



User-centered adaptive clothing collection: The conceptualization of a post-postmodern inclusive framework for adaptive apparel design (PPIF-AAD)

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Apparel product development requires consideration of many variables, especially in a post-postmodern age. Valuing inclusivity and gender fluidity is imperative in today's clothing market. Beyond the inclusion of underrepresented groups, the needs of disabled users must also be considered as clothing options for these individuals are limited. Current product development frameworks are inadequate for developing apparel that has a universal style, functions for persons with disabilities, and expresses the designer's artistic aesthetic. Thus, the purpose of this research was to conceptualize a new framework for apparel design and product development inclusive of these previously overlooked factors. This paper reviews and recontextualizes priorities expressed in past apparel product development frameworks to propose a post-postmodern inclusive framework for adaptive apparel design (PPIF-AAD). The reprioritization served as the basis for conceptualizing a ready-to-wear collection for LGBTQ+ individuals experiencing disability. This proposed framework contributes to the apparel discipline by addressing needs of this specialized user group through design solutions.

The post-postmodern epoch entails creating a global culture where individual identities transcend labels of national, geographic, cultural, historical, and sexual origin (Bourriaud, 2009). Reilly and Schofield conceptualized a framework for post-postmodern garment design based on post-postmodern theory (2020). Specifically, they aimed to “defy cultural and social conventions, resist rigid identities, and foster meaningful connections across disparate traditions” (Reilly & Schofield, 2020, p. 1). Lamb and Kallal situate consumer needs in their FEA model (1992). Throughout the entire process, the designer should be considering the functional, expressive, and aesthetic needs of the user (Lamb & Kallal, 1992). The functional needs include fit, mobility, comfort, protection, and donning/doffing; expressive needs include values, roles, status, and self-esteem; and aesthetic needs include art elements, design principles, and body/garment relationships (Lamb & Kallal, 1992). Carroll and Kincade explore an inclusive product development framework for women with disabilities (2007). Their method emphasizes “a) gathering information on user physical limitations b) gathering information on user clothing needs and preferences and (c) codesign process” (Carroll & Kincade, 2007, p. 301). In 2010, Carroll and Gross improved upon the 2007 model by grouping users' difficulties for more focused garment design. More recently developed frameworks consider a more comprehensive range of variables. Park developed an integrated process model for universal design (IPM-UD) for apparel design (2014). In this model, the seven principles of universal design- equitable in use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use- encompass Lamb and Kallal's (1992) FEA model (Park, 2014). Romeo and Lee examine micro-and macro-level forces that may affect the target customer's acceptance of apparel products in their Apparel Needs and Expectations

Model (2015). Factors such as the consumer's demographics and culture, political and economic climate, and consumer technology adoption are acknowledged to influence a consumer's likelihood of being within a company's target audience and, consequently, their likelihood to accept the company's product (Romeo & Lee, 2015). However, embodying a single product development framework to conceptualize a clothing collection for a very specialized group of individuals (i.e., those from the LGBTQ+ community that also experience a disability) was not effective. Reflection on post-postmodern theory principles and popularly utilized apparel product development frameworks led to the proposal of a new design approach.

Analysis of Bourriaud's (2009), Lamb and Kallal's (1992), Carroll and Kincade's (2007), Carroll and Gross' (2010), Park's (2014), and Romeo and Lee's (2015) tenets was performed to conceptualize and propose a post-postmodern inclusive framework for adaptive apparel design (PPIF-AAD). Briefly, this PPIF-ADD framework considered the functional needs of disabled individuals, utilized codesign methods, and took heed from universal design principles. This framework was then put into practice to conceptualize a clothing collection for the described user(s). Two LGBTQ+ participants (non-binary and pansexual) volunteered for inclusion in this design challenge. Participants were interviewed and questions were structured to address participants' functional, expressive, and aesthetic needs (Lamb & Kallal, 1992). To support the interview responses, an online survey was additionally disseminated, and 12 other disabled adults of varying ages and disability experiences provided data that informed the ideation phase of the collection development process. Abilities and difficulties with clothing were grouped for more focused design solutions. These included clothing difficulties due to wheelchair and orthotic use, need for easy donning and doffing, poor fine motor coordination, unusable pockets, and difficulty finding adaptive apparel for semi-formal occasions. After user data collection, the identified needs along with the designer's inspiration from architecture, amorphous shapes, and a reckoning of the global condition of 2020 was compounded. These elements contrasted more rigid, masculine shapes alongside more organic, feminine-associated shapes, representing blurred boundaries of identity and a shared global experience during 2020, a globally intense year of hardship. This referenced Bourriaud's discussion of global culture and consideration of the current political climate (Romeo & Lee, 2015). A dark, neutral toned color palette for its suitability for multiple genders, adult-age groups, and appropriateness for semi-formal occasion events was established. Original print designs of an optical illusory nature with purely geometric subject matter and line texture was created. These prints served to satisfy stated client aesthetic needs for large and small prints, and the negation of icons supported the androgynous, universal aesthetic. Apparel silhouette, textiles, and component features (specifically those that would assist with easy donning/doffing) were ideated and selected alongside the study participants utilizing a co-design approach (Carroll and Kincade, 2007).

Design assessment concluded that utilizing the proposed PPIF-AAD framework led to the development of a clothing collection that met expectations of individuals who are desiring inclusivity, particularly involving gender identity, as well as those who need functional clothing that addresses adaptive needs. These considerations are outlined in the PPIF-ADD framework and may be employed by other designers to conceptualize clothing solutions for a variety of user needs in the post-postmodern age.

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