

FLIGHT ATTENDANT UNIFORM CONCEPT PREFERENCE STUDY USING KANSEI ERGONOMICS

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ABSTRACT

Flight attendants are required to wear a uniform to work. The image then projected by this uniform is highly important; as well as, the way it makes them feel while wearing it. Unfortunately, the wearers' perception, satisfaction and preferences towards their uniforms are not always considered within the design process of creating these clothes. Studies, in this field, have demonstrated that there are two main sources of dissatisfaction of flight attendants own uniforms: fit and fabrics. The objective of this study is to evaluate the flight attendants visual concept preferences in the design of new uniforms. We used kansei ergonomics methodology to evaluate the perceptions of the potential uniform users regarding six new flight attendant uniform concepts. 103 female flight attendants from different airlines operating in Portugal answered a kansei questionnaire with 13 questions about each uniform concept. A factor analysis was applied to describe the underlying structure of the 13 variables, for each uniform concept. The results suggest that it should be considered between 2 or 3 factors for each concept. The factors with the highest eigenvalues were related with issues about Image/Look, Movement functionality, Identification and being Professional. The results relate the concepts with the suggested factors, according with what designers' envision or what the design projects demands; the designers can then redraw new uniform proposals closer to the preferred user factors. This paper demonstrates that kansei ergonomics can be a useful work methodology in the development of flight attendant uniforms in a user centered design perspective.

Keywords: *flight attendant uniform, kansei ergonomics, kansei engineering*

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1. INTRODUCTION

Flight attendants have a high degree of contact with passengers, and thus it is essential that they transmit a positive image about the airline they work for. Part of that image is passed on through the visual image represented by their uniform, as well as by the knowledge that they have about their company and by their own personal commitment. Every time flight attendants have their airline uniform on, they have to be careful about their posture, language and personal presentation; thus behaving accordingly to their condition and to their companies' image. The correct use of the uniform is constantly verified by their superiors, therefore, it is always important to keep it neat and tidy.

Despite the importance that uniform has for cabin crew personnel and for airline companies, it is verified that the uniform does not always correspond to the user's expectations, needs and limitations. This is primarily due to the designers' options and to design projects outcomes. One way to reduce the thinking differences from designers and users is to adopt a user-centered design approach (Helander and Khalid, 2005). The design of uniforms, in terms of human factors or an ergonomics perspective, means that the designer considers users' social, physical and psychological needs within the context of the design process (LaBat, 2006). User needs, added to forms, materials and details, form the base of uniform design. By combining these elements, the designer will be able to address comfort, security and performance to the user's needs and expectations.

The study by Haise and Rucker (2003) on flight attendant uniforms reveals that pants are the feature/component liked the most. Additionally, the two least liked features of the uniform were fabric and fitting of the jacket. Two additional previous research studies regarding the relationship between uniform clothing attributes and the level of satisfaction or dissatisfaction are one conducted by Feather, Ford and Herr (1996), and another by Wheat and Dickson (1999). Here, it is stated that the negative elements from the user's perspective were centered on cut and sizing, and that the elements that cause the most dissatisfaction were fit and color.

The satisfaction related to a uniform can be viewed into two different perspectives. One is from the user's perspective, and another from other people encountered by the user. Uniforms are usually selected by people that will not wear the uniforms themselves, like managers who make the decisions for their employees. Without the users' feedback, managers tend to focus on organizational goals such as the image that the uniforms will project, thus neglecting employees concerns including comfort and suitability for the tasks that they must perform (Haise and Rucker, 2003).

Here, we advocate that uniform design should involve the users, their limitations, experience, work environment, and preferences. For this matter, we recommend a user-centered design approach. The advantages of a user-centered design methodology is the result of a better understanding of the psychological, organizational, social and ergonomics that affect product's usage. The users' involvement in the design of a product guaranties that the product will be more adequate for its end use and for the situation environment. This methodology leads to the development of more effective, efficient, and safer products.

Thus, we used an ergonomic methodology for customer-oriented product development. More specifically, we used kansei ergonomics developed by Nagamachi, (2007). With this methodology, we will understand some flight attendants feelings in regards to their uniforms, which will then be translated into design elements. The knowledge of these aspects can make a difference in the construct of the uniforms, and on the feelings that users have by using them; thus increasing users' satisfaction, wellbeing and, in some cases, even performance.

This study intends to evaluate the flight attendants' visual concept preferences in the designing of new uniforms using kansei ergonomics from a perspective of user-centered design to support future uniform design teams with more productive strategies.

2. METHODOLOGY

We used the kansei ergonomics methodology to evaluate the visual feelings of the potential uniform users regarding six potential flight attendant uniform concepts. In order to follow kansei ergonomics application we performed 6 phases:

- Ergonomic analysis of the flight attendants activity.
- Collection of different flight attendant uniforms characteristics.
- Development of six new flight attendant uniform concepts.
- Definition of kansei questions and questionnaire construction.
- Questionnaire application.
- Information processing.

2.1. Ergonomic analysis of the flight attendants activity

We conducted an analysis of the relationship between flight attendants and their uniforms in real working conditions. We accompanied two cabin crews on two transatlantic flights from Lisbon (Portugal) to Recife (Brazil). During the observation, photographs and videos were taken of the several tasks that they had to perform on duty. Cabin crew flight attendants were also interviewed on issues related to their uniforms, needs, problems and suggestions. We interviewed 11 subjects, 45% female and 55% male, with the majority being between 20 and 30 years old within a non-chief position. The conclusions were set between two polar opposites; positive aspects and negative aspects of the uniforms. On the positive side, flight attendants included a desire for a bold design and young look for their uniforms, as well as fabric for their shirts. On the negative pole they mentioned the poor fabric of the suit, fitting of the shirts, lack of quality on the shoes and on the ties, and the colors of the aprons. Their responses were taken in account on the questionnaire development.

2.2. Collection of different flight attendant uniforms characteristics

For the kansei questionnaires we needed to have images, photographs or drawings of different uniform types for users' preferences analysis; therefore, we decided to collect different uniform types, from both past years and currently in use and, from different resources (including the internet, books and magazines) to understand their evolution and

differences. From this initial gathering of visual data, an expert panel of 3 designers and 2 ergonomists, sorted out groups of jackets, skirts, shorts and pants that could lead to several clothes combinations. On a second meeting, the group reduced the choices to a more manageable number of combinations for the kansei questionnaires. The selected combinations resulted in six concepts (see figure 1); these models were drawn on similar and simplified drawings for an easier comprehension.

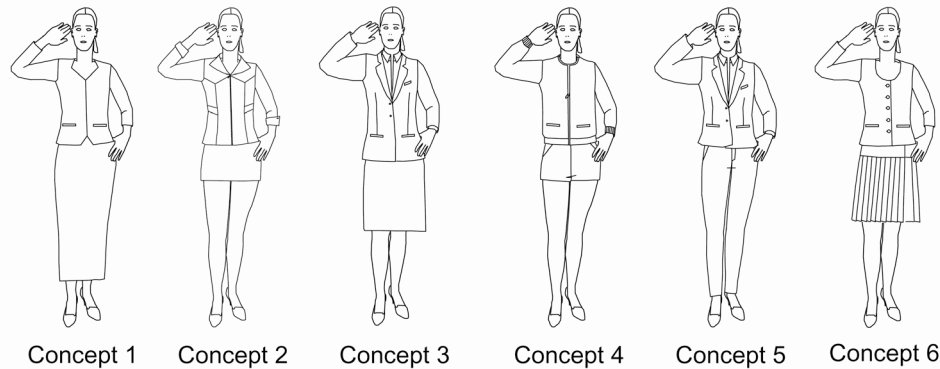


Figure 1: Six concept uniforms

2.3. Definition of kansei questions

For the definition of the kansei questions, we collected words and situations, with the consideration of ergonomic analysis and the flight attendant interviews, that may then help to characterize the uniforms. With the collaboration of 3 designers and 2 ergonomists, the selected information was reduced from 43 to 13 situations. For the questionnaires, we constructed 13 affirmations that convey how the user may feel when wearing each one of the concept uniforms, how each one of the concept uniforms may help them to perform their tasks, how others may respond to them when wearing each one of the concept uniforms, and how distinguishable they might be while wearing each one of the concept uniforms. Each answer had a seven point Likert type scale, the lowest value being one for strongly disagree and the highest value being seven, for strongly agree.

2.4. Questionnaire application

Every volunteer participant received a group of nine paper sheets, one for the questions, six with the concept uniform drawings, one for the responses, and one including the answer scale in order to make it possible to answer the questionnaire while looking directly at each drawing. Each subject then answered 13 questions about each uniform concept.

Respondents rated each concept on the 13 characteristics, using a seven point scale: Distinguish from passengers, Modern, Positive Attitude toward Me, Proud, Sophisticated, Fits My Body Dimensions, Help to Move Lower Body, Help to Move Upper Body, Positive Response from Passengers, Comfortable, Efficiency in My Work, Helps Me to Communicate, Distinguish from Other Companies. The concepts were presented in six random orders. Each participant took approximately 15 minutes to rate all the concepts.

2.5. Information processing

All subjects fully completed the questionnaires. The statistical analysis tasks comprised a factor analysis and it was made using SPSS software v.16.

3. RESULTS

The questionnaire was applied to 103 female flight attendants of different flight companies operating in Portugal. Their age average was 36 years old, distributed by four airline companies.

To verify if Exploratory Factor Analysis (EFA) was a suitable statistical technique to analyze the data, we used the Kaiser-Meyer-Olkin (KMO) measure of sample size adequacy and Bartlett's Test of sphericity to ascertain the existence of several substantial correlations (see Table 1). Sheskin (2007) states that KMO statistic should be 0.6, or greater (if this condition is not met, some variables should then be deleted before performing EFA). The minimum value of KMO statistic was 0.852, which means that the sample size is suitable for EFA for each uniform concept. Bartlett's Test has a p -value less than 0.001 showing that there are significant bivariate correlations between some of the variables. The results of both tests indicated that EFA is suitable to understand the relationship between the variables in our data.

Table 1: KMO by concept

		Concept 1	Concept 2	Concept 3	Concept 4	Concept 5	Concept 6
Kaiser-Meyer-Olkin		.893	.852	.880	.872	.887	.921
Bartlett's Test of Sphericity	Approx. Chi-Square	910.3	782.2	1101.0	814.6	1080.1	1197.0
	df	78	78	78	78	78	78
	Sig.	.000	.000	.000	.000	.000	.000

A factor analysis was then applied to describe the underlying structure of the 13 variables, for each uniform concept. The results suggest that between two or three factors should be considered for each concept (see Table 2).

Table 2: Factor analysis results by concept (extracted factors and the variables associated with the highest loadings)

Concept 1					
Factor 1		Factor 2		Factor 3	
Sophisticated	.827	Help to move upper body	.808	Distinguish from passengers	.830
Modern	.826			Distinguish from other companies	.795
Proud	.781				
Concept 2					
Factor 1		Factor 2		Factor 3	
Efficiency my work	.860	Sophisticated	.856	Distinguish from other companies	.851
Positive response from passengers	.829			Distinguish from passengers	.731
Concept 3					
Factor 1		Factor 2			
Help to move upper body	.845	Proud	.839		
Comfortable	.831	Modern	.834		
		Sophisticated	.811		
Concept 4					
Factor 1		Factor 2		Factor 3	
Proud	.875	Help to move upper body	.777	Distinguish from passengers	.837
Sophisticated	.841	Help to move lower body	.727	Distinguish from other companies	.758
Concept 5					
Factor 1		Factor 2		Factor 3	
Distinguish from passengers	.861	Sophisticated	.834	Help to move lower body	.844
Positive attitude toward me	.725	Modern	.770	Help to move upper body	.687
Positive response from passengers	.719	Proud	.738		
Concept 6					
Factor 1		Factor 2			
Help to move upper body	.841	Sophisticated	.916		
Help to move lower body	.785	Modern	.842		
		Proud	.824		

The factors with the highest eigenvalues were related to issues regarding Image/Look, Movement Functionality, Identification and Being Professional. The Image/Look aspect was present for all the six uniform concepts, while Movement Functionality appeared five times, Distinguishable emerges four times, and Professional was identified only once.

Table 3: Resume of factor analysis results

	Factor 1	Factor 2	Factor 3
Concept 1	Image/Look	Movement functionality	Distinguishable
Concept 2	Professional	Image/Look	Distinguishable
Concept 3	Movement functionality	Image/Look	
Concept 4	Image/Look	Movement functionality	Distinguishable
Concept 5	Distinguishable	Image/Look	Movement functionality
Concept 6	Image/Look	Movement functionality	

The results correlate the concepts to the suggested factors, according to what designers' envision or with what the design projects demands; the designers can then redraw new uniform proposals closer to preferred factors by keeping in mind the important aspects of the uniform concepts. For example, if movement functionality was an important factor for the users to have in the design of new uniforms, the concepts that better transmit these feelings are three visual concepts. These concepts are composed on the top by two different blazer lengths and a jacket; and on the bottom by trousers, knee length straight skirt and kilt; characteristics that could be used by designers in order to improve user response to potential uniform options.

4. CONCLUSIONS

On this study we evaluated the flight attendant visual concept preferences on six concepts for the design of new potential uniforms. The statistical analysis results suggest that we should consider between two or three factors for each concept. The factors with the highest eigenvalues were related with issues about Image/Look, Movement Functionality, Identification, and Being Professional. By valuing these characteristics, designers could then give a more appropriated response to users' preferences in the development process of flight attendant uniform projects.

This paper demonstrates that kansei ergonomics can be a useful work methodology within the realm of product development, with a user-centered design perspective. This then allows the integration of ergonomics within the design practice of different flight attendant uniform concepts. It is known that more opportunities for users' feedback may result in greater employee satisfaction. In conclusion these results can be useful, if integrated in an initial phase of the uniform design development.

Future work will involve the analysis of other uniform characteristics like fabrics and colors.

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