

Research Article

Reimagining Retail: How Braille and Clothing Education Shape the Fashion Experience of the Visually Impaired Consumers

Aubrey Ramatla^{*} , Anne Mastamet-Mason , Nailejileji Mollel-Matodzi 

Department of Fashion Design, Tshwane University of Technology, Pretoria, South Africa

Abstract

Visually impaired consumers often face significant barriers when shopping independently in retail environments due to limited access to product information. Framed within the Social Model of Disability, this study views the challenges faced by visually impaired consumers in apparel shopping as arising from environmental and informational barriers, demonstrating that targeted tools and inclusive design can enhance independence and retail participation. This study investigates the impact of clothing education and the Braille Communication Tool (BCT) on visually impaired consumers' knowledge and behaviour during clothes shopping experiences, focusing on usability, effectiveness, and challenges in assimilated retail settings. A qualitative approach was employed, incorporating focus groups (n = 30), semi-structured interviews (n = 60), and direct observation in a mock retail setting. Participants from Pretoria, Durban, and Upington received training on the BCT before engaging in a simulated shopping experience. Findings revealed that 40% of participants valued the tool's time efficiency, another 40% praised its ability to promote empowerment and independence, while 20% highlighted its contribution to social value and quality of life. Participants reported improved confidence in selecting garments independently, particularly in relation to size, price, and care instructions. However, issues such as unclear label placement, limited garment descriptors, and the need for firmer label surfaces were identified as usability constraints. The study recommends standardising tactile symbols, integrating audio descriptions, and providing ongoing user education to improve usability and inclusivity. Overall, the BCT shows strong potential as an assistive solution for enhancing retail accessibility, but its success depends on addressing structural and communication barriers through inclusive design and retail staff training.

Keywords

Braille Labelling, Clothing Education, Visually Impaired Consumers, Inclusive Fashion Retail

1. Introduction

Visually impaired consumers often face significant limitations in traditional retail spaces due to the absence of adaptive infrastructure [1]. According to [2], conventional apparel shopping environments are rarely designed with sensory im-

pairments in mind, leaving visually impaired consumers dependent on verbal assistance or companions to complete basic retail tasks. This lack of autonomy not only diminishes the shopping experience but also limits consumer choice and

^{*}Corresponding author: RamatlaA@tut.ac.za (Aubrey Ramatla)

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personal expression [3].

The shopping difficulties experienced by visually impaired consumers in American clothing retail led to the investigation of a survival mechanism for clothing shopping [4]. The need for such an investigation into the availability of assistive technologies in current clothing retail led to an increase in the demands of older visually impaired consumers who need to shop self-reliantly [5]. Assistive technology is a tool modified and used to improve the daily functional activities of people with disabilities [6]. For this research, assistive technology can be defined as a device or product system acquired commercially on the apparel retail shelf, adapted to empower visually impaired consumers through its usability. Clothing education is essential for promoting independence and confidence among these demographics [7]. Research has shown that tailored training programs can significantly improve the ability of physically impaired individuals to navigate retail environments [8]. Similarly, it is assumed that training visually impaired consumer can significantly improve their ability to navigate the clothing retail environment.

2. Literature Review

Visually impaired consumers experience multiple barriers when shopping for clothes. The barriers are attitudinal, environmental, infrastructural, institutional, and communicational [1]. Yu et al [1] reported that visually impaired consumers often struggle to navigate traditional clothing retail stores independently, encountering accessibility barriers such as poor signage, inadequate tactile cues, and difficulties interpreting product information, which reduce autonomy and affect shopping satisfaction. Furthermore, visually impaired consumers are not provided with Braille product information tags and labels [9]. Clothing labels provide consumers with essential clothing information such as size, fabric type, wash and care instructions, country of manufacture [10]. Swing tags convey essential product information, including price and brand, while functioning as a strategic marketing instrument to communicate promotional offers, introduce new product lines, and reinforce brand identity [11]. Ramatla et al [12] argue that inaccessible labeling is not just a technical oversight but a reflection of broader exclusionary practices within the fashion and retail industries. Braille labeling has the potential to mitigate these barriers, but only if implemented consistently and accompanied by consumer education. Without accessible, standardized tactile labels, meaningful participation in retail decision-making remains constrained.

2.1. The Role of Braille in Communicative Labelling

Braille as a tactile communication system plays a crucial role in promoting independence among visually impaired consumers. Everett et al [13, 14] found that participants who used Braille-labeled garments reported increased confidence

and reduced reliance on sales assistants. The functionality of Braille labels extends beyond product identification to include proper garment care and fit verification.

Brabyn et al [15] further highlight that the effectiveness of Braille labelling is dependent on user proficiency and the standardization of label placement. Inconsistencies in label location, terminology, or tactile legibility can undermine the label's usability. Therefore, the development of uniform Braille labelling systems in apparel is essential for facilitating consumer independence.

A BCT is an assistive labelling system that integrates Braille-encoded swing tags, context labels, and aftercare labels on clothing items. This tool provides visually impaired consumers with essential product information, including garment size, fabric composition, colour, brand details, and washing instructions, enabling independent shopping and proper garment care [12]. Braille-encoded tags or labels offer visually impaired consumers essential information about clothing, including size, colour, and fabric type [12]. Braille labelling incorporates a tactile writing system on product packaging or items, conveying crucial details like product information, use instructions, and safety warnings. This practice promotes accessibility and autonomy for individuals who are blind or have low vision [16]. In 2014, Ramatla designed a Braille clothing label readable by visually impaired consumers that was later registered and published as Tshwane University of Technology (TUT) intellectual property (IP) and by the South African Department of Science and Technology (SADST).

Empowering visually impaired consumers when shopping is one of society's most important social aspects [4]. Independent shopping experiences emotionally impact sighted individuals, especially when buying brands that satisfy their needs [17]. Visually impaired consumers often experience reduced emotional satisfaction when shopping for clothing due to reliance on others, which limits independence and undermines confidence [18]. The BCT for visually impaired consumers establishes a link between specific clothing attributes offered by certain brands and these consumers' emotions, resulting in a strong bond between clothing brands and visually impaired consumers [19].

2.2. Theoretical Framework

This research is guided by the Social Model of Disability and Self-Efficacy Theory. Within this context, the Social Model of Disability emphasizes that the barriers faced by visually impaired consumers in retail environments are not inherent to their impairments, but rather result from societal and systemic shortcomings. It calls upon stakeholders including clothing retailers, the textile and clothing industry, and organisations representing visually impaired individuals to implement inclusive practices that remove these barriers. In parallel, Self-Efficacy Theory highlights the importance of enhancing visually impaired consumers' confidence and au-

tonomy in clothing-related decision-making. This can be fostered through supportive interventions, such as the implementation of the BCT, which equips consumers with the necessary information to shop independently. Together, these frameworks advocate for a shift from individual limitation to collective responsibility, promoting an inclusive retail environment that empowers visually impaired consumers.

2.2.1. Social Model of Disability

This study is grounded in the Social Model of Disability, which posits that disability is not the result of an individual's impairment, but rather a consequence of the way society is structured [20]. As [21] argues, this model shifts the focus from individual deficits to the barriers within social, physical, and institutional environments that limit participation and autonomy. The United Nations Convention on the Rights of Persons with Disabilities [22] defines people with disabilities as those with long-term physical, mental, intellectual, or sensory impairments which, in interaction with various barriers, may hinder their full and effective participation in society on an equal basis with others. The Social Model highlights how exclusionary environments and inaccessible services, rather than impairments themselves, are the primary sources of disability [6]. In the context of this study, the inability of visually impaired consumers to independently access essential clothing information such as size, fiber content, and care instructions, reflects a systemic design failure in retail spaces. Therefore, this model provides a critical lens through which to analyse and address structural inequalities in consumer access and retail participation.

2.2.2. Self-Efficacy Model

Our sense of self is shaped by social constructs influenced by the societies and circumstances in which we live [23]. Self-Efficacy Theory underscores the significance of individuals' beliefs in their capabilities, highlighting how these perceptions influence motivation, persistence, and positive outcomes when undertaking tasks [23]. However, achieving self-efficacy often requires deliberate, structured interventions that help individuals build the confidence and skills necessary for success [24]. In this study, the use of the BCT by visually impaired consumers is conceptualised as such an intervention designed to enhance their perceived self-efficacy within the apparel retail environment. The BCT functions not only as a practical assistive device but also as a psychological empowerment tool that improves users' confidence, decision-making autonomy, and shopping competence. Viewed through the lens of Self-Efficacy Theory, the BCT serves as a catalyst for increasing self-belief and agency, thereby fostering more inclusive and independent participation in clothing retail experiences.

Braille, a tactile writing system used by visually impaired persons, has long been a crucial medium for accessing written information. By integrating Braille into the retail environment, particularly in apparel stores, visually impaired consumers

can gain direct access to essential product information such as size, colour, fabric composition, and price. This integration of information may empower visually impaired consumers to make more informed decisions without needing to rely on others, thereby enhancing their autonomy and confidence while shopping. Few studies have explored the impact of implementing BCT clothing labels and swing tags on visually impaired consumers' clothes shopping experience. [25] stress that South African clothing retailers rarely accommodate tactile labelling systems, resulting in systemic exclusion. There's a need for a Braille clothing label with size and fabric content information for South African visually impaired consumers neglected by the industry [25]. This study investigates the impact of clothing education and the BCT on visually impaired consumers' knowledge and behaviour during clothes shopping experiences.

The study has three objectives

- 1) Evaluate the effectiveness of clothing education and the BCT in enhancing apparel-related knowledge and shopping autonomy among visually impaired consumers.
- 2) Explore consumers' attitudes and perspectives regarding the usability and effectiveness of the BCT in apparel shopping.
- 3) Identify challenges and barriers encountered by visually impaired consumers when using the BCT in retail environments.

Understanding BCT knowledge, attitudes, perspectives and challenges of the Braille clothing labels and swing tags is crucial for developing strategies to make retail environments more accessible and inclusive for visually impaired consumers.

3. Materials and Methods

A qualitative approach was employed to collect data from sixty participants. Data was collected through focus groups (n = 30), semi-structured interviews (n = 60), and direct observation in a mock retail setting. Purposive sampling and snowball were used to select participants. In Pretoria, the Pretoria Workshop for the Blind (Dream House) assisted in identifying the participants. In KwaZulu-Natal province, the KwaZulu-Natal Society for the Blind, and the Northern Cape province, the Northern Cape Society for the Blind (Old Ivy Kros Centre for the Blind). The initial recruitment process yielded varying numbers of participants across provinces. In Pretoria, 18 participants were recruited through the initial call, and the remaining two were secured through snowball sampling. In Durban, 17 participants were recruited initially, with the final three also identified via snowballing. In Upington, the full cohort of 20 participants was obtained from the initial recruitment, facilitated by strong collaboration with the Northern Cape Society for the Blind. Once the initial cohort was established, participants were encouraged to refer others to the study, following the principles of snowball sampling [26].

This approach resulted in a complete sample of 60 participants consisting of 30 men and 30 women.

Three training workshops were conducted to address the objectives of the study. To train the visually impaired participants required the development of a peer reviewed training manual was developed and approved by curriculum experts. The peer-reviewed training manual was developed to ensure that the content was relevant to visually impaired consumers, aligned with the design of the Braille Communicative Label, and effectively addressed the intended learning objectives.

The Braille communicative tools used to collect data were Braille label and swing tag (Figure 1). The label follows the six-dot Braille system, designed for durability, washability, and clear tactile reading. It uses a heat-resistant synthetic or cotton-blend base, measures about 3 × 5 cm, and is sewn on the inside seam or back neckline. Braille dots are raised using thermoforming/embossing for long-lasting accuracy. Currently in Grade 1 English, it can be adapted to other South African languages in future.



Figure 1. Braille label and swing tag.

Data collection involved observation, focus groups, and semi-structured interviews with visually impaired consumers, conducted across three phases. Phase one (Day 1) focused on empowering participants through a training session covering key elements of clothing, including color identification, care label contents, pricing considerations, and, most importantly, the use of the Braille Communicative Label (BCL) and swing tags. Phase two (Day 2) involved a simulated retail environment (Figure 2), designed to replicate a real-world clothing store. In this setting, participants engaged in a mock shopping experience, during which their interactions with garments, BCL swing tags, and labels were closely observed. Phase three (Day 3) consisted of focus group discussions and semi-structured interviews, allowing participants to reflect on their experiences and provide deeper insights into the usability and challenges of the BCL in a retail context.

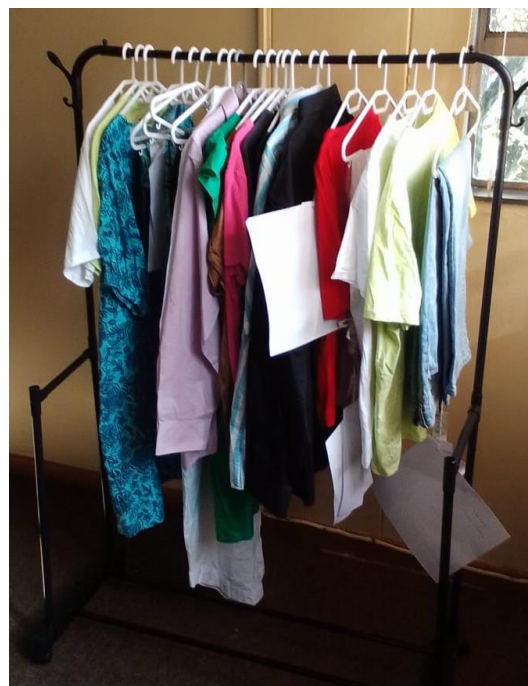


Figure 2. Simulated retail experience, phase 2 of data collection.

4. Results and Discussion

The results of this study are presented according to key themes identified within the objectives. Access to product information, and empowerment and autonomy themes are linked to objective 1. Discussions on attitudes and perceptions are linked to objective 2. Challenges and concerns in using the BCT theme is linked to objective 3.

4.1. Access to Product Information

A quarter of the participants noted that Braille labels provide crucial information about price, size, and colour, helping them make informed shopping choices. This statement verifies that: “I will use Braille in the future because it is informative on the price, size, and colour of the clothes I want to buy” (P5) (also echoed by P17, P22, P25, P29, P30). Previous research indicates that insufficient access to product information poses a significant hurdle for visually impaired shoppers in retail settings [27]. The introduction of Braille labels effectively mitigated these issues by providing direct access to crucial product details like size, price, and colour. This accessibility allowed participants to verify information independently [28], empowering them to make informed choices without depending on others [29].

Additionally, a few of the participants appreciated that the Braille inner label provided garment care instructions (7%), helping them maintain their clothing better. The statement below affirms this: “I will use the Braille inner label in the future because it teaches me how to care for my clothes after shopping so that they last longer” (P6). This intention to use the tool in the future highlights how Braille can serve as a

shopping aid and a tool for post-purchase clothing management [25, 30].

What emerges from this study is that the BCT is very effective in achieving self-efficacy. The results indicate that the BCT provides a sense of independence, self-reliance, a sense of being appreciated as a valuable customer, self-worth and choice on the part of visually impaired shoppers. The size of the label and its emboldened Braille print provide adequate information to empower customers to make decisions with minimal to no assistance. The label containing the same information as the information provided to sighted shoppers demonstrates a recognition of visually impaired shoppers as a valuable client base that deserves as much service as anyone else. The study demonstrates how the BCT enhances the shopping experience for visually impaired persons by improving independence, autonomy, and access to essential product information. It adds to the literature by empirically evaluating the tool's perceived usefulness and ability to meet visually impaired consumers' unique needs.

The BCT demonstrates how accessible design can remove barriers and promote inclusion, aligning with the Social Model of Disability. By providing essential product information, the BCT empowers visually impaired consumers to shop independently and confidently, reflecting key principles of Self-Efficacy Theory. The tool not only enhances practical decision-making but also reinforces users' sense of autonomy, self-worth, and belonging in the retail space.

4.2. Empowerment and Autonomy

Almost half of the participants expressed that the BCT provided a strong sense of independence in the empowerment and autonomy category (24 or 40%). For instance, a participant stated: "Yes, I will recommend to the other visually impaired friends as it gives a sense of empowerment because it integrates new assistive tools into our community" (P2). This theme underscores how the BCT allows users to shop without relying on external assistance, fostering self-reliance, a core element of the Unified Theory of Acceptance and Use of Technology (UTAUT)'s facilitating conditions. Seven participants (P14, P15, P17, P18, P20, P26, and P30) also supported this view, which is crucial for enhancing user satisfaction and promoting wider technology adoption. The tool's ability to deliver accurate and immediate details directly to the user was crucial in reducing common frustrations associated with miscommunication or errors that often occur when relying on sighted companions [31]. For instance, independently verifying an item's size ensures a better fit, while knowing the price allows users to assess affordability without external input [25]. Additionally, understanding fabric type supports more deliberate choices based on personal comfort, style preferences, or practical considerations, such as seasonal suitability [32].

Finally, almost a quarter of the participants endorsed the social value and quality of life theme (6 or 20%). These re-

spondents noted that the BCT improved their shopping experience and uplifted their social identity and overall quality of life. One of the participants mentioned: "Yes, I will recommend an innovative component that will enhance our quality of life to the other visually impaired colleagues" (P11). This insight suggests that beyond its practical benefits, the BCT plays a role in improving how visually impaired persons perceive themselves as valuable customers, a finding consistent with the social influence construct in the UTAUT (Venkatesh et al., 2003). Some of the participants (P12, P19, P23, P24, and P25) echoed similar observations, highlighting a more significant benefit of the tool.

The high percentage of positive responses in the time efficiency and empowerment themes indicates that users overwhelmingly appreciate the tool's ability to make shopping faster and more autonomous. These results suggest that the BCT effectively meets the needs of visually impaired consumers by reducing dependency on sales assistance and streamlining the shopping process. Conversely, the lower percentage in the social value category may reflect that while these benefits are appreciated, they are viewed as secondary to the practical advantages of the tool. In addressing the diverse needs of visually impaired shoppers, Chien Wen Yuan et al [33] state that the tool transforms the shopping experience into accessible, satisfying, and empowering. This comprehensive approach fosters trust, loyalty, and a sense of belonging among visually impaired customers, reflecting a retail environment where everyone can shop confidently and independently [33].

The analysis of these categories and emerging themes revealed that the BCT is highly valued for its efficiency and empowerment capabilities, significantly enhancing independent shopping experiences. The strong positive feedback provides robust support for the BCT: "It saves time when we shop because the sales assistants take time" (P3) and "It gives a sense of empowerment because it integrates new assistive tools" (P2). These insights not only validate the effectiveness of the BCT in addressing key challenges in retail shopping for visually impaired persons but also suggest that the tool's continued refinement could further uplift the social identity and overall quality of life for its users. Braille's impact on emotional and social well-being was also a recurring theme. Some participants mentioned feeling valued and respected as customers when stores provided Braille accessibility (10%), reinforcing the importance of inclusive retail spaces. This feeling of being respected is supported by some of the relevant statements: "I will most likely use the Braille in the future because I can shop independently, which makes me feel valued as a customer and respected as a person" (P8) (also echoed by P9, P10). These responses suggest that accessible shopping tools such as Braille can help integrate visually impaired persons into mainstream shopping experiences, reducing social barriers and promoting inclusivity [34]. Participants regarded the Braille tool as a significant step toward social empowerment, offering them a sense of worthiness and

customer respect within retail environments. A further 10% stated that using Braille resonates with their identity as visually impaired persons and signifies social connection progress. Some relevant statements were: “I will use it in the future as it aligns with my social identity as a person with a disability who wants to be included in all the spaces and have the appropriate information to also shop independently with pride” (P12) (also echoed by P13, P18).

The findings show that the BCT empowers visually impaired consumers by reducing retail barriers and promoting independence. In line with the Social Model of Disability, the BCT transforms the shopping environment to be more inclusive. From a Self-Efficacy Theory perspective, it builds users’ confidence and autonomy by enabling informed decision-making. Overall, the BCT enhances both access and self-worth, making shopping a more empowering experience.

4.3. Attitudes and Perspectives

The second objective attempted to answer the first research question, “How can the attitudes of visually impaired persons on the use of BCTs be understood and explained when shopping for clothing at retail outlets?” The question used for this strand of the study was: “After applying the BCT for this short space of time you had, would you recommend it to your friends and colleagues who have not used it? (If yes, explain why?)”.

There were 30 visually impaired participants who were asked whether they would recommend the swing tag to their friends and colleagues, and their responses were categorised into three main themes. Overall, the responses revealed that 40% of the participants praised the BCT for its time efficiency and problem-solving ability, 40% highlighted its role in providing empowerment and independence, and the remaining 20% noted that it enhanced social value and quality of life. The BCT was designed to bridge the accessibility gap in retail environments, empowering visually impaired consumers with greater autonomy during their shopping experience [12].

For the time efficiency and problem-solving theme, almost half of the respondents reported that the BCT significantly reduced the time required to shop by solving common challenges encountered during the shopping process (24 of 60 or 40%). This reduced problem-solving time is demonstrated by one participant’s comment: “Yes, I will suggest it to other friends. It saves time when we shop because the sales assistants take time to come to us and help us in the shops” (P30). Such responses indicate that the tool effectively mitigates delays often experienced in retail environments, aligning with the UTAUT model’s performance expectancy—users are more likely to adopt technology that makes tasks easier and faster [35]. Other participants (e.g., P1, P4, P5, P7, P8, P27) echoed similar sentiments, reinforcing that time efficiency is a key attribute of the BCT. This level of detail also supports a more efficient shopping process. It allows users to quickly identify items that meet their preferences and needs, reducing the time and effort spent searching or verifying information [29].

Regarding participants’ perspectives, an analysis of the tool’s performance from the user’s perspective was conducted. Analysing the tool’s performance involves defining effectiveness. Effectiveness includes overall satisfaction when applying the tool, clarity, information delivery, reliability, influence on user independence, and in-depth feedback collection. Effectiveness was established through visually impaired users in focus group discussions and usability tests conducted in a mock store.

A third (33%) of participants emphasised that the Braille tool enables them to shop independently without requiring assistance. This independence when shopping aspect is backed by several pertinent statements, headlined by: “I will most likely use the Braille in the future because I can shop independently” (P1) (also echoed by P2, P7, P11, P20, P21, P27). a few participants valued privacy (7%), emphasising that Braille enables them to shop without pressure or external interference. The following statement supports this: “I will use Braille in the future because I can shop privately” (P3) (also echoed by P23). Privacy in shopping is crucial, as visually impaired consumers often rely on verbal communication with sales assistants, which may not always be convenient or preferred. Moreover, the inability to verify product details independently diminishes the shopper’s confidence and sense of control, reinforcing feelings of reliance and exclusion [36]. This gap in accessibility also complicates the process of comparing clothing items, evaluating their suitability, and determining long-term usability, such as ease of maintenance [37].

A few participants (P24 and P28) mentioned time efficiency as a significant benefit (10%), as they no longer need to wait for assistance to identify product details. The BCT promotes efficiency, enabling visually impaired shoppers to navigate retail spaces more effectively and complete transactions with minimal delays. This streamlined process enhances individual satisfaction and contributes to a more inclusive and accommodating clothing-related environment from the manufacturer to the retail space [38]. Participants underscored that such tools demonstrate a retailer’s commitment to addressing the diverse needs of their customers, fostering goodwill and loyalty within the visually impaired community.

The findings from the second objective strongly align with the principles of Self-Efficacy Theory, which emphasises that individuals’ belief in their ability to act independently influences motivation and behaviour. Participants’ responses revealed that the BCT significantly enhanced their confidence, autonomy, and control during clothing shopping, particularly through improved time efficiency, problem-solving, and privacy. These positive experiences reinforced their belief in their own capabilities, demonstrating that accessible tools like the BCT can effectively build self-efficacy among visually impaired consumers. The ability to shop independently and make informed choices without assistance reflects increased perceived self-efficacy, which is essential for fostering long-term behavioural change and greater inclusion in retail environments.

4.4. Challenges and Concerns in Using BCT

The findings suggest that the experience of using the Braille communicative tool (Braille clothing label) in apparel retail environments is mixed, with some participants noting applicability and usability challenges. Conversely, others deemed the tool effective and easy to use.

A few participants reported a significant challenge in searching for the correct clothing size (10%). A participant stated: "Even though it is nice to find and use it independently, it can be time-consuming to search for the right size" (P2) (also echoed by P5, P22). Although the tool fosters independence, locating specific sizes remains inefficient for some users. This difficulty locating sizes indicates a need for improved store merchandise layout enhancements to streamline accessibility [39].

Another challenge noted by participants was the learning curve associated with using the Braille labels. One participant said: "It might take a bit of time to get used to it as it needs a bit of concentration" (P21). This level of concentration required may impede seamless use. Therefore, there is a necessity for user training or instructional support to assist new users in adapting to the tool more swiftly [40].

Some participants mentioned usability concerns related to the positioning of the labels, indicating that the BCT must be held in the right position to enable reading. A participant noted that: "It needs to be held at the right position to read it correctly" (P3) (echoed by P6, P23, P26). Participants noted that the BCT may have to be supported at a specific angle by a firmer surface for optimal readability. Therefore, future versions of the Braille clothing label could use more durable materials or refined placement strategies to improve ease of use [31].

A criticism raised by participants was that a sturdier backing for the label could improve readability. "It needs to be backed with a harder surface to be able to be read easily" (P4) (also echoed by P24). This finding aligns with best practices in assistive technology, where tactile feedback should be optimised for clarity and ease of interpretation [41].

Participants expressed the need for more detailed label information, such as whether the garment has a gender specification, garment style description, and country of manufacture. A participant shared: "The inner label needs to state where the garment is made" (P9) (also echoed by P13, P26). This feedback reflects a broader issue inclusive retail, where visually impaired consumers should have access to as much clothing product information as sighted customers [14].

Additionally, 16.7% of respondents noted that the tool lacks a gender specification of belonging to either male or female. One participant mentioned: "BCT gives me information that helps me to buy clothes on my own, referring to size, colour, and price, but it does not state whether the clothing item is for men or women" (P4). This omission might lead to ambiguity in product selection, suggesting an area for improvement to better serve diverse consumer needs [42].

Finally, 13.3% of the participants pointed out that the tool falls short of describing garment style or fabric characteristics. For instance, a respondent said: "Braille label gives me information that helps me to buy clothes by myself because it displays size, colour, price and care instructions though it does not explain fabric colour shades on prints and patterns in a clothing item" (P3). Such feedback highlights that while basic information is well covered, the tool could be enhanced with more detailed product descriptors to support finer decision-making [12]. This fusion suggests that the tool is fundamentally sound but would benefit from further addressing minor gaps to optimise the shopping experience.

The findings for the third objective highlight the relevance of the Social Model of Disability, which views disability not as a personal limitation but because of inaccessible environments and systems. While the Braille Communication Tool (BCT) fosters independence and access to essential product information, participants' feedback reveals that challenges such as poor label placement, limited garment details, and store layout inefficiencies continue to create barriers. These issues highlight that the effectiveness of assistive tools like the BCT is shaped by broader environmental and design factors. Addressing these shortcomings through improved label design, clearer product descriptions, and user support reflects a shift in responsibility from the individual to society, as advocated by the social model. Ultimately, the findings support the need for ongoing structural and design interventions to ensure that retail spaces are truly inclusive and equitable for visually impaired consumers.

5. Conclusions

The results of this study demonstrate that the BCT plays a significant role in enhancing shopping experiences for visually impaired consumers by promoting independence, improving access to product information, and fostering a sense of inclusion. Most participants reported increased autonomy, time efficiency, and confidence key indicators of self-efficacy when using the tool. At the same time, challenges related to label placement, limited garment details, and initial usability highlight the continued influence of environmental barriers. These findings align with the Social Model of Disability, which emphasizes the need to address systemic and design-related obstacles rather than viewing limitations as inherent to the individual. Collectively, the evidence supports the BCT as both a self-efficacy-enhancing and socially enabling intervention, reinforcing the importance of inclusive design in creating equitable retail environments for all consumers.

6. Recommendation and Limitations

To enhance accessibility and autonomy for visually impaired consumers within South African retail environments,

the integration of BCL onto apparel items is recommended. These labels should include essential information such as garment size, fabric composition, care instructions, and colour descriptions, presented in standardised, durable, and easy-to-read Braille formats. This would enable visually impaired consumers to engage more independently with clothing selections and reduce reliance on assistance for basic product identification. Equally important is the training and sensitisation of retail staff. Employees must be equipped with the knowledge and interpersonal skills required to assist visually impaired customers effectively. Collaboration with disability advocacy organisations is crucial to ensure that accessibility initiatives are grounded in the lived experiences, needs, and insights of visually impaired individuals. Co-designed solutions are more likely to be practical, effective, and widely accepted by users.

Although the study offers meaningful insights based on the experiences of 30 visually impaired participants, the limited sample size restricts the generalisability of the findings to the broader visually impaired population. While the research makes a valuable contribution to the field, incorporating a larger and more diverse participant group could enhance the representativeness of the results. Furthermore, the study was conducted within a controlled, simulated retail environment, which may not fully capture the complexities and unpredictability of real-world retail settings. The presence of dynamic variables such as fluctuating crowd levels, inconsistent lighting, and untrained retail personnel influences user behaviour and perceptions differently. Therefore, future research conducted in authentic retail contexts is recommended better to understand the tool's practical applicability and effectiveness.

Abbreviations

BCT	Braille Communication Tool
BCL	Braille Communicative Label
TUT	Tshwane University of Technology
IP	Intellectual Property
SADT	South African Department of Science and Technology
UTAUT	Unified Theory of Acceptance and Use of Technology

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Author Contributions

Aubrey Ramatla: Conceptualization, Methodology, Investigation, Formal Analysis, Writing – original draft, Visualisation

Anne Mastamet-Mason: Supervision, Project administration, Writing – review & editing, Funding acquisition

Nailejileji Mollel-Matodzi: Supervision, Validation, Writing – review & editing

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Data Availability Statement

The data supporting the findings of this study are available at the Tshwane University of Technology (TUT) Library and the Department of Fashion Design, Faculty of Arts and Design, TUT, South Africa. Some of the data supporting the outcomes of this research are reported within this manuscript.

For further access:

- 1) Data can be requested from the corresponding author upon reasonable request.
- 2) Visit the TUT Library website: <https://library.tut.ac.za>

Conflicts of Interest

The authors declare no conflicts of interest.

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