



## Design Functions in Transformable Garments for Sustainability

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**Introduction/Significance.** The trends of fast fashion and overconsumption have brought negative influences on the environment, the economy, and society (Fletcher, 2008; Hawley, 2008; Hethorn & Ulasewicz, 2008). Consumers keep purchasing garments as their needs and wants change, and waste related to clothing and footwear consumption keeps increasing (Fletcher, 2008; The U.S. Environmental Protection Agency, 2012). Among many ways to encourage sustainability, transformable garments (which add a transformation phase to the regular clothing lifecycle) are expected to encourage consumers to be naturally involved in sustainable practices (Dombek-Keith & Loker, 2011; Loker, 2008). However, there is a lack of understanding about what design variety consumers value in their garments and what design functions need to be changed in their garments. This research uses a bottom-up approach to identify variability in garment design functions in people's wardrobes, and the variety in garment design functions people value in their garments. The main research question was what kind of changeable design functions people desire in transformable garments. The results of this study will help apparel designers develop garments that naturally lead consumers to adopt sustainable behaviors by transforming their garments to increase wear frequency rate.

**Literature review/Theoretical framework.** To understand possible changeable design functions for transformable garments, three aspects of the literature were reviewed: theoretical background for sustainability and design strategies, types of transformable garments, and clothing selection criteria and design elements. The defined candidates for changeable design functions were color/pattern, size/fit, silhouette, garment type, and design details. From the literature, an apparel designer's sustainable action model and conceptual framework for transformable garment were proposed.

**Methods.** Mixed-methods approaches were used: quantitative wardrobe variability assessment and qualitative follow-up personal interview. The population of this study was professional working women ages 20 to 40 years, who comprise almost 86% of all employed women in the United States (Bureau of Labor Statistics, 2011). The quantitative data was analyzed by means of descriptive analysis. About 900 garments of participants were investigated in-depth including more than 400 tops. The analysis was conducted in three layers: (a) the whole wardrobe; (b) selected garment type-tops; and (c) different garments sub-types within the "tops" category. There were eleven participants in the wardrobe database, and seven ( $M=27$ ,  $SD=3.34$ , range of 24-33) agreed to participate in the interview phase. The average percentage of tops was about a half of the whole wardrobe ( $M=50\%$ ,  $SD=14\%$ ,  $R=22-65\%$ ). If a top has more versatility, then it might replace many tops and have a longer garment life. Therefore, tops were selected as a potential candidate for the set of transformable garments. The total 41 interview questions covered the participants' demographics (4Q), perceptions of their wardrobes (17Q), and the

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perceived value of transformable garments (22Q). From the interviews, the transcribed texts were open- and color-coded, and themes were quantified within participants and across participants by using descriptive analyses.

**Result/Conclusion.** In considering candidates for changeable design functions, from the most to the least preferred were colors/patterns or sleeve length (100%); neckline shape, neckline depth, or collar type (86%); silhouette (70%); size/fit, sleeve fit and cuffs, or pockets (43%); and sleeve type or collar size (29%). Preferred changeable design functions were identified in detail such as preferred number of changeable options for each top type and suggested possible options for each changeable design functions for designers. Based on these results, the conceptual framework was modified to represent the interaction between transformable garments and consumers. Versatility was the most important reason for preferring specific changeable design functions. There were three expectations for transformable garments: functional (ease of matching, ease of layering, comfort, usability, ease of care, and durability), hedonic (fun and experimentation with various styles), and social (context aptness, and modesty). Participants responded that they would like to decrease the frequency of their garment purchases and the size of their wardrobes as a result of increasing the use of transformable tops. Designers can support this behavior by encouraging consumers to naturally consider versatile, transformable fashion while still satisfying their needs and wants. Design criteria for transformable garments were also suggested based on study results to help designers better understand consumer needs and wants when developing transformable garments. The aim of this study was to identify what changeable design functions people want to have in transformable garments. Transformable garments have the potential to introduce a paradigm shift in the clothing lifecycle and influence consumers to wear fewer pieces over longer periods of time and more frequently due to their ability to serve multiple needs.

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