Developing a Missy Pants' Sizing System for Mass Production and Customization

1. Introduction

Missy is a major division that describes a size range as well as a type of styling in women's apparel. In general, Missy garments are styled for the mature woman's figure. Current mass production and customization trends force the apparel manufacturers to offer a range of selections for apparel items so that the customer can choose style and fit options. Over the decades, styles in Missy have noticeably changed in Missy with a lowered waistline placement and a curved hipline. Current sizing is not a guarantee of fit since sizing varies in brands and styles, and individuals have different body shapes. Thus, it is difficult for apparel manufacturers to set size ranges and grading rules to fit every figure.

Purpose of this study:
The purpose of this study is to reveal current Missy pants' sizing and fit problems and to provide a modified sizing system by applying a methodology of a quantile-to-quantile plot analysis with a fitted standard distribution.

2. Experimental Procedures

2.1 Data Collection

Female's size in Missy size ranges were selected from SizeUSA National Sizing Survey that was conducted by TCF between 2002 and 2003 in the United States.

* A total 1335 of 6310 females answered that they wear Missy sizes.

2.2 Data analysis procedure

Scenario I: When each consumer finds a pair of pants based on waist sizing systems.

Scenario II: When each consumer finds a pair of pants based on hip sizing systems.

2.3 Statistical analysis**

Mann-Whitney W test and t-test were used to determine whether or not there are significant differences between the means, variances, and/or medians of the populations from which the samples were taken by displaying data graphically in quantile-quantile plots.

3. Results and Discussions

3.1 Fit problem assessment with a current sizing system

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<th>Size</th>
<th>Waist</th>
<th>Hip</th>
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3.2 Quantile-to-quantile plot analysis of missy pants' sizing systems

Quantile-to-quantile (Q-Q) plot displays graphically the quantiles of one sample (ASTM size) versus the quantiles of the other (US female size). In the plot, the points are drawn for each observation of the US female sizes in the smaller sizes versus interpolated percentiles for the larger sizes. The two samples (US female size and ASTM size) come from the same underlying population, the points should lie approximately along the diagonal line. Points to the left of the line corresponds to the smaller sizes (size 2), while points to the right of the line corresponds to the larger sizes (size 20). Vertically lined points to the plot shows each size (=size 2, 4, 6, 8,10, 12, ... are located above the diagonal lines, the points (US female size) can not fit within the size ranges and the points should lie next larger sizes because the points were plotted after defining size ranges.

4. Conclusions

The methodology of quantile-to-quantile plots with database creation for finding fit scenarios was able to graphically prove fit problems with current sizing systems. The plot methodology can be used for fit assessment tool comparing with any sizing system. In the results, both waist and hip sizing systems could not be the best way to find a pants' fit for the missy figure type. When trying to find fit based on waist size, then, hips were below the fit line in smaller size ranges, and even more, hips were above the fit line in larger size ranges. In other words, a consumer who usually wears a small waist size tries on a pair of jeans fitting on waist, but the consumer might feel too low hip line on the jeans. If a consumer who usually wears over size 20 lines on a pair of jeans fitting on waist, but the consumer's hip could not fit in the jeans. Yet, when attempting to find fit based on the hip, then the waist sizes were above the fit line overall in all size categories. This indicates that neither hip sizes nor waist sizes is applicable for finding pants for a missy figure body type. Current missy pants sizing systems are far from a custom fit. Further studies should be done to modify current sizing systems for diverse consumers considering a demographic factor so that apparel companies could provide better quality of fit for mass customization.

**According to the Mann-Whitney W test results, there is a statistically significant difference between the means, variances, and/or medians of the populations at the 95% confidence level (P-value = 0.05). In addition, it has been concluded to determine whether the difference between the two means. The null hypothesis (H0: Mean of ASTM size = Mean of US female size) was rejected since the P-value was less than 0.05.