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DESIGNING WITHOUT DIALOGUE: AN EXPLORATORY CASE STUDY OF THE DESIGN-PRODUCTION INTERFACE IN LAHORE (PAKISTAN) APPAREL SMES INTEGRATING DYNAMIC CAPABILITIES AND HUMAN-CENTERED DESIGN FOR INCLUSIVE ACTIVEWEAR INNOVATION

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Abstract
Apparel small and medium enterprises (SMEs) in emerging economies frequently face market saturation due to reliance on fast fashion replication of Western silhouettes. Currently niche domestic demographic such as Active Aging Women (AAW) aged 55 and above remain structurally underserved. This qualitative exploratory study investigates the alignment between consumer needs and product development routine within a Lahore based apparel SME. Drawing on Teece's Dynamic Capabilities Framework (Sensing, Seizing, Transforming) and Human-Centered Design (HCD) principles, we analyze in depth interviews with ten active aging female consumers and a key brand holder.
The finding illustrates a structural disconnect, while AAW experience distinct physiological, thermoregulatory, and functional modesty challenges, the case SME relies on passive store sales data and copycat designs, operating under the assumptions that and absence of product returns signifies customer satisfaction. Strict local "NO Return/Exchange" policies suppress post purchase feedback. Based on these insight, we present the Human Centered Design Management Model (HCDMM) as a conceptual framework and multi-phase research road map to guide future empirical validation and managerial implementation in apparel management.

1. INTRODUCTION

The global activewear market continues to expand rapidly, driven by growing participation in physical wellness across diverse demographic segments (Grand View research 2023). Industry analysis describes women's activewear as a growing global market, with the Asia Pacific region identified as the fastest growing (Mordor intelligence, 2026). However, in developing apparel manufacturing hubs such as Pakistan, domestic product development remains largely supply-driven (Memoni et al., 2020). Such reports are commercial estimates, they do not show which groups of women are designed for. Academic work has synthesized trends and drivers in women's activewear (O'Sullivan et al., 2017). Apparel Small and Medium Enterprises (SMEs) frequently rely on contract manufacturing or fast fashion imitation, replicating Western athletic silhouettes characterized by tight compression, synthetic fabrications, and revealing cuts without adapting them to local anthropometric, thermo-physiological, or socio-cultural needs (Jacobs & Subramanian, 2012).

The strategic disconnect is evident among Active Aging Women, women aged 55 and above who participate in regular low to moderate physical activities such as yoga, brisk walking, muscles building and mobility exercises. Research on older women's clothing indicates that ageing is

accompanied by changes in body shape that affect clothing choice and satisfaction (Rahman & Yu, 2018; Chang et al., 2022). Older adults' motivation to exercise involves social and psychological factors such as inclusion and competence (Tsai et al., 2022), and the portrayal of older people in advertising has been reviewed (Eisend, 2022). Furthermore, in south Asia socio cultural contexts, preferences for functional modesty often dictate apparel choices during public or semi-public exercise (Hassan & Shah, 2019). because local apparel firms prioritize standard youth centric sizing, AAW struggle to find suitable activewear in the domestic retail market.

This study explores the internal and external mechanism contributing to this market gap. Specifically, it addresses the following research question:

How do product development routines within an apparel SME align with or disconnect from the functional and socio-cultural activewear requirements of active aging female consumers?

2. Literature Review

Regular physical activity is essential for supporting cardiovascular health, mobility, psychological well-being, and independence among women aged 50 and above. However, participation in physical activities is closely linked to the availability of suitable clothing that accommodates their changing bodily needs, comfort requirements, and activity contexts. Therefore, activewear research should investigate the design preferences, functional requirements, and lived experiences of older women to inform the development of inclusive and user centered activewear solutions. (O' Sullivan et al. 2017) Industry and academic research have largely overlooked the transition of Active Aging Women (AAW) from organized sports to lifestyle integrated physical activity. Limited attention has been given to how changing activity patterns, aging trajectories, and menopause related physiological changes shape activewear preferences. Hot flashes, night sweets, thermoregulatory disruptions, body fate redistribution, and changes in muscular support creates specific requirements for comfort, fit, mobility and moisture management. This highlights the need for age inclusive, user centered activewear designs that addresses both the bodily challenges and the social meanings of physical activity in later life. (Luo et al., 2020).

Recent research indicates that conventional ready to wear sizing and design systems remain insufficiently responsive to variations in women's body shapes, particularly those associated with aging. These limitations extend beyond size and fit to include age responsive design considerations, movement support, and mobility related comfort. (Chung et al., 2024) Qualitative research indicates that older women' participation in physical activity in influenced by their desire of inclusion, a sense of competence, and meaningful social connection within active lifestyles. (Tsai et al., 2022). Together these findings suggest that activewear should be conceptualized not merely as performance-oriented apparel but also as lifestyle clothing that promotes comfort, confidence, and functional empowerment among active aging women (AAW).

Research has shown that the underrepresentation of Active Aging Women in activewear marketing contributes to both physical and motivational barriers to staying active. (Wallbank et al., 2022; Palombi et al., 2025). Recent research indicates that older women prefer realistic, age-appropriate portrayals and often reject stereotypical or overly youthful imagery which reduces the effectiveness of conventional brand messaging. (Elsend, 2022). The absence of representation can deteriorate AAW apprehension about appearance and confidence in active social setup. (Tsai et al., 2022). No study has directly compared the activewear needs of younger women with those of women aged 50 or older. (Chang et al., 2022). Older women tend to prioritize comfort, modesty, functionality, and adaptability over other factors.

3. Theoretical Framework

3.1 Macro Level: Dynamic Capabilities Framework

Teece's (2007, p. 1319) Dynamic Capabilities Framework posits that enterprise success in dynamic environments depends on an organization's capacity to *"sense and shape opportunities and threats, seize opportunities, and maintain competitiveness through enhancing, combining, protecting, and, if necessary, reallocating the*

business enterprise's intangible and tangible assets." These capabilities operate across three distinct clusters:

- **Sensing:** Identification of customer needs, technological opportunities, and market shifts.
- **Seizing:** Mobilization of organizational resources, product structures, and business models to capture value.
- **Transforming (Reconfiguring):** Realignment of organizational assets and operational routines to sustain long-term fit.

While the framework offers high-level strategic guidance, it lacks specific micro-foundational tools for operationalizing user empathy within creative product development workflows (Teece, 2018).

3.2 Micro level: Human-Centered Design (HCD)

Human-Centered Design (Norman, 2013) provides an iterative, human-focused problem-solving methodology that complements dynamic capability clusters. HCD prioritizes deep user empathy, rapid prototyping, and contextual feedback through an iterative cycle: *Observation, Ideation, Prototyping, and Testing* (Norman, 2013). By positioning HCD tools as operational micro-foundations within Teece's strategic pillars, apparel firms can build structured routines for user-centric innovation:

- **Sensing Micro-Foundations:** User journey mapping, empathetic interviewing, and observational field studies.
- **Seizing Micro-Foundations:** Ergonomic pattern adjustments, hybrid material selection, and 3D virtual prototyping.
- **Transforming Micro-Foundations:** Wear-trial assessments, post-purchase feedback loops, and master-pattern updating.

4. Conceptual Background

4.1 Aging Bodies and Activewear

Fit, support, ease of movement and moisture management recur in research on older women's clothing (Rahman & Yu, 2018; Chang et al., 2022).

4.2 Participation, Identity & Representation

Older women's participation in exercise has been linked to inclusion, competence and social connection (Tsai et al., 2022). Representation in marketing is a related concern (Eisend, 2022).

4.3 Modesty, Climate & Local Context

significant barrier to physical activity for young Muslim women is the lack of culturally compliant, modest athletic wear. Traditional or standardized sports uniforms often cause severe socio-cultural discomfort, leading to low engagement or total withdrawal from physical education and sports activities (Ahmed & Lawrence, 2021). Furthermore, the fear of inappropriate bodily exposure alongside a global scarcity of high-performance modest activewear acts as a structural deterrent rather than a mere inconvenience (Afrouz & Crisp, 2022).

4.4 Designing for a Defined User Group, & Small Firm Practice

Apparel design for a specific group is commonly organized around functional, expressive, and aesthetic needs (Lamb & Kallal, 1992). Human-centered design directs attention to people's experience in their context of use through an iterative cycle of observation, ideation, prototyping, and testing (Norman, 2013). The dynamic capabilities perspective describes a firm's ability to sense opportunities, seize them, and reconfigure its resources (Teece, 2007).

4.5 Conceptual Lens, objective & Research Questions

Table 1. Conceptual lens applied to the study

Domain	Covers in this study
Functional	Thermal comfort, fit, ease of movement
Expressive	Modesty, coverage, age-appropriate self-presentation
Aesthetic	Color and appearance
Market and process context (human-centered design lens)	Availability of suitable garments, being asked, feedback

5. Research problem Statement:

How can a local activewear SME construct organizational dynamic capabilities by embedding Human Centered design principles into their product development routines to bridge the gap between local user needs and responsive product innovation?

6. Research Objectives:

To address this research problem, the study pursues following research objectives:

1: To investigate how a local activewear SME currently sense and capture local end user knowledge, identifying operational barriers withing existing product development pipelines.

2: To explore the physiological ergonomics, thermos physiological, and socio-cultural modesty requirements of Active Aging women (AAW).

3: To construct a contextually grounded HCD management Model that offers local SME apparel enterprises a diagnostic roadmap for building user centered dynamic capabilities.

7. Research questions:

1. (Sensing) How do Local apparel SME currently scan, capture and interpret local end knowledge regarding the physiological, ergonomics, and socio-cultural modesty requirements of AAW?
2. (Sensing Barriers + Seizing) What/how organizational and operational barriers prevent activewear manufacturer from identifying the unarticulated consumer needs during the problem definition phase?
3. (Prototyping/co design) In what ways prototyping deployed to evaluate functional and symbolic activewear attributes before commercial production?
4. (Transforming feedback) How is post market customer feedback systematically processed and fed back into relevant technical department?

8. Methodology

8.1 Research Design

This study uses a qualitative, exploratory single-case design (Yin, 2018) combined with consumer inquiry. The approach provides an in-depth understanding of participants' experiences and firm-level product development practices (Miles et al., 2014).

8.2 Participants Selection & Data Collection

Data were gathered through semi-structured interviews across two participant groups:

- **Active Aging Women Consumers (n = 10):** Women aged 55 and above residing in Johar Town Area, Lahore, Pakistan, who engage in physical exercise on regular basis. Participants were recruited via purposive sampling and snowball technique.
- **Apparel SME Case Firm (n = 1):** A brand owner/manager of a Lahore-based apparel SME producing domestic activewear and casual wear.

Sample adequacy for the consumer group was evaluated using Malterud et al.'s (2016) Information Power model. Given the focused aim (exploratory study of AAW activewear needs), specific participant criteria (women 55+ engaged

in regular exercise), and rich dialogue quality, ten consumer interviews provided sufficient information power to achieve thematic saturation for an exploratory inquiry.

8.3 Data Analysis

Recruitment used purposive and snowball sampling. The initial plan was 14–20 women; the final sample was ten. Interview were taken in local Urdu language keeping the informed consent approval ethics and professional trustworthiness procedures align. Transcripts were coded inductively to identify recurring empirical patterns across consumer experiences, which were subsequently mapped deductively against Teece's dynamic capability clusters. The sample was considered using information power (Malterud et al., 2016): a narrow aim and a specific sample can support a smaller sample, while the quality of dialogue and the analysis strategy also matter.

8.4 Empirical Findings and Discussion

Table 1: Strategic & Operational Disconnect Across Dynamic Capability Clusters

Capability Cluster	Consumer Realities & Unmet Needs (n = 10)	Case SME Operational Routines (n = 1)
Sensing	• Need for high-cotton, breathable blends to manage thermal spikes. • Difficulty finding hip-covering, loose-fit silhouettes.	• Heavy reliance on fast-fashion copying of Western activewear styles. • Primary reliance on passive store sales data rather than user research.
Seizing	• Substitution of commercial activewear with oversized menswear. • Wrapping heavy shawls/dupattas over fitted activewear during workouts.	• Standard youth-centric sizing templates without ergonomic adjustability. • Superficial style adjustments without altering underlying pattern blocks.
Transforming	• Unexpressed dissatisfaction due to local "No Return/Exchange" policies. • Permanent brand switching or complete abandonment of commercial activewear.	• Assumption that zero product returns equal high customer satisfaction. • Absence of structured wear-trial feedback integration mechanisms.

8.5 Sensing Capabilities: Unarticulated Physiological & Modesty Needs

The consumer interviews revealed significant physical and thermoregulatory challenges during exercise. Synthetic, non-breathable fabrics commonly used in the commercial activewear trap heat and cause skin irritation during post-menopausal thermal spikes. Consequently, respondents preferred high cotton natural blend fabrics.

In addition, functional modesty was identified as a key factor influencing product usability. Participants noted that tight fitting athletic wear felt uncomfortable in semipublic exercise spaces (e.g., public parks or neighborhood walking tracks). To compensate, several respondents reported wrapping heavy cotton shawls, or dupattas over fitted gym wear, a practice that restrict arm movement and retains unwanted heat. Others reported purchasing oversized clothing from male activewear sections to secure a loose fit and longer garments lengths.

Conversely, interviews with the case SME revealed a complete reliance on fast fashion copying and passive store sales data. The firm does not conduct structured user research, focus groups, or anthropometric assessments for nonstandard body types.

8.6 Seizing Capabilities: The Pattern Block Rigidity

When evaluating product fit, participants highlighted restrictive armhole, narrow waistbands, and tight thigh cuts that limited joints movement during yoga or stretching exercises. Despite these clear user requirements, the case SME relies on standardized youth centric pattern blocks. Rather than re-engineering pattern architecture for aging body contours, the SME makes superficial changes, such as slightly extended shirt lengths, without adjusting sleeves ease, armhole depth, or waistline compression.

8.7 Transforming Capabilities: The feedback Vacuum

A critical finding involves the post purchase feedback mechanism. The brand stakeholder noted that low return rates were interpreted internally as indicative of product success and customer satisfaction. However, consumer interviews revealed that dissatisfaction rarely resulted in formal returns. Due to standard local retail policies that strictly enforce "no return/no exchange" on activewear, consumer accept the loss, adapt the garments informally, or permanently switch to alternative solutions (e.g., local tailor or menswear). This operational discount creates a total breakdown in consumer brand dialogue.

8.8 Proposed Conceptual Framework HCDMM

Based on these exploratory insights and theoretical synthesis, we proposed the Human Centered Design Management Model (HCDMM) as a conceptual framework for future empirical testing and validation

Table 2: Proposed Human Centered Design Management Model (HCDMM) Propositions

Capability Phase	HCD Micro-Foundational Tools	Proposed Operational Propositions
Sensing	• Empathetic Body Mapping • Contextual Observation • Co-Design Focus Groups	P1: Integrating structured user interviews and body-mapping routines enhances an SME's ability to identify unarticulated physiological and modesty needs.
Seizing	• Ergonomic Pattern Engineering • Hybrid Material Sourcing • Functional Modesty Prototyping	P2: Utilizing adaptive pattern grading and 3D virtual prototyping reduces sample iteration costs while improving garment fit for non-standard body types.
Transforming	• Structured Field Wear-Testing • Technical Feedback Auditing • Master Pattern Block Iteration	P3: Establishing systematic post-purchase feedback channels enables continuous master-pattern block refinement and reduces long-term customer churn.

8.9 Strategic Implications for Design & Business

Table 3: discipline Specific Strategic Implications

Discipline Matrix	Managerial & Design Implications
Fashion & Apparel Design	• Re-engineering pattern blocks to accommodate age-related bodily changes and dynamic movement ease rather than relying solely on aesthetic scaling. • Developing hybrid silhouettes that incorporate functional modesty features (e.g., adjustable lengths, non-clingy drape) without sacrificing utility.
Textile Engineering	• Sourcing and testing hybrid fabric constructions (e.g., cotton-modal-elastane blends) that provide thermoregulation, soft hand-feel, and breathability.
Design Management	• Reorganizing internal linear workflows into iterative, cross-functional loops that connect retail customer feedback directly to pattern makers.
Business Strategy	• Differentiating domestic SMEs from low-cost fast-fashion competitors by targeting underserved, highly loyal demographic niches.

9. Limitations & Future Research Agenda

Study Limitations

SME level insights were gathered from a single brand stakeholder (n=1) which is Lahore based. These observations serve as exploratory insights rather then sector wide generalizations for all Pakistan apparel SMEs.

Qualitative Sampe Boundaries

The consumer sample (n=10) was restricted to urban women in Lahore. Regional variation in modesty preferences and workout environments across Pakistan requires broader investigation.

Conceptual Nature of HCDMM

The proposed model remains a conceptual framework that requires empirical implementation, testing and validation across multiple production environments.

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