

Online Adaptive Clothing Shopping Experience: Text-mining of Product Titles and Consumer Reviews

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The demand for adaptive clothing is continuously increasing worldwide. According to the estimation of Coresight Research, the global adaptive apparel market will reach \$349.9 billion in 2023 (Coresight, 2019). However, when visiting the adaptive clothing retail stores, some consumers may face many issues (such as transportation, parking, and product accessibility) and as a result, resort to online shopping to get desired clothes (Rutledge, 2017). In the context of online shopping, without access to try on the clothing, consumers could only get information from the images, videos and product descriptions on the shopping websites. Hence, online searching plays an important role in consumer decision making process, but marketers are struggling with selecting appropriate and impressive keywords used in their product titles. Therefore, it is necessary to understand the needs of consumers when they shop online and how the online adaptive clothing retailers can enhance their online shopping experiences. This study aims to discover the current needs of adaptive clothing consumers and how consumers assess the adaptive clothing product in their comments.

In this paper, the functional, expressive, aesthetic (FEA) consumer needs model, proposed by Lamb and Kallal (1992) , was utilized to identify the special needs of adaptive clothing customers. According to FEA model, functional considerations relate to the utility of apparel, including protection, fit, and ease of movement. Expressive considerations deal with the symbolic and communicative aspects of apparel, while aesthetic consideration relate to the customers' desire of beauty. Researchers in fashion area have adopted this model to guide their product design and assess consumer needs(Jung, Lee, & Ahn, 2010). However, there are few studies focusing on the needs and wants of adaptive clothing customers in terms of online adaptive clothing shopping. Product titles indicate how marketers view consumers' needs, and reviews would reflect consumers' needs. In this research, FEA model could help us to understand these needs in a holistic perspective.

Table 1. target consumers of online adaptive clothing

Occurred times	Terms describe target consumers in product titles
More than 15 times	Arthritis, disabled, hospital patients
5-15 times	Alzheimer's, elderly, nursing home, Senior/seniors, disabled adults
Less than 5 times	disabled women/men, mature ladies, women/men wheelchair

To achieve the research goal, an adaptive clothing website, Silvert's, was chosen for its well-known adaptive clothing supply and abundance of consumer comments. 253 adaptive clothing product titles and 1060 customer reviews posted since 2014 October from Silvert's website were collected using web scraping with Python. To better understand how online marketers communicate needs and describe

their target consumers in product titles, the top n-grams frequencies (the sequence of n words) were identified, among which there are 142 unigrams, 89 bigrams and 68 trigrams. Only terms associated with needs and target consumers were selected and coded guided by the FEA theory. Then, a widely-used topic modeling algorithm, Latent Dirichlet Allocation (LDA) (Yu, Zhang, & Luo, 2010) was implemented to extract the topics from consumer reviews. The calibrated LDA model identified nine distinct topics discussed by the customers in their online reviews. The 5 most important keywords in each topic were presented and researchers summarized the topics based on these keywords. Finally, the needs indicated from consumers' perspectives were analyzed.

From the data analysis of product titles, "adaptive" occurred more than 140 times, showing that "adaptive" is the most prevailing used term in industry, consistent with the research result from McBee-Black and Ha-Brookshire (2019). Table 1 shows how online website describe their target consumers in product titles. Some disease names were utilized to indicate the features of target consumers, such as "Arthritis" and "Alzheimer's", while keywords such as "elderly" and "seniors" show the demographic feature of the consumers. "Disabled" and "hospital patients" implies that the clothing is for the consumers with limited mobility. There are 122 n-grams mentioned in product titles more than 4 times. Only 12 of them indicate the aesthetic of the clothing, such as "fashionable", "embroidered", "attractive" and "stylish". The rest of the high-frequency words are all related to the functional features and design of the clothing, for instance, "anti-strip", "snaps", "open backs", "front closure" and so on. Table 2 shows the nine main topics identified and summarized from customers' reviews. It can be observed that customers'

Table 2. topics of needs from consumers' reviews

Topic	words
Right size	Size, fit, right, large, small,
Ease for nursing	Easy, Mom, Home, Nursing, bought,
Mother gowns	Mother, Gowns, loves, idea, wonderful
Fit bra	Fit, Bra, wear, front, closure
Adaptive material	Material, adaptive, well, ease, cozy
Easy and comfortable	Comfortable, easy, soft, warm, snaps
Quality and service	Quality, service, arrived, delivered, quickly
Ease for Wheelchair	Easier, wheelchair, winter, care, needs
Attractive product	Product, gown, attractive, loves, colors

functional needs of clothing mainly include: appropriate fit/right size, ease of use, comfort (e.g. soft, warm), and adaptive material. Besides, the results suggest that consumers bought adaptive clothing mainly for nursing mothers and people using wheelchairs. In particular, gowns are regarded as ideal gifts for elderly mothers, and adaptive bras are popular because of the front-closure design. Consumers also show their interest to attractive and fashionable products with various colors. However, the needs for other aesthetic characteristics, such as style and silhouette, are not mentioned enough to be extracted. Similar to other online shopping experience, customers expect online marketers of adaptive clothing to provide quick service delivery and high-quality products.

This study explores the online adaptive clothing experience based on FEA model, through text mining of product titles and consumer reviews. The high-frequency words in current product titles reflected the target customers' profiles, customer needs from marketers' points of view. These words could ease the search process and provide more accurate search results for consumers. Meanwhile, the key words from 9 main topics of customer reviews provide implications how target consumers would like to describe themselves and their core needs. The finding suggests the functional needs are most important from both marketers' and consumers' perspective in adaptive clothing market. Online marketers mainly use functional words to introduce the products, while only few words are related to aesthetic. In customer reviews, 7 out of 9 main topics talk about the functions of adaptive clothing, one topic focuses on the general online shopping service, and one topic mentions the attractiveness of the product. The finding will also be beneficial for online adaptive clothing marketers to select appropriate words to make their product titles easily searched by consumers. For example, "Mom" and "Mother" might be a good substitute for "elderly women". For future research, data from other resources, such as social media, will be collected to further explore the online searching habits of adaptive clothing consumers.

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