An Analysis of India's Homegrown Adaptive Apparel Brands with special reference to their Digital Presence and its Accessibility.

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***Abstract*—India's apparel industry is witnessing an unprecedented paradigm shift from standardized mass production toward inclusive, human-centric design, driven by increasing awareness of the needs of elderly citizens and Persons with Disabilities (PwDs). A new wave of homegrown brands is revolutionizing the concept of "Dignity in Dressing" by blending functional fashion with traditional aesthetics. However, while the garments themselves are becoming more inclusive, the digital pathways used to discover, evaluate, and acquire them often remain deeply restrictive. This study provides a comprehensive analysis of India's homegrown adaptive apparel brands Zyenika, Haxor, and Aaraam Se with a specific focus on the maturity and reach of their digital presence. The research maps each brand's ecosystem across three interconnected dimensions: (1) platform architecture and e-commerce infrastructure, (2) social media and shadow-commerce channels, and (3) technical compliance with Web Content Accessibility Guidelines (WCAG 2.1). The study identifies a pervasive "Accessibility Irony" wherein inclusive physical products are marketed through exclusive or non-compliant digital storefronts. Through a WAVE-based technical audit supplemented by competitor benchmarking, the paper evaluates the "Shadow Presence" phenomenon the sector's heavy reliance on informal channels such as WhatsApp and Instagram and assesses its implications for reach, trust, and autonomy within the geriatric and disabled communities in India.**

***Index Terms*—Adaptive Apparel, Digital Accessibility, Functional Fashion, Homegrown Indian Brands, WCAG Compliance, Web Accessibility Audit.**

I. INTRODUCTION

The contemporary fashion landscape is undergoing a radical transformation as the industry moves away from the "standardized body" myth toward a philosophy of universal inclusivity. In India, the rapid growth of the adaptive apparel market is inextricably linked to the country's e-commerce trajectory. A critical disconnect persists: while a garment may be engineered for physical ease of use, the digital ecosystem used to promote and sell it often remains a site of exclusion. This study analyses the digital presence of India's homegrown adaptive brands their platform maturity, social media strategy, shadow-commerce patterns, and WCAG compliance to assess how effectively these brands reach the very community they aim to empower.

A. The Paradigm Shift: From Conformity to Inclusivity

For decades, global fashion was governed by a standardized aesthetic that prioritized specific physical abilities. The emergence of Universal Design has shifted this focus toward the "freedom of the user." This shift is particularly vital in India, where the apparel market is projected to reach ₹11.29 lakh crore by late 2026. This growth is fuelled by a rising demand for "Functional Fashion" catering to the 2.21% of the Indian population living with disabilities and an ageing geriatric cohort that increasingly demands style alongside utility. Adaptive clothing has thus evolved from a niche medical necessity into a fundamental right to self-expression and autonomy.

B. The Homegrown Revolution: Innovation with Empathy

Unlike Western markets dominated by conglomerates such as Tommy Hilfiger or Nike, India's adaptive sector is powered by socially entrepreneurial homegrown brands. Leaders such as Zyenika, Haxor,

and Aaraam Se are uniquely positioned to bridge the "Cultural Gap" by re-engineering traditional silhouettes Sarees, Kurtas, and Dhotis with functional adaptive elements.

- Zyenika remains a pioneer in "no-bend" and magnetic-closure garments designed for high mobility impairment.
- Haxor has scaled significantly, processing over 10,000 monthly orders by mid-2025 and launching the "Chairman's Club" to move adaptive fashion away from clinical aesthetics.
- Aaraam Se focuses on bespoke, craft-heavy solutions that maintain the tactile heritage of Indian textiles while ensuring ease of access for caregivers.

C. The Digital Irony: Barriers in the Virtual Storefront

Despite these physical advancements, a "Digital Irony" persists. As the Indian ecommerce market scales toward a projected ₹5.23 lakh crore by 2030, the digital divide remains a second layer of segregation. Recent data suggests that over 96% of e-commerce homepages fail basic WCAG 2.1 standards, featuring low-contrast text or missing ARIA labels. For a user with Parkinson's, a magnetic shirt is useless if the website's checkout process is not keyboard-navigable. Equally, for a brand operating primarily through WhatsApp DMs, its discoverability and the autonomy of its customers is severely constrained. This lack of digital inclusivity creates a paradoxical barrier where the process of acquiring inclusive clothing remains an exclusive experience.

1.1 Research Questions

1. How do Indian homegrown adaptive apparel brand's structure their digital presence across formal e-commerce platforms versus informal "Shadow Commerce" channels (WhatsApp, Instagram DM)?
2. To what degree does the absence of condition-based navigation and filtering on brand websites limit the discoverability of products for PwDs and caregivers?
3. What is the current relationship between the lack of inclusive imagery (representation of PwDs and elderly users) on brand websites and perceived brand credibility within the disability community?
4. How effectively do these brands communicate the technical benefits of specific adaptive features through digital media and product storytelling?
5. Based on WCAG 2.1 guidelines, what are the primary technical barriers preventing visually impaired users from independently navigating Indian adaptive e-commerce sites?
6. How does the reliance on "Shadow Commerce" (WhatsApp/Instagram sales) impact the accessibility, reach, and purchase autonomy of the geriatric and disabled populations in India?
7. How do brands like Zyenika and Haxor leverage social media and digital storytelling to build brand identity and differentiate adaptive fashion from medical or hospital wear?
8. What factors contribute to the gap between high digital awareness and low purchase conversion for adaptive wear in urban Indian markets?
9. How do pricing strategies and "perceived value" conveyed on homegrown digital storefronts differ from conventional Indian retail benchmarks, and how does this affect brand trust online?
10. How can Indian adaptive brands transition from a prototype-driven niche to a scalable digital standard through improved platform architecture and inclusive design?

1.2 Objectives

1. To analyse and compare the digital presence of India's leading homegrown adaptive apparel brands across websites, social media, and online commerce platforms.
2. To evaluate the accessibility and compliance of brand digital storefronts using WCAG 2.1 standards and WAVE-based assessment.
3. To identify key digital gaps in navigation, representation, and product communication that influence consumer trust and purchase decisions.

1.3 Hypothesis

1. Brands relying primarily on Shadow Commerce channels exhibit lower digital maturity and accessibility than those with dedicated ecommerce platforms.
2. The absence of condition-based navigation and inclusive representation reduces purchase confidence among PwDs and caregivers.
3. As adaptive apparel brands scale commercially, digital accessibility tends to decline, reflecting a Scale–Inclusivity Paradox.

II. LITERATURE REVIEW

The emergence of homegrown adaptive fashion in India is characterized by a "deeply personal and community-driven" mission, moving the sector from clinical utility toward design-forward identity. The following three brands represent the vanguard of this movement, each occupying a distinct position in the digital landscape.

A. Zyenika (The Pioneer of Autonomy)

Zyenika, founded by Soumita Basu and Amita Roychowdhury, serves as a primary case study for "Independence-Led Design." Basu's own experience losing 80% of her mobility to arthritis informed the brand's pivot from standardised silhouettes to "no-bend" engineering. On the digital front, Zyenika operates a dedicated e-commerce website supplemented by an Instagram presence. The brand's digital narrative is built around the founder's personal story, lending authenticity to its product claims.

Figure 1 Zyenika's Logo

- Design Philosophy: Focused on "Self-Dressing" and high-mobility impairment, with independence as the core value proposition.
- Product Catalog: Signature items include "no-bend" trousers, wrap-around sarees, and open-sleeve kurtas, using magnetic closures, long-pull zippers, and Velcro.
- Pricing Strategy: Mid-Premium range of ₹1,800 to ₹4,500, reflecting specialised hardware and construction.
- Digital Presence: Maintains a dedicated website with an accessibility widget (Texthelp toolbar). Digital storytelling is text-heavy, with limited video demonstration of product mechanics. Social media supplements but does not replace the website as the primary purchase channel.

Figure 2 Zyenika's Website Homepage

Figure 3 Zyenika's Product Page

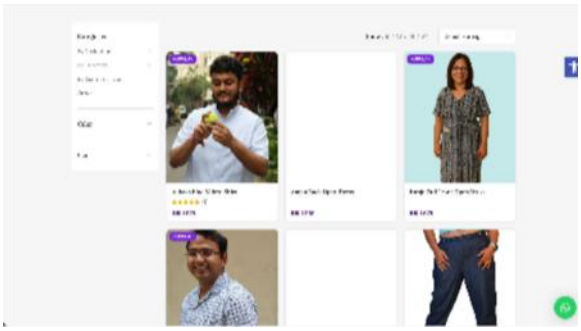

Figure 4 Zyenika Website Items Page

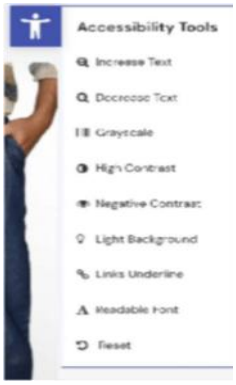

Figure 5 Website Accessibility tools

B. Haxor (The Lifestyle Modernist)

Based in Delhi and founded by Kkanchan Kkhushi Gupta, Haxor represents the "Lifestyle-Centric" shift in the Indian silver economy. By mid-2025, the brand

had processed over 10,000 orders, signaling a successful move into mainstream eldercare [7].

Figure 6 Haxor Logo

- Design Philosophy: "Lifestyle over Medicalization." Haxor explicitly attempts to remove clinical stigma, positioning its products as trendy, mainstream fashion for the "Silver Economy" and wheelchair users.
- Product Catalog: The "Chairman's Club" line features bold printed shirts and chinos with side-zip openings. Functional trims incorporate side-zips for catheter access and bio-wash cotton for skin sensitivity.
- Pricing Strategy: Competitive-Mass Market. By scaling operations, they maintain a price point of ₹900 to ₹2,500, making them highly accessible to the middle class.
- Visual Branding & UX: Vibrant, lifestyle-oriented photography featuring active elderly models. Its digital layout is modern but still lacks condition-based filtering infrastructure.

Figure 7.1 Haxor Website Homepage

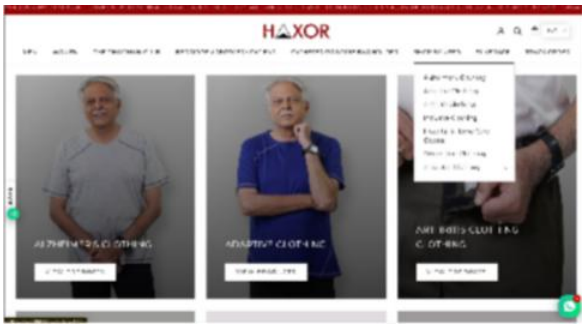

Figure 7.2 Haxor Website Homepage

Figure 8 Haxor Product Page

Figure 9 Haxor Items Page

C. Aaraam Se (The Cultural Traditionalist)

An Indian brand filling the "Socio-Cultural Void" created when PwDs or the elderly are forced to swap traditional ethnic wear for hospital gowns or Western-style adaptive apparel.

Figure 10 Aaraam Se's Logo

- Design Philosophy: "Socio-Cultural Continuity." The brand ensures that individuals do not have to abandon traditional Indian identity (Sarees/Kurtas) for functional comfort.
- Product Catalog: Signature items include pre-pleated sarees, snap-button kurtas, and adaptive dhotis engineered with soft snap buttons and hidden Velcro panels.
- Pricing Strategy: Bespoke/Variable. Due to custom-tailoring and heritage fabrics, pricing is project-based or premium-targeted.
- Visual Branding & UX: Soft, empathetic imagery focused on the caregiver-patient relationship. It exhibits a low digital framework maturity, relying heavily on a "Shadow Presence" (WhatsApp/Instagram), which introduces friction for users with visual or motor impairments.

Figure 11 Aaraam Se's Website Homepage

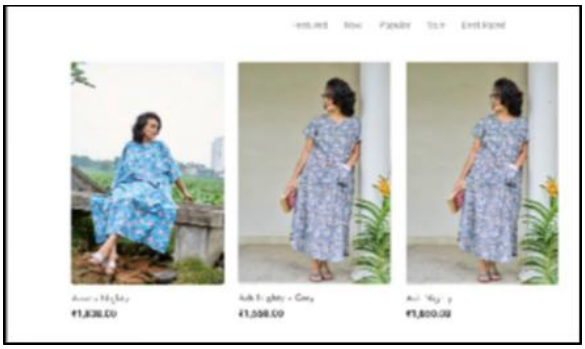
Figure 12 Aaraam Se's Items Page

Figure 13 Aaraam Se's Product Page

III. ANALYSIS OF DIGITAL GAPS AND ECONOMIC RESTRAINTS

A. Platform Architecture and E-Commerce Infrastructure

A comparative analysis of the three brands' digital architectures reveals a significant disparity in platform maturity. Zyenika and Haxor maintain dedicated storefronts capable of processing independent transactions, whereas Aaraam Se's website functions primarily as a catalogue, with the majority of sales flowing through informal channels.

B. The Shadow Commerce Phenomenon

All three brands exhibit some degree of "Shadow Commerce" the practice of conducting sales through informal, non-transactional digital channels such as WhatsApp conversations and Instagram DMs. While this approach offers a degree of personalized service, it fundamentally undermines purchase autonomy for the brand's target demographic. For a visually impaired user relying on a screen reader, or an elderly user with limited motor dexterity, navigating a WhatsApp conversation to complete a purchase is significantly more burdensome than using a well-structured, accessible e-commerce checkout. Shadow commerce also limits brand discoverability through search engines, restricts the availability of formal product specifications, and exposes transaction data to privacy risks.

C. Social Media Strategy and Digital Storytelling

Social media platforms particularly Instagram serve as the primary brand-building channels for all three brands. However, their approaches differ significantly. Haxor's lifestyle-oriented photography featuring active elderly models effectively de-medicalises adaptive wear and broadens its aspirational appeal. Zyenika's digital narrative leans on the founder's personal story of arthritis and recovery, building authenticity and emotional connection. Aaraam Se's social presence is empathetic but operationally over-stretched, as it must function simultaneously as a brand channel, a product catalogue, and a customer service interface.

D. Economic and Social Restraints on Digital Investment

The adoption of advanced digital infrastructure remains hindered by a "Price-Access Gap." Adaptive garments typically cost 20-30% more than regular apparel due to low-volume production and specialised hardware. The resulting thin margins make significant investment in WCAG-compliant website development, AI-powered sizing tools, or video production challenging for small, socially entrepreneurial brands. Studies show that while consumer recommendation metrics are high, actual purchase conversions lag due to high digital friction and lack of localised trial channels.

This creates a self-reinforcing cycle: inadequate digital investment limits reach and conversion, which limits revenue, which limits digital investment.

Table 1.1 Brand Benchmarking

Feature	Zyenika	Haxor	Aaraam Se
Primary USP	Independe nt Self-Dressing	Trendy Lifestyle Apparel	Traditional Indian Aesthetics
Key Mechanism	Magnetic Closures	Side-Zips & Bio-wash	Snap Buttons & Pre-pleating
Pricing Tier	Mid-Premium (₹1.8k - ₹4.5k)	Mass-Market (₹0.9k - ₹2.5k)	Bespoke / Custom
Digital Maturity	Moderate (Site-based)	High (Scalable E-comm)	Low (WhatsApp/Social-based)
UX Focus	Functional Clarity	Visual Style	Emotional Comfort

IV. PROBLEM STATEMENT

Despite the Indian adaptive apparel market projecting toward ₹11.29 lakh crore by 2026, a critical "Accessibility Irony" persists within the digital ecosystem. Homegrown brands excel in physical garment engineering, but their digital storefronts remain non-compliant with international accessibility criteria. Recent data indicates Indian e-commerce homepages perform poorly in digital inclusivity, averaging 121.5 errors per page, with over 64% categorised as fundamental Level A violations.

This creates a two-fold structural disconnect:

- The Navigation Barrier: Digital systems ignore mobility condition categories, relying instead on traditional binary gender classifications. This forces PwDs and caregivers into generic search journeys ill-suited to their specific needs.
- The Compliance Gap: Brands rely on a non-compliant "Shadow Presence," transforming a process meant to provide physical independence into an excluding and dependent digital experience. Users who cannot navigate websites independently are forced into WhatsApp conversations, surrendering the very autonomy the garments are designed to restore.

V. RESEARCH METHODOLOGY

A. Secondary Data Collection

- Literature Review: Analysis of data regarding adaptive apparel engineering, inclusive UX systems, and disability frameworks within India.
- Competitor Benchmarking: Comparative analysis of product lines, metrics, and interfaces across target brands.

B. Primary Data Collection

(WCAG 2.1 Technical Audit): A systematic web heuristic evaluation using accessibility testing suites (WAVE/AXE) coupled with manual screen reader and keyboard navigation validation [5].

C. Sampling Strategy

The study utilizes a purposive, case-study-based sampling strategy designed to evaluate the digital ecosystem of India's homegrown adaptive apparel market.

- Platform Sample Set: The technical audit was bounded strictly to the primary, customer-facing digital storefronts and official e-commerce platforms of the three pioneering homegrown Indian adaptive brands: Zyenika, Haxor, and Aaraam Se.
- Qualitative Validation Cohort: To ground the automated WAVE audit findings in real-world user experience, a focused validation cohort of 6 to 9 purposively selected participants including assistive technology users, caregivers, and accessibility design researchers was integrated to qualitatively map and verify the primary navigational barriers and hard stops discovered during the technical evaluation.

VI. DATA ANALYSIS AND INTERPRETATION

A. Digital Portal Interface Evaluation & Sizing Gaps

- Platform Information Gaps: While some sites like Haxor.com provide technical specification notes [4], overall digital awareness remains low to moderate. Platforms consistently fail to provide detailed descriptions optimized for screen readers, relying instead on images that lack descriptive alt-text [6].
- The Anthropometric Digital Gap: Technical evaluations confirm that digital sizing tools must be improved to account for seated or reclining postures through 3D scanning or posture-based models. Without these, users face high cart abandonment rates due to fit uncertainty.
- The Digital Procurement Barrier: A segment of the target market remains excluded from online shopping due to a total lack of technical engagement with, or systemic mistrust in,

automated digital payment and configuration setups.

B. WCAG 2.1 Technical Audit

1. The "Digital Gateway" Audit

A critical component of this study is the evaluation of the digital infrastructure through which adaptive apparel is accessed. Using the WAVE (Web Accessibility Evaluation Tool) and the AIM (Accessibility Impact Measurement) scoring methodology, a technical audit was conducted on the e-commerce platforms of Zyenika, Haxor, and Aaraam Se.

The AIM Score (scaled 1 to 10) provides a benchmark of a site's accessibility impact. A score of 5 represents the global average for standard web pages; however, for a sector dedicated to inclusivity, a score significantly higher than the average is the expected ethical baseline. The findings below highlight a systemic "Accessibility Irony" across the industry.

1. Zyenika

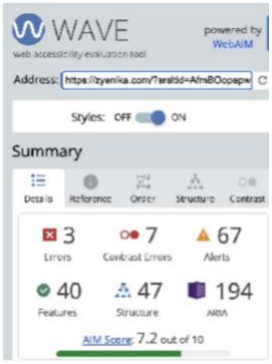

Figure 14 Wave Overview of Zyenika's Website

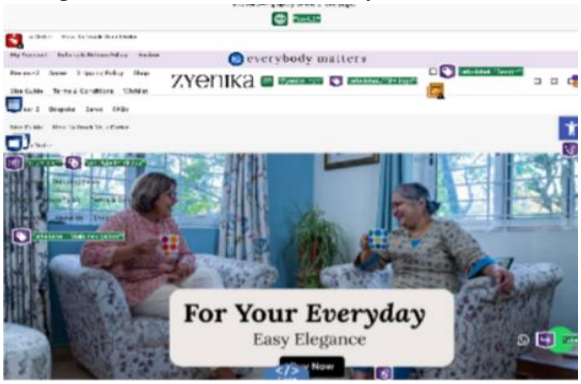

Figure 15 Zyenika's Website Errors by WAVE

Quantitative Analysis of Barriers:

The audit returned an AIM Score of 7.2 out of 10. While numerically high, a granular look at the errors reveals "Hard Barriers" that specifically disenfranchise the brand's target demographic: the elderly and PwDs.

- Critical Errors (n=3): These errors predominantly represent Missing Alternative Text and Null Button Labels. In a functional context, if a "Magnetic Closure Kurta" is represented by an unlabelled image or an "Add to Cart" button is coded as a generic icon, a screen-reader user perceives only a "Link" or "Button" without context. This renders the primary conversion goal the purchase impossible to complete without sighted assistance.
- Contrast Deficiencies (n=7): The audit identified seven distinct violations of WCAG 2.1 Color Contrast ratios. For a geriatric population frequently dealing with age-related macular degeneration or cataracts, low-contrast text (e.g., light grey on white) creates physical eye strain. This aesthetic choice directly contradicts the brand's mission of "Dignity in Dressing" by making the "Information Access" phase undignified and difficult.

Cognitive Load and Navigation Complexity

- The Alert Threshold (n=67): The presence of 67 Alerts indicates a high degree of "Digital Noise." These alerts typically flag redundant links, skipped heading levels, or justified text. For users with Neurodivergence or Early-stage Cognitive Decline, this lack of structural hierarchy increases cognitive load, leading to higher bounce rates and "Cart Abandonment."
- The ARIA Paradox (n=194): The high volume of ARIA (Accessible Rich Internet Applications) attributes suggests a reactive attempt at accessibility. However, excessive ARIA usage in a non-standardized ecommerce framework often creates a "false sense of inclusivity." If these labels are mismanaged, they provide conflicting cues to Assistive Technology (AT), transforming a simple shopping task into a complex navigational puzzle.

Synthesis: The Digital Ceiling:

The data suggests that Zyenika's digital storefront operates under a "Digital Ceiling." While the garment removes physical barriers to dressing, the website maintains a high "barrier to entry." This reinforces the study's hypothesis: inclusive clothing is currently being sold through exclusive digital interfaces. The

"Dignity" promised by the product is compromised by the "Dependence" required to navigate the purchase process.

Table 1.3 Digital Accessibility Audit Summary of Zyenika

Metric	Value	Impact on User Group
AIM Score	7.2/10	Moderate accessibility baseline.
Critical Errors	3	Blocks independent screen-reader purchases.
Contrast Errors	7	Limits readability for low-vision/cataract users.
Alerts (UX Noise)	67	Increases cognitive fatigue for geriatric/neurodivergent users.
ARIA Integration	194	High complexity; risks navigational looping.

2. HAXOR

Figure 16 WAVE Overview of Haxor's Website

Figure 17 Haxor's Website Errors by WAVE

Digital Interface Audit: Haxor – The Scalability vs. Inclusivity Trade-off The digital audit of Haxor reveals a lower AIM Score of 6.3 out of 10, indicating a higher level of digital friction compared to its competitors. As Haxor is one of the most commercially successful adaptive brands in India, this data highlights a critical "Growth Gap": as brands scale toward mass-market success, their digital storefronts often become less accessible to their core demographic.

Critical Failures and Visual Barriers

- Elevated Error Count (n=10): With 10 critical errors (more than triple Zyenika's), the platform presents substantial "hard stops" for users of Assistive Technology (AT). These errors typically involve Missing Form Labels or Broken Links, which prevent screen-reader users from independently selecting sizes, inputting shipping addresses, or navigating to the checkout page.
- Contrast Deficiencies (n=10): The presence of 10 contrast errors indicates a systematic aesthetic preference for low-contrast UI elements. In the context of geriatric fashion, where the user base often experiences age-related visual impairments, these contrast failures act as a Digital Gatekeeper, making the site unreadable for a large segment of the target audience.

Architectural Inconsistency (Structure vs. ARIA)

- Structural Complexity (n=92) vs. Low ARIA (n=94): Unlike Zyenika, which utilized a high number of ARIA labels to bridge accessibility gaps, Haxor has a high "Structure" count (92) but relatively low ARIA integration (94). This suggests a Complex Page Layout that lacks the necessary accessibility "tags" to help a disabled user navigate it.
- The "Noise" Factor (n=71 Alerts): The 71 Alerts indicate significant UX Friction. These often represent redundant links or "Link-Title" mismatches. For a person with motor dexterity challenges or tremors (e.g., Parkinson's), every extra or redundant link increases the physical effort required to navigate the site, turning a simple purchase into an exhausting task.

Synthesis: The "Medical" vs. "Digital" Paradox

Haxor's marketing focuses on moving away from the "medical" stereotype through their "Chairman's Club" and stylish designs. However, their digital infrastructure remains rooted in an Exclusive Design Architecture. The audit suggests that while the brand has successfully scaled its logistics and product range, it has neglected the Digital Autonomy of its users. This creates a reliance on "Shadow Commerce" (WhatsApp or phone-based orders) rather than empowering the user to shop independently online.

Table 1.4 Digital Accessibility Audit Summary of Haxor

Metric	Value	Impact on User Group
AIM Score	6.3/10	Low-to-moderate baseline; below industry average.

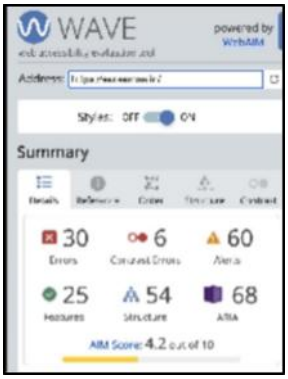

Figure 18 Wave Overview of Aaraam Se's Website

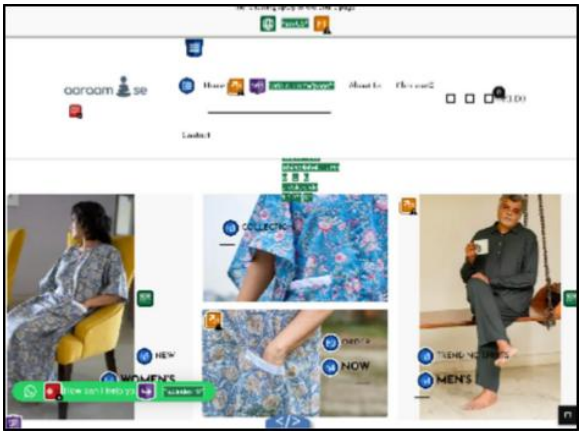

Figure 19 Website Errors of Aaraam Se's Website by WAVE

Digital Interface Audit: Aaraam Se –The "Bespoke" Accessibility Gap

The audit for Aaraam Se reveals a stark contradiction. While the brand emphasizes "Aaraam" (Comfort) and ease of access for the wearer and caregiver, their digital gateway is significantly fragmented. With an AIM Score of 4, the platform presents a "High-Barrier" environment that almost necessitates the intervention of a non-disabled intermediary to complete a purchase.

Systematic Failures: The 36-Error Threshold

- Critical Errors (n=36): This is the highest error density in the study. A count of 36 critical errors suggests that the website lacks basic semantic HTML structure. For a user with significant motor impairment or blindness, the site likely appears as a "dead end." Navigation menus, product filters, and payment gateways are likely unlabeled, making the "bespoke" experience digitally inaccessible.
- Contrast Vulnerabilities (n=6): While slightly better than Haxor in terms of contrast count, the errors still represent a failure to meet WCAG AA standards. For a brand targeting the geriatric population, these errors make critical information such as wash-care instructions or fabric composition nearly invisible to those with visual impairments.

The "Shadow Commerce" Implication

- Low Feature/ARIA Count (25/68): Compared to Zyenika (40 Features) and Haxor (55 Features), Aaraam Se has a very "thin" digital footprint. This data suggests that the website may be a secondary storefront, with the brand likely relying on WhatsApp or Instagram (Shadow Commerce) for the majority of its sales.
- The "Irony of Comfort": The high number of errors (36) against a low number of features (25) indicates that even the simplest tasks on the site are prone to failure for PwDs. The very demographic that needs "Aaraam" in their daily life is met with "Digital Friction" at the point of purchase.

Table 1.4 Digital Accessibility Audit Summary of Aaraam Se

Metric	Value	Impact on User Group
AIM Score	4/10	Critical failure; fundamentally non-compliant.
Critical Errors	36	Total exclusion; blocks screen-readers past the homepage/cart.
Contrast Errors	6	Legibility risk for users with age-related eye conditions.
Alerts (UX Noise)	48	Broken/outdated site architecture causing high frustration.
Features	25	Minimal feature set that still fails to provide a barrier-free experience.

B. Brand-Specific Analysis

1. Zyenika: Achieved an AIM score of 7.2. Despite strong baseline numbers, its 3 critical errors (missing alt text/null labels) form definitive barriers for screen reader operations. Seven contrast errors restrict legibility for geriatric vision conditions. The 67 structural alerts and high ARIA

element volume (194) create an unstable structural landscape prone to loop errors.

2. Haxor: Logged an AIM score of 6.3. The 10 critical failures represent a 233% increase in transactional barriers compared to Zyenika, reflecting a systemic compromise during commercial scaling. Ten contrast errors emphasize aesthetic choices over legibility baselines, while 71 user experience alerts induce cognitive friction for motor-impaired operators.
3. Aaraam Se: Scored a critical 4.0, representing severe digital fragmentation. A count of 36 critical errors indicates an absolute lack of standard semantic layout structure, making independent checkout processes impossible. This performance establishes a total reliance on shadow communication protocols, undermining buyer privacy and autonomy.

Table 1.5 Cross-Brand Accessibility Audit

Metric	Zyeni ka	Haxor	Aaraa m Se	Research Implication
AIM Score	7.2	6.3	4.0	Brand "heritage" focus correlates inversely with digital readiness.
Critical Errors	3	10	36	Aaraam Se is a "Digital Dead-end" for screen-reader users.
Contra st Errors	7	10	6	Haxor is the most visually taxing for low-vision/elderly users.
Total Alerts	67	71	48	High "digital noise" across all brands causes cognitive fatigue.
ARIA Elements	194	94	68	Zyenika shows the most effort in "coding for inclusivity."
Status	Amber	Orang e	Red	No brand currently meets WCAG 2.1 "AAA" standards.

VII. FINDINGS AND INSIGHTS

- The Digital Accessibility Gateway: For individuals with visual or motor impairments, the storefront interface is currently a barrier rather than an enabler [6]. Comprehensive alt-text fields and image labels are missing across major catalogs.
- The Scale-Inclusivity Paradox: Digital accessibility tends to dip as homegrown brands shift from boutique impact models to mass-market scale [4]. Scaled platforms exhibit higher critical script errors, prioritizing standard sales conversion funnel optimizations over universal e-commerce access architecture.
- The Shadow Commerce Dependency: Persistent website failure rates force a systemic reliance on WhatsApp or Instagram DM pipelines [6]. While functional, this reliance strips users of transaction privacy and operational autonomy, replacing self-serve automation with manual chat loops.
- Systemic Sensory Exclusion: The digital data indicates a "Physical-First" bias across the Indian adaptive industry [3]. Brands successfully engineer physical hardware (magnetic trims, open backs) but overlook sensory and digital access constraints, turning the virtual storefront into a gatekeeper [6].
- Lack of Industry ARIA Standardization: Massive variance in ARIA code counts reflects an absence of industry-wide technical best practices. There are no unified tagging benchmarks to filter garments by accessibility category (e.g., "Sort by One-Handed Use") versus traditional binary configurations.
- Fragmented Technical Specifications: Brand platforms fail to maintain structured, professional-grade technical data regarding trim durability, wash-cycle thresholds, or medical hygiene indexes, preventing medical clinicians from making formal online product referrals.

VIII. SUGGESTIONS

A. Digital Accessibility and Universal Design Standards

- Mandatory Web Accessibility Compliance: Homegrown brands must adopt a universal design framework across their web storefronts, resolving the critical alt-text omissions and contrast failures highlighted in current market leaders [5]. Enforcing strict ARIA metadata compliance will enable screen readers to execute checkout actions independently.
- Implementation of Technical Filtering Systems: Platforms should transition away from strict gender/price binary structures. Databases must be indexed to allow users and caregivers to sort catalogs directly via dexterity levels and structural closure classes (e.g., "Magnetic", "Velcro", "One-Handed Zip").

B. Technological and Anthropometric Web Innovation

- Posture-Based Digital Sizing Tools: To mitigate

high online return rates and cart abandonment, storefronts should deploy AI-driven photogrammetry or 3D posture-based sizing calculators that accurately map seated or asymmetrical bodily measurements directly onto digital sizing guides.

- Academic-to-Industrial Platform Integration: Design schools and homegrown labels should establish shared open-access digital repositories documenting adaptive trim specifications, performance sheets, and patterns to fast-track the deployment of scalable e-commerce catalogs.

C. Market Visibility and Structural Visibility Models

- Technical Specification Visibility: Brands should configure download portals containing detailed clinical specification sheets for physical therapists and eldercare centers, establishing brand authority through open technical disclosure.
- D2C Digital Subscription Architectures: To balance the premium costs of adaptive hardware production [3], web storefronts should integrate automated subscription, rental, or buy-back frameworks, making specialized functional garments economically accessible to the Indian middle class via an ongoing digital management cycle.

IX. CONCLUSION

The analysis of India's homegrown adaptive apparel sector reveals a profound structural disconnect: an "Accessibility Irony" where physically liberating garment innovations remain bound within digitally restrictive ecommerce storefronts [6]. While brands like Zyenika, Haxor, and Aaraam Se successfully pioneer empathetic design solutions for traditional and lifestyle silhouettes [3],[4], their web platforms present critical technical failures, low color contrasts, and a lack of semantic HTML mapping [5],[7]. To transition from a fragmented, social-media-dependent "Shadow Commerce" framework to a mature, autonomous market sector, the Indian adaptive apparel industry must elevate its digital infrastructure to match its physical craftsmanship. By integrating WCAG 2.1 standards, condition-based filtering architecture, and AI-driven posture sizing tools, these brands can establish seamless, barrier-free digital pathways ensuring that the dignity promised by the product is fully realized during the digital purchasing process.

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