
|        | HSchool         | 4     | 7.50          | 9.00           | 6.00         | 7.00       | 7.75           |

With 34.4%, solid colour jeans took the second rank in the preference list of the participants. Mid-rise waist type (59.6 %) was the most popular one, when compared to high (25.2 %) and low rise (13.2%) waist types. The final note regarding the general design expectations was that the participants mostly
preferred zipper (59.3 %) as a closure type. Only 37.4% of the participants preferred denim jeans having buttons as closure (Table 3).

Table 3. Consumer design preferences for denim jeans

| Design Properties          | Freq. | %  |
|----------------------------|-------|----|
| Skinny                     | 188   | 62.3 |
| Straight                   | 68    | 22.5 |
| Bootcut/flare              | 26    | 8.6  |
| Boyfriend/wide leg         | 20    | 6.6  |
| **Colour**                 |       |     |
| Washed/Stone washed        | 138   | 45.7 |
| Solid colour               | 104   | 34.4 |
| Whisker/Rodeo/Destruction/ | 50    | 19.9 |
| **Waist Type**             |       |     |
| Mid-rise                   | 180   | 59.6 |
| High rise                  | 76    | 25.2 |
| Low rise                   | 40    | 13.2 |
| **Closure Type**           |       |     |
| Zipper                     | 179   | 59.3 |
| Button                     | 113   | 37.4 |

When it came to pocket design, the majority demonstrated “traditional” tastes for both back and front pocket design, such that only 22% of them preferred embellished/fancy front pocket whereas only 6.2% was found to have embellished/fancy back pocket (Table 4). The data obtained from the survey did also show that the participants generally preferred national brands (MAVİ, LTB, and COLIN’s). Among the foreign brands, Levi’s took the first rank which was followed by GAP, TOMMY HILFIGER, and DIESEL (Figure 1).

Table 4. Consumer design preferences for pockets in denim jeans

| Pocket Details               | Freq. | %  |
|------------------------------|-------|----|
| **Back Pocket Details**      |       |    |
| Traditional                  | 204   | 67.5 |
| Carpenter utility            | 42    | 13.9 |
| Oval pocket                  | 31    | 10.3 |
| Embellished/No pocket and others | 25 | 8.3 |
| **Front Pocket Details**     |       |    |
| Stitched rounded pocket      | 109   | 36.1 |
| Traditional five pocket      | 85    | 28.1 |
| Seamed                      | 41    | 13.6 |
| Diagonal with zippered coin pocket | 19 | 6.3 |
| Embellished                 | 19    | 6.3 |
| Rectangular patch with diagonal opening | 19 | 6.3 |
| Rectangular patch pocket/slit with zipper | 10 | 3.2 |
3.3. Perception of slow fashion in design process of denim jeans

For the identification of design and manufacturing specifications that represent slow fashion, the literature on slow fashion as well as on social responsibility in the apparel industry was studied. This was followed by incorporating the slow fashion themes into the survey conducted. These themes, together with the relative importance rating values of the participants, are given in Table 5.

| Themes                                           | Mean    | Std. Deviation |
|--------------------------------------------------|---------|----------------|
| Upholding Child Labour Laws                      | 7.05    | 2.556          |
| Having Safe Working Conditions                   | 6.64    | 2.584          |
| Minimizing Pollution in Denim Production         | 6.63    | 2.501          |
| Minimizing Waste in Production                   | 6.38    | 2.596          |
| Fair Wage Policies in Production                 | 6.36    | 2.649          |
| Overall Naturalness in Denim                     | 6.27    | 2.539          |
| Minimizing Energy Use in Denim Production        | 6.11    | 2.574          |
| Use of Organic Fibres                            | 6.08    | 2.368          |
| Use of Natural Dyes                              | 5.89    | 2.582          |
| Minimizing Transportation                        | 3.76    | 2.707          |

As may be seen from Table 5, the majority were highly in favour of socially and economically sustainable denim production. Familiarity of consumers with the terms such as eco-friendly, upcycling, etc. was very important to create denim jeans with slow fashion qualities using HOQ. Therefore, the participants were asked about these terms, and it was found that the majority (64%) was familiar with the terms eco-friendly (33 %) and recycling (31 %). The percentage of the participants being aware of “organic apparel production” was almost 23 %, which was quite low. Reuse and upcycling terms were, on the other hand, known by 31 and 10 % of the participants, respectively. The comparative data evaluation did also show that irrespective of education level, the female participants were more familiar to the terminology than the male participants. However, surprisingly enough, both the participants who were familiar with the sustainability related terms in apparel as well as the ones who were not, did show the same tendency for their preferences of colour for denim jeans, which was bleached/stone washed jeans. This may be concluded that many Y generation consumers did not have enough information to correlate design properties such as colour with sustainability in denim production.

Table 6. The importance of price for organic denim jeans

| Price                                                      | Freq. | %   |
|------------------------------------------------------------|-------|-----|
| If they have the same price                                 | 189   | 62.6|
| If the organic one is a little bit expensive than inorganic one | 56    | 18.5|
| If the organic one is cheaper                               | 45    | 14.9|
| If the organic one is more expensive than inorganic one     | 10    | 3.3 |

Table 6 demonstrates that price was an important factor for purchasing organic denim jeans which had almost the same design as its conventional counterpart. The majority said that they would buy organic denim jeans if they did have the same (or almost the same) price as conventional denim jeans. Furthermore, almost 28 % of the participants stated that irrespective of price, they would buy organic products because they cared about their wellbeing. The percentage of the participants who would prefer purchasing organic products for more environmentally friendly reasons was, however, only 17 %. The statistical evaluation of the data revealed that the Y generation female consumers with children...
gave more importance to the overall naturalness of denim jeans than their male counterparts. The survey showed that 5% of the participants would not buy organic products for any reason. Finally, the survey also revealed that for buying recycled goods, 36% of the participants could be encouraged by various promotions, such as discounts and coupons whereas 16% of them were influenced by campaigns and ads on increasing the awareness on this very subject.

3.4. Building House of Quality
The customer requirements section of the house of quality was identified with the information obtained from the surveys. The relative importance values obtained from the surveys were averaged and the highest ratings were used as the needs in the customer requirements section of the house of quality along with the importance values. This information was then used in the subsequent steps in the HOQ development. The second phase of HOQ development was completing the technical requirements section. The customer requirements were translated into specific technical actions that would satisfy the Y customer needs. The third step in building a HOQ was to establish the interrelationship and planning matrices. The completed HOQ was used to design a pair of denim jeans that strived to satisfy the defined customer requirements (Figure 2).

![Figure 2. The House of Quality (HOQ)](image)

The planning matrix in HOQ provides a visual display of how the product of interest compares to the competition in satisfying the identified customer needs. For the study, the imaginary pair of denim jeans, together with the products of the most preferable brands, were used as the competitors. First, the figure between 1 and 5 was given for meeting customer needs of the imaginary product depending on the relative importance of customer requirements obtained from the survey analysis. The means of customer demands which were between 1 and 9 (referred as relative importance) were transformed to 1 to 5 scales in the planning matrix. Mavi was preferred because of its “perfect fit and size options, designs, and durability”. Also, they have a collection called as “Mavi Organics” made from hundred percent of organic cotton fibre, which shows the brand’s awareness of environment and consumers’ well-being. The survey revealed that Levi’s, on the other hand, was mainly preferred due to design variations as well as durability. Based on this information and on the researchers’ individual experiences as consumers with the brands, the grading for both brands was done using “1 to 5” scale.
The final part of House of Quality contained important sections which were technical priorities, benchmarks and targets (Figure 2). Targets identified the final products properties with analyzing the customer needs, technical requirements, the position of the competitive companies and our product’s performance. For the calculation of the technical importance, the selected technical requirements were fiber type (natural/organic fiber or polyester fiber) and fabric composition (including elastane). This was mainly because they were not only the most important parameters for denim jeans, but also could have been graded in accordance to the “1 to 5” scale based on the researches’ professional experiences. In addition to that, the designs of the brands for this part were selected such that they represented the most favored design details of the Y generation consumers which were revealed by the survey. As may be seen from Figure 2, the imaginary product based on the generation Y’s expectations for sustainable denim jeans together with two commercial denim apparel brands having sustainable products in their lines were included in the HOQ. The HOQ revealed that technical requirements such as use of elastane, natural (or organic) fibres, and natural dyes together with waste reducing design adjustments should have been improved to achieve a more sustainable denim jeans’ designs for generation Y.

4. Conclusions
Slow fashion is described as quality apparel which has a longer useful life and is more highly valued than typical fast fashion apparel. The purpose of this study was to develop a slow fashion design model using the house of quality (HOQ) which would provide fashion designers a tool to improve the overall sustainability of denim jeans for Y generation consumers. The model showed that the most important qualities to the consumer when identifying slow fashion included sustainable production techniques. It also revealed that “design/style” was the main concern of Y generation consumers when buying conventional and/or organic denim jeans. Finally, the retailers operating in Turkish market may use this model to improve their denim related clothing ranges.

References
[1] Moon K K L, Youn C, Chang J M T & Yeung A W H. 2013. Product design scenarios for energy saving: A case study of fashion apparel. International Journal of Production Economics, 146 392–401
[2] Cervellon M C & Wernerfelt A S. 2012. Knowledge sharing among green fashion communities online. Journal of Fashion Marketing and Management, 16 176–192.
[3] Bray J P. 2009. Ethical dimensions in clothing purchase. First Annual Ethics in Everyday Life Conference, 17–19 March, Salzburg.
[4] Bianchi C & Birtwistle G. 2010. Sell, give away, or donate: an exploratory study of fashion clothing disposal behaviour in two countries. The International Review of Retail, Distribution and Consumer Research 20(3) 353–368.
[5] Blanchard T. 2013. Green is the New Black: How to Save the World in Style. Hodder & Stoughton: Hachette UK
[6] Tobeck M R. 2013. Slow Fashion Development: A Model for Sustainability, Master of Science Thesis, Oregon State University, USA
[7] Goldsmith R E & Clarke R A. 2009. An analysis of factors affecting fashion opinion leadership and fashion opinion seeking. Journal of Fashion Marketing and Management, 12 (3) 308-322