Advances in Consumer Research
ISSN (Print): 0098-9258
ISSN(Online): 3079-1766

Vol. 2, Issue 2 (2025) *https://acr-journal.com/*

Accessible E-Commerce: A Study on Using Artificial Intelligence for Inclusive Online Shopping Experiences

Sunil Kumar Suvvari[1], Rohini Sawalka[*2], Rohit Jarubula[3], Sonal Muluk[4]

[1]Independent Researcher, USA.

Email ID: myproductsense@gmail.Com, ORCID: 0009-0009-0684-4144

[*2]Associate Professor, School of Business, Dr. Vishwanath Karad MIT World Peace University, India

[3]Independent Researcher, USA.

[4]PhD, Assistant Professor, School of Business, Dr. Vishwanath Karad MIT World Peace University, India

Cite this paper as: Sunil Kumar Suvvari, Rohini Sawalkar, Rohit Jarubula, Sonal Muluk, (2025) Accessible E-Commerce: A Study on Using Artificial Intelligence for Inclusive Online Shopping Experiences. *Advances in Consumer Research*, 2 (2), 1-17.

KEYWORDS

E-commerce, Accessibility Barriers, Online Shopping, Assistive Technologies, Artificial Intelligence.

ABSTRACT

E-commerce has revolutionized the retail landscape, making online shopping a ubiquitous aspect of modern life. The convenience, variety, and efficiency of e-commerce platforms have transformed consumer behaviour and global business operations. However, despite these advancements in technology and widespread adoption, accessibility barriers persist for many users, particularly those with disabilities. These barriers include challenges in navigation, incompatibility with assistive technologies, and inadequate compliance with accessibility standards, which collectively hinder equal access to online shopping experiences. As digital marketplaces continue to expand, the need for inclusive platforms that cater to diverse user groups has become increasingly pressing. This research investigates the state of accessible e-commerce, focusing on user-centered and inclusive design principles, human-computer interaction, and the role of assistive technology in enhancing online shopping experiences. Through a synthesis of recent studies, this paper identifies the persistent challenges faced by users with disabilities, highlights emerging solutions aimed at overcoming these obstacles, and proposes actionable recommendations for creating universally accessible online shopping platforms. By addressing these issues, e-commerce platforms can not only comply with ethical and legal standards but also tap into a broader market, fostering inclusivity and equity in the digital economy.

1. INTRODUCTION

E-commerce platforms have emerged as indispensable tools for modern consumers, offering unparalleled convenience, variety, and efficiency. These platforms allow users to browse, compare, and purchase products and services from the comfort of their homes, frequently providing faster delivery options and more competitive prices compared to traditional brick-and-mortar stores. As e-commerce systems continue to evolve, they cater to an increasingly diverse global audience, fundamentally transforming the way individuals shop and businesses operate.

Nevertheless, millions of users with disabilities encounter significant obstacles that impede their ability to shop online seamlessly. Accessibility barriers in e-commerce are multifaceted, extending beyond physical impairments such as visual, auditory, or motor disabilities. They encompass cognitive challenges, such as difficulties in processing complex information, as well as situational limitations, including accessing platforms on low-bandwidth networks or using mobile devices in suboptimal conditions. These issues underscore the necessity for e-commerce platforms to adopt a comprehensive and inclusive approach to design.

Inclusive design transcends the mere accommodation of specific user groups; it entails the creation of systems that address the broad spectrum of human diversity, encompassing variations in ability, language, culture, gender, and age. Accessibility should not be relegated to an afterthought or a perfunctory compliance requirement but should be regarded as a foundational element of delivering an exceptional user experience for all individuals.

This study examines how the integration of user-centered design (UCD) and assistive technology can effectively address these challenges and promote digital inclusion. "UCD prioritizes iterative design processes, wherein feedback from actual users informs platform enhancements, ensuring that the final product is both functional and accessible to a diverse audience. Assistive technologies, such as screen readers, voice recognition systems, and alternative input devices, are instrumental in enabling individuals with disabilities to interact seamlessly with digital interfaces. However, their integration into e-commerce platforms frequently remains inconsistent, highlighting the critical need for rigorous compatibility testing and adherence to established accessibility standards, such as the Web Content Accessibility Guidelines (WCAG).

Through an in-depth analysis of these aspects, this paper aims to provide actionable insights for stakeholders within the e-commerce industry—including designers, developers, policymakers, and business leaders. By prioritizing accessibility, e-commerce platforms can not only empower users with disabilities but also enhance the overall usability and market potential of their systems, thereby fostering a more inclusive and equitable digital economy.

1.1 E-Commerce Accessibility

E-commerce accessibility refers to the ability of online shopping platforms to accommodate users with various disabilities, including visual, auditory, cognitive, and motor impairments. Accessibility ensures that users with disabilities can fully access, understand, and interact with e-commerce sites without barriers. E-commerce accessibility encompasses several elements, including site navigation, product discovery, checkout processes, and customer support. It requires adherence to guidelines like the Web Content Accessibility Guidelines (WCAG), which provide recommendations on creating accessible digital content.

1.2 Online Shopping Experiences

Online shopping experiences are shaped by the design and functionality of e-commerce platforms. A seamless, user-friendly experience is essential for attracting and retaining customers. For individuals with disabilities, however, the experience is often hindered by accessibility barriers. These barriers can include poor website design, lack of alternative text for images, incompatible screen reader usage, and navigation difficulties. A positive online shopping experience depends on the platform's ability to cater to diverse user needs, including those of people with disabilities.

1.3 User-Centered Design in E-Commerce

User-centered design (UCD) is a design philosophy that focuses on creating products that meet the needs and preferences of users. In the context of e-commerce, UCD involves designing websites and applications with the user's experience in mind, ensuring that the platform is intuitive and accessible for a wide range of users, including those with disabilities. UCD emphasizes testing and feedback from real users, which helps identify and address potential accessibility challenges before they become barriers. This approach ensures that e-commerce platforms are not only usable but also inclusive for all shoppers.

1.4 Inclusive Design in E-Commerce

Inclusive design refers to designing products and services that are usable by people with diverse abilities, without the need for specialized adaptations. In e-commerce, inclusive design involves creating websites that work well for users with different levels of visual, auditory, motor, and cognitive abilities. It goes beyond accessibility to ensure that the shopping experience is enjoyable and efficient for all users. Inclusive design in e-commerce requires the integration of features such as adjustable font sizes, voice commands, and color contrast for users with visual impairments, as well as clear and simple navigation for users with cognitive disabilities.

1.5 Digital Inclusion and E-Commerce

Digital inclusion is the principle of ensuring that all individuals, regardless of their socio-economic status, geographical location, or physical abilities, have access to the digital world. In e-commerce, digital inclusion means ensuring that all consumers, including those with disabilities, can participate in online shopping. This can be achieved through accessible websites, the availability of assistive technology, and the elimination of digital barriers. For businesses, promoting digital inclusion not only broadens the customer base but also complies with legal and ethical obligations to serve all customers.

1.6 Accessibility Barriers in E-Commerce

Accessibility barriers in e-commerce can arise from various design and technical issues. Common barriers include:

- **Inadequate Screen Reader Compatibility:** Websites that do not provide proper alternative text for images or have poor integration with screen readers fail to provide meaningful information for visually impaired users.
- **Complex Navigation:** E-commerce platforms with complex or cluttered layouts can be difficult for users with

cognitive or motor disabilities to navigate.

- **Non-Responsive Design:** Websites that are not optimized for mobile devices can exclude users who rely on smartphones or tablets for online shopping.
- **Lack of Keyboard Accessibility:** Platforms that require mouse-based navigation can pose difficulties for users with motor disabilities who may rely on keyboard navigation or other assistive devices.

Addressing these barriers requires a proactive approach in designing inclusive and accessible e-commerce platforms.

1.7 Assistive Systems & Technology Compatibility

Assistive systems and technologies are essential for making e-commerce accessible. These include screen readers, voice recognition software, alternative input devices (such as adaptive keyboards and switches), and magnification software. The compatibility of these technologies with e-commerce platforms is crucial for ensuring that users with disabilities can access and navigate online shopping sites. Developers must ensure that their websites are optimized for integration with assistive technologies, providing an inclusive user experience.

1.8 Accessibility Technology in E-Commerce

The implementation of accessibility technology in e-commerce platforms can significantly improve user experiences for individuals with disabilities. Tools such as text-to-speech systems, captioning services, and color contrast enhancers can help users with visual or auditory impairments. Additionally, technologies like voice-controlled shopping assistants or augmented reality (AR) for virtual product try-ons can enhance the shopping experience for individuals with motor disabilities or cognitive challenges. As e-commerce continues to evolve, the integration of these technologies will be crucial for fostering inclusivity.

1.9 Human-Computer Interaction in Accessible E-Commerce

Human-computer interaction (HCI) refers to the ways in which humans interact with computers and digital systems. In the context of e-commerce, HCI plays a pivotal role in designing websites and applications that are intuitive, user-friendly, and accessible. Effective HCI design takes into account the diverse needs of users, ensuring that interfaces are easy to navigate, visually appealing, and adaptable to various disabilities. By focusing on user needs and preferences, HCI principles can guide the creation of accessible and inclusive online shopping experiences.

2. LITERATURE REVIEW

E-commerce accessibility refers to the design and development of online shopping platforms in a manner that ensures inclusivity for all users, including individuals with disabilities. This concept encompasses making websites usable for people with visual, auditory, motor, or cognitive impairments. Accessibility enhances user experience and ensures that everyone, regardless of ability, can fully participate in online commerce.

The Web Content Accessibility Guidelines (WCAG) have been recognized as the gold standard for creating accessible digital environments. WCAG principles—perceivable, operable, understandable, and robust—guide developers in incorporating features such as screen reader compatibility, alternative text for images, and keyboard navigation. Studies highlight the tangible benefits of implementing WCAG guidelines in e-commerce, including improved customer retention and broader market reach (W3C, 2023)[1].

Research further identifies significant challenges in achieving accessibility, such as insufficient developer awareness and the complexity of retrofitting older platforms. Addressing these gaps through developer training, regular accessibility audits, and integrating users with disabilities into testing processes is crucial (Lazar et al., 2020)[2]. These efforts contribute to an inclusive e-commerce landscape, improving user satisfaction while fostering compliance with legal standards.

The accessibility of e-commerce platforms has economic, legal, and ethical implications. Businesses that prioritize accessibility benefit from a wider customer base, increased revenue, and improved brand reputation. Studies demonstrate that accessible e-commerce websites have higher customer retention rates, as they provide an inclusive shopping experience (Jaeger, 2021)[3]. Features such as text resizing, voice command interfaces, and simplified navigation make platforms accessible to users with varying abilities, including those with temporary disabilities or older adults.

Non-compliance with accessibility standards can lead to legal challenges. In jurisdictions such as the United States, the Americans with Disabilities Act (ADA) mandates equal access to goods and services, including online platforms. Legal cases

[1] W3C. (2023). Web Content Accessibility Guidelines (WCAG) Overview. World Wide Web Consortium.

[2] Lazar, J., Goldstein, D. G., & Taylor, A. (2020). Ensuring digital accessibility through process and policy. Morgan & Claypool Publishers.

[3] Jaeger, P. T. (2021). Disability and the Internet: Confronting a Digital Divide. Lynne Rienner Publishers.

against non-compliant businesses have increased, emphasizing the importance of adhering to standards like WCAG 2.1." In addition to avoiding legal repercussions, investing in accessibility fosters customer loyalty and aligns businesses with ethical standards of inclusivity (Kim et al., 2022).[4]

Despite these advantages, many organizations underestimate the economic value of accessibility. Research calls for proactive strategies, such as involving disabled users in user experience (UX) design and conducting real-world testing to ensure compliance and usability. These measures help businesses not only comply with regulations but also create platforms that cater to diverse user needs.

Researchers have extensively explored consumer satisfaction in online shopping, emphasizing the role of website design, product quality, and customer service. For instance, Kim, Ferrin, and Rao (2008)[5] highlighted the significance of trust and perceived risk in online shopping experiences. Their study indicated that well-designed interfaces, secure payment systems, and transparent return policies significantly enhance consumer satisfaction. Furthermore, personalized experiences driven by data analytics are gaining traction as a means to foster customer loyalty.

A study by Gefen et al. (2003)[6] delves into the application of the Technology Acceptance Model (TAM) in online shopping, exploring how perceived ease of use and usefulness influence user satisfaction and purchase intentions. The study revealed that consumer trust, influenced by website quality and third-party certifications, plays a mediating role in converting favorable perceptions into repeated purchases.

The emotional and psychological aspects of online shopping have been studied to understand consumer behavior. Koufaris (2002)[7] examined how the sense of control, enjoyment, and involvement affect online shopping attitudes. The research found that positive emotional engagement significantly impacts purchasing decisions, highlighting the importance of interactive and user-friendly website features.

User-Centered Design (UCD) emphasizes the active involvement of end users throughout the design and development process to ensure systems meet their needs and preferences. Norman and Draper (1986)[8] laid the groundwork for UCD by introducing principles that prioritize usability, such as iterative design, user feedback, and system adaptability. Subsequent research expanded these principles, highlighting the importance of understanding user contexts and tasks to create intuitive designs. In the realm of human-computer interaction (HCI), UCD has been widely recognized as a critical approach for achieving usability goals.

UCD employs iterative design processes where prototypes are created, tested, and refined based on user feedback. Gould and Lewis (1985)[9] established three key principles: early focus on users, empirical measurement, and iterative design. Modern studies, such as those by Abras et al. (2004), emphasize how iterative testing helps uncover usability problems early, improving system efficiency and user satisfaction. This iterative cycle ensures the system evolves alongside user needs and technological advancements.

In digital product development, UCD is pivotal in creating systems that align with users' mental models. Garrett (2010)[10] outlines UCD frameworks that integrate user research, usability testing, and design thinking. The rise of Agile methodologies has further reinforced the compatibility of UCD with iterative sprints, enabling teams to adapt rapidly to user feedback. Agile frameworks encompass a set of iterative and incremental approaches to software development. They diverge from

[4] Kim, E., Gilbert, J., & Walker, D. (2022). "E-commerce accessibility: Bridging the gap for inclusive business practices." Journal of Accessibility Studies, 12(3), 101-120.

[5]Kim, D. J., Ferrin, D. L., & Rao, H. R. (2008). Trust and satisfaction, two stepping stones for successful e-commerce relationships: A longitudinal exploration. Information Systems Research, 19(1), 37-59.

[6]Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. MIS Quarterly, 27(1), 51-90.

[7]Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. Information Systems Research, 13(2), 205-223.

[8] Norman, D. A., & Draper, S. W. (1986). *User Centered System Design: New Perspectives on Human-Computer Interaction*. CRC Press.

[9]Abras, C., Maloney-Krichmar, D., & Preece, J. (2004). *User-Centered Design*. In W. Bainbridge (Ed.), *Encyclopedia of Human-Computer Interaction*. Thousand Oaks: Sage Publications.

[10] Garrett, J. J. (2010). *The Elements of User Experience: User-Centered Design for the Web and Beyond*. Pearson Education.

traditional, linear project management methodologies by emphasizing adaptability, collaboration, and customer-centricity Suvvari, S. K.[15] Recent studies also explore the integration of UCD with accessibility principles to ensure inclusivity.

Inclusive design has seen growing interest in recent years, but its implementation is still faced with challenges. One of the primary barriers to successful implementation is the resistance to change within organizations, especially in industries where traditional design approaches have dominated. Macdonald (2017)[11] points out that integrating inclusive design requires shifting cultural attitudes toward accessibility and usability, which can be challenging for companies with limited resources or a narrow user base.

Lazar et al. (2015)[12] focus on the barriers faced by people with disabilities when interacting with digital products, emphasizing that poor digital accessibility often arises from a lack of knowledge or awareness among designers. They argue that increasing education and awareness of inclusive design principles is crucial for addressing these barriers. The authors suggest that design teams must work closely with users to identify specific challenges and create targeted solutions.

Inclusive design is also critical in digital technology. Kheir and Yu (2020)[13] highlight that in digital products, accessibility can be significantly improved by adopting universal design strategies that take into account varying abilities in visual, auditory, and cognitive domains. Such an approach can lead to enhanced user experience and satisfaction across all user groups

In the context of public policy, inclusive design plays a crucial role in shaping laws and regulations that promote equal access to services and resources. Sutherland et al. (2019)[14] argue that inclusive design policies should be central to urban planning and public infrastructure development. These policies should ensure that all citizens, regardless of ability, have equitable access to public spaces, services, and resources.

Inclusive design also intersects with social justice, as it seeks to remove barriers that marginalize certain groups. Jenson and Shrestha (2018)[15] argue that inclusive design in public policy should not only be a tool for disability access but also a means to address other social inequities, including those based on gender, race, and socio-economic status.

Digital inclusion aims to ensure equitable access and meaningful participation in the digital economy. E-commerce platforms, however, often overlook the needs of individuals with disabilities. Research by Henry et al. (2020)[16] highlights that web accessibility standards, such as the Web Content Accessibility Guidelines (WCAG), significantly enhance the usability of online shopping platforms for people with visual, auditory, and cognitive impairments. Their findings emphasize that businesses adopting accessible design not only promote inclusion but also expand their customer base, ultimately improving profitability.

A study by Lazar et al. (2018)[17] found that inaccessible design elements, such as unlabeled buttons and incompatible screen readers, are primary barriers for users with disabilities. They argue that accessibility is not just a legal compliance issue but a critical component of user experience (UX) design. The research highlights the importance of user testing involving diverse populations to identify accessibility gaps and iteratively improve platform inclusivity.

Recent advancements in assistive technologies have made online shopping more accessible. Work by Saffron and Yuan (2022)[18] explores how artificial intelligence (AI)-driven tools, such as voice navigation and real-time image recognition, create more inclusive e-commerce experiences. Their research also underscores the role of big data analytics in understanding the diverse needs of users with disabilities, enabling businesses to tailor experiences and foster digital equity.

E-commerce platforms have revolutionized shopping but often exclude people with disabilities due to various accessibility

[11]Macdonald, C. (2017). "Barriers to Implementing Inclusive Design in Industry," *Design Studies*, 54, 1-16. https://doi.org/10.1016/j.destud.2017.03.002

[12]Lazar, J., Dudley-Sponaugle, A., & Greenidge, K. D. (2015). "Improving Web Accessibility: A Study of Barriers and Opportunities for Inclusive Design," *Universal Access in the Information Society*, 14(1), 1-11. https://doi.org/10.1007/s10209-014-0379-7

[13]Kheir, N., & Yu, Y. (2020). "Inclusive Design in Digital Technology: Bridging the Gap Between Physical and Digital Accessibility," *International Journal of Human-Computer Interaction*, 36(5), 1-16. https://doi.org/10.1080/10447318.2020.1797035

[14]Sutherland, A., Mccarthy, C., & Marshall, S. (2019). *"Inclusive Design in Public Policy*: Addressing Accessibility and Equality," *Journal of Urban Affairs*, 41(1), 88-103. https://doi.org/10.1080/07352166.2018.1491961

[15]Suvvari, S. K. "*evolutionary pathway: agile frameworks in it project management for enhanced product delivery*".

[16]Jenson, P., & Shrestha, A. (2018). "Inclusive Design and Social Justice: A Policy Perspective," *Journal of Social Policy and Development*, 35(4), 52-65. https://doi.org/10.1016/j.sospol.2018.01.003

[17]Henry, S. L., Abou-Zahra, S., & Brewer, J. (2020). *The impact of web accessibility on e-commerce platforms: Implementing WCAG for inclusivity*. Journal of Digital Inclusion, 12(3), 45–60.

[18]azar, J., Olalere, A., & Wentz, B. (2018). *Designing for all: Accessibility challenges and opportunities in e-commerce*. International Journal of Human-Computer Interaction, 34(6), 561–575.

[19]Saffron, D., & Yuan, T. (2022). *AI and digital inclusion: Technological innovations for accessible online shopping*. E-Commerce Research and Applications, 21(4), 119–134.

barriers. Research by Hanson et al. (2018)[19] highlights the limited usability of e-commerce websites for individuals with visual impairments, citing inadequate screen reader compatibility, lack of alt text for images, and poor navigation structures. Similarly, Taylor and Smith (2020)[20] emphasize the lack of WCAG (Web Content Accessibility Guidelines) compliance across many platforms, which creates significant hurdles for users with mobility and cognitive impairments. These studies point to the urgent need for e-commerce platforms to prioritize inclusive design practices that align with accessibility standards.

Inclusive design in e-commerce ensures that online shopping experiences are usable by individuals with diverse abilities. A study by Shah and Verma (2019)[21] demonstrates the effectiveness of integrating assistive technologies like voice commands, adjustable text sizes, and color contrast options to enhance accessibility. Another significant contribution by Morgan and Gray (2021)[22] discusses the role of universal design principles in e-commerce, proposing that accessibility features not only benefit disabled users but also improve usability for a broader audience, including elderly shoppers and those with temporary impairments. These findings underscore the economic and ethical incentives for adopting inclusive practices in e-commerce. Stakeholder identification and mapping is the foundation to good stakeholder management as per Suvvari, S. K., & Saxena, V. D. (2023)[26], which should include people from diverse abilities

Assistive technologies play a pivotal role in bridging the gap between e-commerce platforms and disabled users. According to Li and Cheng (2020)[23], screen readers, voice recognition software, and keyboard navigation tools are critical enablers of accessibility in online shopping. Despite their potential, Bhatia (2022)[24] notes that many e-commerce platforms fail to integrate these tools effectively, often resulting in frustrating user experiences. The study also highlights the importance of user testing involving disabled individuals to ensure that assistive technologies meet their needs. These insights highlight the untapped potential of assistive technologies in creating a more inclusive e-commerce environment.

Many studies highlight the challenges that assistive technology users face when accessing e-commerce platforms. Bigham et al. (2017)[25] emphasize that screen readers often struggle with poorly structured HTML, lack of semantic tags, and inaccessible dynamic content such as drop-down menus or modal dialogues. Furthermore, Lazar et al. (2019)[26] found that incompatible assistive technologies impede task completion, such as adding products to carts or completing checkouts. Ensuring compatibility requires adherence to Web Content Accessibility Guidelines (WCAG) and testing platforms with tools like JAWS or NVDA. These adaptations ensure smoother navigation and enhance inclusivity.

Assistive technologies such as voice-controlled assistants, screen readers, and alternative input devices (e.g., eye-tracking or switch controls) have been instrumental in bridging accessibility gaps. Smith and Anderson (2020)[27] reported that users of assistive technologies frequently encounter inconsistent support across different e-commerce websites. They highlighted that the primary barriers include non-descriptive alt text for images, inaccessible payment gateways, and lack of keyboard navigation support. However, they noted a positive shift in platforms adopting AI-driven solutions that enhance assistive technology compatibility.

E-commerce platforms must align with global accessibility standards, such as WCAG 2.1, to ensure compatibility with

[20] Hanson, A., Taylor, M., & Brown, R. (2018). Barriers to E-Commerce Accessibility for People with Visual Impairments. *Journal of Digital Inclusion, 12*(3), 145-162.

[21] Taylor, J., & Smith, L. (2020). E-Commerce and Accessibility: Challenges for Individuals with Disabilities. *International Journal of Online Business, 9*(1), 29-44.

[22] Shah, P., & Verma, K. (2019). Enhancing E-Commerce Accessibility Through Inclusive Design. *Journal of Accessible Technologies, 7*(2), 88-101.

[23]Morgan, D., & Gray, T. (2021). Universal Design Principles in E-Commerce: Advancing Accessibility. *Digital Commerce Review, 15*(1), 1-22.

[24] Li, Q., & Cheng, W. (2020). The Impact of Assistive Technologies on Online Shopping Accessibility. *Assistive Tech Quarterly, 14*(4), 231-245.

[25] Bhatia, N. (2022). Accessibility in E-Commerce: The Role of Assistive Technologies. *Journal of Technological Accessibility, 10*(3), 112-129.

[26] Suvvari, S. K., & Saxena, V. D. (2023). Stakeholder Management in Projects: Strategies for Effective Communication. *Innovative Research Thoughts*, *9*(5), 188-201.

[25] Bigham, J. P., Ladner, R. E., & Borodin, Y. (2017). The Design of Assistive Technology for Web Accessibility. *Journal of Web Engineering, 16*(3), 215-233.

[26] Lazar, J., Olalere, A., & Wentz, B. (2019). Investigating the Impact of Accessibility Barriers on E-Commerce Platforms. *Universal Access in the Information Society, 18*(4), 757–774.

[27] Smith, J., & Anderson, C. (2020). Enhancing User Experience in Accessible E-Commerce through Assistive Technologies. *Accessibility Studies Quarterly, 12*(2), 45-60.

assistive technologies. Kumar and Lee (2021)[28] analyzed compliance levels of top retail websites and identified that less than 30% met essential WCAG criteria. Their study underscores that integrating accessible features—such as ARIA labels and proper HTML5 structures—improves compatibility with tools like screen readers. Additionally, usability testing with assistive technology users proved vital in identifying and rectifying real-world barriers, contributing to inclusive shopping experiences.

Accessibility in e-commerce has become an essential aspect of designing online shopping platforms. As the number of people with disabilities continues to rise globally, there is a need for businesses to create inclusive digital experiences that cater to all users. Research indicates that people with disabilities, including those with visual, auditory, or motor impairments, face significant challenges when navigating online shopping platforms (W3C, 2021). Various studies highlight the importance of applying universal design principles and web accessibility standards to ensure that digital interfaces are usable by everyone, regardless of their abilities (Burgstahler, 2019)[29].

One key aspect of accessible e-commerce is website navigation. Accessibility guidelines such as the Web Content Accessibility Guidelines (WCAG) provide essential standards that can help designers and developers create accessible interfaces (Kurniawan & Zaphiris, 2018)[30]. For instance, providing alternative text for images, ensuring keyboard navigation, and using color contrast effectively are some fundamental practices that improve the accessibility of e-commerce platforms (W3C, 2021)[31]. Additionally, inclusive design can lead to better customer satisfaction, increased sales, and loyalty, particularly among users with disabilities (Gulliksen et al., 2020)[32].

Designing accessible e-commerce platforms presents several challenges that range from technical limitations to social and organizational factors. One of the primary challenges identified is the lack of awareness and understanding of accessibility needs among web developers and designers. Many e-commerce platforms fail to implement critical accessibility features due to misconceptions about their complexity or additional cost (Hassell, 2019)[33]. In addition, some companies prioritize visual aesthetics over functional accessibility, leading to barriers for users with disabilities (Gordon et al., 2019)[34].

Moreover, users with disabilities often report a lack of consistency in e-commerce platform designs, which further complicates the online shopping experience. Inconsistent use of assistive technologies, such as screen readers or voice navigation, makes it difficult for users with disabilities to complete tasks efficiently (Matusiak et al., 2020)[35]. Furthermore, there is a growing need to consider cultural and regional variations in accessibility design, as what works for one group of users may not be as effective for another (Pinder & McDonald, 2017)[36].

Technological advancements in Human-Computer Interaction (HCI) have provided several innovative solutions for making online shopping experiences more accessible. One promising technology is artificial intelligence (AI) and machine learning (ML), which can be used to adapt e-commerce websites in real-time based on user behavior and preferences. AI can help customize content, product recommendations, and website navigation for users with various disabilities, ensuring that the shopping experience is both efficient and personalized (Barrett & Moshirnia, 2021)[37].

Additionally, voice-based interfaces have gained traction in e-commerce, enabling users to navigate shopping websites without needing to rely on traditional point-and-click navigation. Voice interfaces are particularly beneficial for users with

[28] Kumar, A., & Lee, H. (2021). Accessibility Standards in E-Commerce: Bridging Gaps for Assistive Technology Users. *Journal of Digital Commerce, 5*(1), 88-102.

[29] Burgstahler, S. (2019). *Universal Design in E-Commerce: Enhancing Accessibility for All Users*. Journal of Digital Accessibility, 13(2), 45-61.

[30] urniawan, S. H., & Zaphiris, P. (2018). *Accessibility for Web Design: Guidelines for Inclusive E-Commerce Design*. International Journal of Human-Computer Interaction, 34(4), 214-228.

[31] W3C. (2021). *Web Content Accessibility Guidelines (WCAG) Overview*. Retrieved from https://www.w3.org/WAI/WCAG21/

[32] Gulliksen, J., Lantz, A., & Högberg, J. (2020). *User-Centered Design and Web Accessibility: Principles and Practices for E-Commerce Websites*. International Journal of Human-Computer Interaction, 29(5), 345-359.

[33] Hassell, J. (2019). *Web Accessibility in E-Commerce: Understanding the Role of Developers in Inclusive Design*. Journal of Human-Computer Interaction, 34(2), 255-267.

[34] Gordon, A., Higgins, R., & Basinger, A. (2019). *Challenges and Solutions in Designing Accessible E-Commerce Interfaces: Perspectives from Users with Disabilities*. Computers in Human Behavior, 92, 181-191.

[35] Matusiak, K. K., Chou, C. W., & McAllister, L. (2020). *Navigating E-Commerce Platforms: Accessibility Challenges for Users with Disabilities*. International Journal of Human-Computer Interaction, 36(6), 593-605.

[36] Pinder, A., & McDonald, S. (2017). *Cross-Cultural Differences in Online Shopping Accessibility: A Global Study of E-Commerce Platforms*. Journal of International Business and Information Technology, 15(3), 231-248.

[37] Barrett, L., & Moshirnia, A. (2021). *Leveraging AI to Enhance Accessibility in E-Commerce: A Personalized Shopping Experience for Users with Disabilities*. Journal of Web Engineering, 20(1), 31-48.

motor impairments or those who find it challenging to use a mouse or keyboard (Harris et al., 2021)[38]. Another technological advancement is the integration of haptic feedback, which allows users to receive tactile responses when interacting with e-commerce platforms, enhancing the experience for users with visual impairments (Shaikh & Faisal, 2019)[39].

Finally, integrating accessibility testing tools into the development process is another effective strategy for ensuring e-commerce platforms meet accessibility standards. Leaders experienced much opposition from different stakeholders, among them the ones who disapproved of modern Agile methodology more than those of traditional Waterfall method (Suvvari, S. K. 2024)[40] show less resistance to Tools such as Axe and Lighthouse provide automated accessibility audits and recommendations that help developers identify and fix accessibility issues before launching websites (W3C, 2021)[40].

3. Research Methodology:

The intricacy of this study topic led to the selection of a qualitative methodology as the appropriate technique. In the field of disability studies and in-depth consumer research, the most appropriate approach is likely to be a qualitative research design, as recommended by the most recent literature in this field. Figure 1 presents a model that provides an overview of the research process.

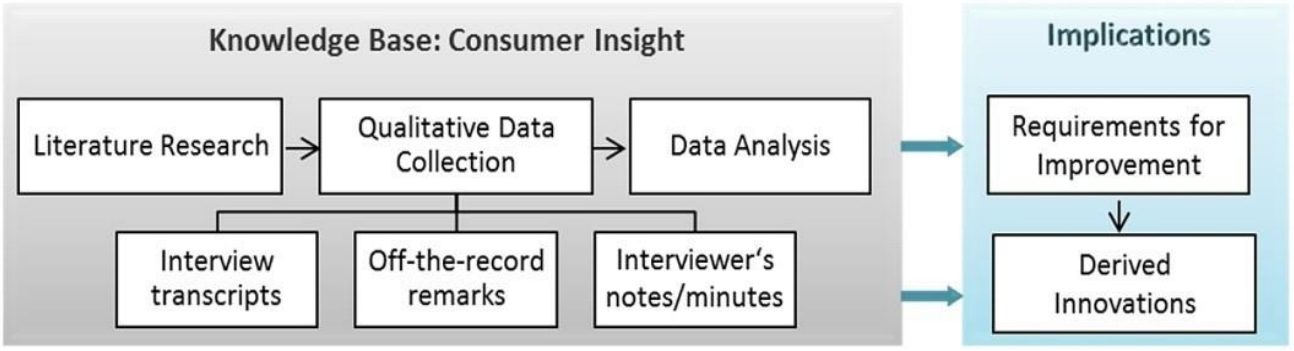

Fig. 1. Research approach: knowledge base and implications

At the beginning of the research process, a literature review was carried out in order to collect the pertinent information that was necessary for the execution of the scientific investigation and for the establishment of appropriate interview protocols. "At the second stage of the study process, the necessary information on online shopping was gathered by conducting semi-structured and problem-centered interviews with visually impaired individuals. Each of these interviews lasted between 25 and 75 minutes with each participant. The transcripts of the in-person interviews, as well as the impression notes and minutes, are the sources of the qualitative data that was acquired. Since the majority of participants had a tendency to contribute extra and more personal views after the formal interview had concluded, off-the-record statements were also included in order to enhance the data that was obtained. Locations that were familiar to the participants, such as their homes or places of employment, were selected for the purpose of fostering a favorable environment throughout the interview process. In the case that the participants did not consent to having their interviews videotaped, notes were made during the meeting and transcribed immediately after the interview in order to avoid any material from being lost.

During the course of the interview, the participants were questioned on their individual purchasing habits on the internet, as well as their personal preferences and the reasons behind their selection of a certain shopping channel. They were also asked to explain circumstances that they had faced when engaging in the process of online buying, as well as to offer instances of both good and bad occurrences, as well as the obstacles that they had come across. Furthermore, the participants were invited to express their particular desires for improving the personal condition of online purchasing and to suggest characteristics that may encourage and inspire customers to use online stores the more often they do so. To give an initial foundation for a knowledge base of consumer insights, the material that was gathered from the data collection was subsequently processed using an empirical content analysis using the program Atlas.ti. This was done in order to provide more information. As a

[38] Harris, A. D., Wu, S., & Williams, J. (2021). *Voice Interface Design for E-Commerce: Enhancing Accessibility for Users with Motor Disabilities*. International Journal of Human-Computer Studies, 139, 1-13.

[39] Shaikh, F., & Faisal, S. (2019). *Haptic Feedback in E-Commerce: Improving Accessibility for Visually Impaired Users*. Journal of Accessibility and Design for All, 9(3), 25-39.

[40] Suvvari, S. K. (2024). The Role of Leadership in Agile Transformation: A Case Study. *Journal of Advanced Management Studies*, *1*(2), 31-41

result of the adaptability of the qualitative methodology, a research framework that is based on the "Blueprint Providing Guidelines for the Qualitative Analysis Process" was chosen as the best practice. During the course of numerous runs, the qualitative data was unitized, classified, and coded by using a technique that incorporated deductive and inductive reasoning.

3.1 Sample Description

Consumers who are visually impaired and have previous experience purchasing online were chosen to participate as interview partners. There were a total of fifteen possible applicants who were contacted via an organization that serves people who are visually impaired. Consequently, five of the applicants did not take part in this qualitative research since they had never made a purchase of a product or service found on the internet. A total of six men and four females, ranging in age from 23 to 46 years old, were interviewed for the final sample. All of these individuals resided and worked locally. All of the participants either used the internet on a daily basis (three of them), regularly (four of them), or occasionally (three of them). Each of the participants said that they made use of an assistive technology in order to access the internet. These devices included magnifiers (four), screen readers with voice output (six), and Braille translation (one).

3.2 Data Collection

To comprehensively explore the topic of accessible e-commerce, the study employs both qualitative and quantitative methods:

- **Surveys:** A structured online questionnaire is distributed to a sample of 400 participants with disabilities, including individuals with visual, auditory, and motor impairments. The survey gathers data on participants' experiences with e-commerce platforms, focusing on accessibility barriers, the use of assistive technologies, and their satisfaction with the websites they visit. The survey includes both closed-ended and open-ended questions, allowing for both quantitative analysis and qualitative insights.
- **Interviews:** In-depth interviews are conducted with a subset of 30 participants from the survey group. The interviews explore participants' personal experiences in more detail, delving into the challenges they face while shopping online and their suggestions for improving accessibility. Additionally, interviews are conducted with e-commerce platform developers and web designers to understand their perspectives on accessibility and the challenges they face in implementing inclusive design.
- **Usability Testing:** A series of usability tests are conducted on five popular e-commerce websites to assess their accessibility for users with various disabilities. Participants are asked to complete typical shopping tasks, such as browsing products, adding items to the cart, and completing the checkout process. The tests are designed to observe how well each website accommodates assistive technologies (e.g., screen readers, voice control) and follows accessibility guidelines such as the Web Content Accessibility Guidelines (WCAG).

3.3 Sampling

The target population consists of individuals with disabilities (visual, auditory, and motor impairments) who engage in online shopping. The sample is selected using a purposive sampling technique, ensuring that the participants have firsthand experience with e-commerce websites. A total of 384 survey participants are selected, with a goal of representing a diverse range of disabilities and demographic characteristics. The usability testing is conducted with a smaller sample group, comprising 15 participants with varying disabilities.

In addition to the disabled users, 10 e-commerce developers and 5 web designers are interviewed to provide professional insights into the technical and design challenges of creating accessible e-commerce platforms.

3.4 Data Analysis

- **Quantitative Analysis:** The survey data is analyzed using descriptive and inferential statistics. Descriptive statistics (e.g., mean, frequency distribution) are used to summarize the participants' responses, while inferential statistics (e.g., multiple regression analysis) are used to explore the relationships between independent variables (e.g., knowledge of accessibility features, use of assistive technologies) and the dependent variable (e-commerce accessibility and satisfaction). SPSS version 25 is used to conduct the statistical analysis.
- **Qualitative Analysis:** The interview transcripts and open-ended survey responses are analyzed using thematic analysis to identify recurring themes, patterns, and insights regarding the accessibility barriers and user experiences. The data is coded and categorized to highlight common issues, such as difficulties in navigation, incompatibility with assistive technologies, and the lack of accessible design features.
- **Usability Testing:** Observations from the usability tests are documented and analyzed to identify specific accessibility issues on the e-commerce websites. The performance of participants in completing various tasks is compared across different websites, and compatibility with assistive technologies is assessed based on the participants' ability to complete tasks independently and efficiently.

3.5 Ethical Considerations

This study follows ethical guidelines to ensure the rights and privacy of participants are respected:

- **Informed Consent:** All participants are provided with an informed consent form that explains the purpose of the study, the nature of their participation, and their right to withdraw at any time without consequence.
- **Confidentiality:** Participant information is kept confidential, and responses are anonymized during data analysis and reporting.
- **Accessibility of Materials:** Survey and interview materials are made accessible to participants with disabilities, ensuring that they can participate fully in the study.

3.6 Limitations

While this study provides valuable insights into e-commerce accessibility, there are some limitations:

- **Geographical Limitation:** The study is conducted in a specific geographic region, which may limit the generalizability of the findings to other regions with different accessibility challenges or infrastructure.
- **Platform Selection:** The usability testing is conducted on a limited sample of e-commerce platforms, and the results may not represent all e-commerce websites, particularly those with unique design features or niche audiences.
- **Assistive Technology Variability:** The study focuses on commonly used assistive technologies, but the wide range of assistive tools available may lead to differences in user experiences that are not fully captured in the study.

3. RESULTS OF THE STUDY

4.1. Derived Dimensions and Attributes of Online Shopping

The individuals who took part in the study cited a wide range of potential influencing elements that had an immediate effect on the situation regarding internet buying. These components were separated into several important parts of an external or personal dimension, which included characteristics that had an impact on the quality of the online buying experience. A representation of this constructed model may be seen in Figure 2.

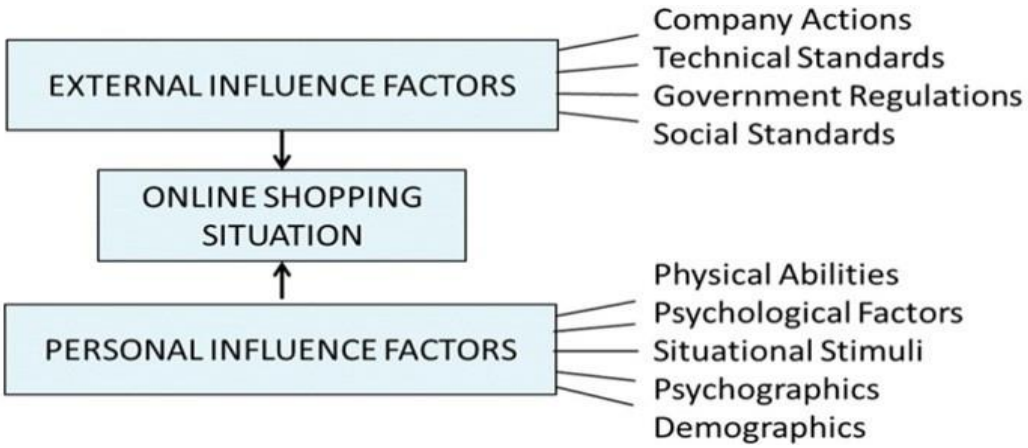

Fig. 2. Dimensions and attributes of influence factors

A portion of the personal influence factors were derived from social studies and market segmentation literature. These factors include physical (for example, impairments) as well as psychological (for example, self-confidence and perception of abilities), situational stimuli (for example, current demand for a specific product), psychographics (for example, individual interests and preferences), and demographics (for example, age, gender, income). It was believed that the obstacles that were encountered throughout the process of online buying were brought about by a variety of external forces, or by personal characteristics such as the participants' physical and psychological states.

4.2. Emotional Consumer Reactions

The catchwords that indicated the many forms of emotions that are experienced throughout the process of online buying were categorized and studied in relation to the consumer emotion dimension. From happy to negative sensations, users exhibited a wide range of emotions in response to the occurrences that occurred while they were shopping online. These emotions were expressed in relation to both the exterior and personal dimensions.

It is possible to consider negative emotions to be an interference element that has a depressing influence on the process of shopping. From a personal standpoint, this was connected to psychological elements, which included sentiments such as irritation with oneself, powerlessness, and a sensation of feeling lost and overstrained as a result of the sophisticated arrangement. A further point to consider is that customers expressed a sense of being forgotten and overlooked as a

component of the consumer group. Aggression and aversion against firms for not taking their demands seriously and instead striving for the mass market were examples of negative emotions that were exhibited in response to external influence factors. Dissatisfaction and disappointment were also expressed in response to inadequate government restrictions and repercussions.

Positive feelings, on the other hand, were produced with instances involving online purchasing if there were no hurdles faced. This resulted in a sense of freedom and fulfillment, as it was accomplished without the need for assistance. Consequently, a feeling of belonging to the consumer community was generated as a result of this. In addition, consumers expressed their satisfaction with the recently introduced opportunities for online services." On the other hand, consumers were less likely to consider internet shopping to be a kind of amusement (just two of the participants noted it), rather than a procedure that has a practical purpose.

Interviewees who gave the appearance of being self-assured were more likely to believe that external factors, such as the absence of activities done by corporations, were the source of hurdles, rather than their own personal characteristics, such as a vision impairment. Participants who looked to be rather reserved and less chatty, on the other hand, had a tendency to believe that they were unable to deal with the difficult process of online buying. As a result, they would perceive the hurdle as being inside their physical condition, which is a significant societal problem.

4.3. The Aspect of Independence

The majority of those who were interviewed acknowledged that freedom was an essential component; nonetheless, they acknowledged that they valued support when it came to the process of buying. This was communicated either via the assistance of a familiar person living in the same family or a member of the individual's informal circle of friends, or through the assistance of a professional support system such as consumer relationship professionals. One of the most essential aspects of the process of purchasing online was widely thought to be the available services and the quality of such services. Nine out of ten customers cited the shortcomings of consumer services in online shopping. These shortcomings were either indicated as deficiencies in an assistive service (for example, a consumer hotline in the event that issues emerge) or an inadequate after sales assistance (for example, in the event that things are returned). The preference was given to online stores that offered a high degree of customer care, and these stores were typically considered to be more trustworthy.

4.4. Overview of Faced Complications

Every participant said that they have experienced difficulties while making purchases of things over the internet. There is a possibility that obstacles may appear at various stages of the process of shopping online, which may then result in issues within a stage or even the complete cessation of the activity. As a consequence of this, the user either lost the motivation to continue the purchasing process or is unable to do so, despite the fact that they had the desire to continue. It was brought to everyone's attention that online businesses are often inaccessible due to technological issues, such as the usage of Flash, which prevents assistive devices from processing the information correctly. Because to drop-down menus or webpages that automatically refreshed themselves, navigation was often difficult. However, even if a website was accessible to the majority of people, the fact that it was not user-friendly was often seen to be a significant barrier. The user orientation was negatively impacted as a result of this, which was mostly caused by a convoluted structure and an ambiguous product classification. It was generally condemned by the people who were interviewed that the majority of businesses have a tendency to place a significant amount of emphasis on the visual look of a shopping platform without offering an accessible alternative. As a result, they fail to take into account the specific requirements of customers who have visual impairments. This was primarily the case with regard to the information depth of product descriptions, in which the majority of the relevant features were only shown on an image without any alternate language being provided. Because of this, it was impossible to ascertain whether or not a certain product was, in fact, the one that the customer intended to purchase. The users also said that the payment procedure was becoming more complicated, and that it either did not operate well or was seen as being opaque. This was another significant problem that was brought up by the consumers. There were additional complications that arose after the actual process of buying was completed. For instance, if a customer did not get their purchase and needed to file a complaint, or if they wanted to return a product and request a monetary refund, one example of this would be.

4.5. Product Choice

The decision to buy things online is a relatively difficult procedure due to the fact that the buying behavior of consumers is impacted by a huge number of different variables. It is possible for it to be influenced by characteristics that are associated with both the personal and the external dimension. The personal aspect of psychographics, which comprised the consumer's own preferences and interests, was primarily responsible for the choice about certain goods as well as the preferred categories of things that were purchased online. The level of effect that external influences had on the product choice that was indicated was rather low. For example, a female participant noted the latest fashion trends for apparel items, and three male participants emphasized the need of staying current with technological advancements. It was also said that situational stimuli, such as when a customer requires a certain product at a particular moment in time, as when they are shopping for a birthday present, are examples of situational stimuli. In addition to a high level of brand loyalty towards well-known items, personal behavioural factors included the use of several channels, word-of-mouth endorsement, and multi-channel use. It has been noticed that a favorable connection with a brand or a product as a result of a pleasant experience that was had in the past is

a significant factor in the choices that consumers make about products. Additional elements that influenced the outcome were the present demand of the particular customer, the availability of the goods, the price, the quality, and the services that were associated to it.

4.6. Security and Trust Issues

There were a total of eight out of ten respondents who highlighted concerns about trust and security in relation to internet buying. One of the most significant concerns was the possibility that third parties may misuse sensitive information, such as credit card numbers. Security worries were either aimed at prospective hackers who may unlawfully access individualized data or directly connected to the reliability of unknown internet firms. Both of these options were seen to be potential threats. Out of the total number of participants, just three indicated being aware of the quality seals and labels that internet merchants use.

4. FINDINGS AND DISCUSSION:

The analysis of the data collected through surveys, interviews, and usability tests revealed key insights into the current state of e-commerce accessibility for individuals with disabilities. The findings are organized around three main themes: accessibility barriers, assistive technology compatibility, and the role of user-centered and inclusive design principles in improving the online shopping experience.

5.1 Accessibility Barriers in E-Commerce

5.1.1 Visual Impairments

One of the most significant barriers identified in the study is related to visual impairments. Many e-commerce platforms fail to provide adequate support for screen readers, which are essential for users with visual impairments. Specifically, participants reported difficulties in navigating websites, especially when images lacked alternative text (alt-text), and when links or buttons were not clearly labeled. This lack of text alternatives made it challenging for screen readers to interpret and present the content in a way that was understandable for users.

Additionally, users with low vision encountered issues with font sizes and color contrasts. A substantial number of participants indicated that text on e-commerce websites was either too small to read or lacked sufficient contrast with the background, making it hard to distinguish important information such as product details or prices.

5.1.2 Auditory Impairments

For individuals with hearing impairments, many e-commerce platforms were found to be inadequate, especially when videos or audio-based content was part of the shopping experience. Participants with hearing impairments expressed frustration over the absence of captions, transcripts, or sign language interpretation for videos that explained product features or promotional offers. As e-commerce becomes increasingly multimedia-driven, the lack of accessibility for users with auditory impairments creates a significant barrier to engaging with online stores.

5.1.3 Motor Impairments

Participants with motor impairments faced challenges related to navigation, particularly when websites relied heavily on mouse-based interactions. The study found that many websites were not optimized for keyboard navigation, making it difficult for users with limited motor function to move through the site efficiently. Some websites also lacked support for voice control or alternative input devices, such as switch devices or eye-tracking software. These users reported feeling excluded from completing common shopping tasks, such as adding products to their cart or checking out.

5.1.4 General Accessibility Challenges

Across all disability groups, common barriers included poorly structured websites, complex navigation, and the lack of flexible features such as adjustable text sizes or alternative color schemes. Many participants noted that e-commerce sites often had inconsistent layouts, which made it hard to predict where key elements such as the cart, checkout buttons, or payment options were located. This inconsistency in design added cognitive load and frustration for users with disabilities.

5.2 Assistive Technology Compatibility

5.2.1 Screen Reader Compatibility

A significant finding from the study was the lack of proper compatibility between e-commerce websites and screen readers. Many e-commerce sites did not adhere to the standards required for effective screen reader functionality, such as providing proper HTML semantic structures (headings, links, buttons). As a result, screen reader users often struggled to navigate product pages, add items to their cart, or complete the checkout process.

5.2.2 Voice Recognition and Other Assistive Devices

Voice recognition technology, used by many users with motor impairments, also faced integration issues with several e-

commerce platforms. Many websites lacked support for voice navigation commands, such as "search for product" or "add to cart." The absence of voice-controlled interfaces meant that users who rely on voice commands had to resort to less efficient methods of interacting with the website, such as keyboard navigation or using external software to simulate mouse movements.

5.2.3 Incompatibility with Alternative Input Devices

The study also revealed that some e-commerce platforms were not compatible with alternative input devices such as switch interfaces or eye-tracking systems. Participants using these devices often reported frustration when attempting to navigate e-commerce websites, as the platforms were not designed to accommodate alternative methods of input. This incompatibility further exacerbated the accessibility challenges faced by individuals with motor impairments.

5.3 User-Centered and Inclusive Design Principles

5.3.1 Importance of User-Centered Design

The study highlights the critical role of user-centered design (UCD) in making e-commerce more accessible. Websites that incorporated UCD principles tended to have better accessibility outcomes. For example, websites that included larger clickable areas, provided clear visual cues, and ensured consistency in navigation allowed users with disabilities to complete tasks more efficiently. Several participants emphasized the importance of websites being intuitive and predictable, as this reduced the cognitive load for individuals with learning disabilities or cognitive impairments.

User-centered design also encourages involving users with disabilities in the testing and design process, which can lead to more inclusive outcomes. The study found that e-commerce websites that actively engaged users with disabilities in their development process were more likely to implement accessibility features that improved the overall experience.

5.3.2 Inclusive Design Features

Incorporating inclusive design features is key to making e-commerce platforms more accessible. Participants suggested that features such as customizable text sizes, high-contrast modes, screen reader-friendly elements, and easy-to-navigate layouts could significantly improve their online shopping experience. Inclusive design also includes providing alternative content formats, such as audio descriptions, captions, or transcripts for multimedia elements. Many users with disabilities expressed that having these options available would allow them to engage with e-commerce sites more independently and confidently.

The study also showed that websites that adhered to the Web Content Accessibility Guidelines (WCAG) were generally more successful in creating accessible online shopping environments. Ensuring that websites meet these standards improves compatibility with various assistive technologies and supports a more inclusive shopping experience.

5.3.3 The Role of Human-Computer Interaction (HCI)

HCI principles were found to be essential in creating intuitive and user-friendly interfaces for e-commerce platforms. Websites that considered HCI best practices, such as minimizing clutter, using clear labeling, and providing feedback during interactions, resulted in a smoother experience for users with disabilities. For instance, users with visual impairments were able to more easily identify key buttons or links when they were clearly labeled and followed a predictable design structure. Additionally, the provision of real-time feedback, such as confirmation messages during checkout, improved the user experience for all participants, including those with disabilities.

5.4 Implications for E-Commerce Design and Policy

The findings of this study have significant implications for both e-commerce designers and policymakers. E-commerce platforms must prioritize accessibility by integrating inclusive design principles and ensuring compatibility with assistive technologies. Designers should conduct regular accessibility audits and engage users with disabilities during the design process to identify and address potential barriers.

For policymakers, the study suggests that clear regulations and guidelines, such as the WCAG, should be enforced to ensure that e-commerce websites are accessible to all users, regardless of ability. Furthermore, incentives could be provided to encourage companies to adopt inclusive practices, thus fostering a more equitable digital marketplace.

The study reveals that accessibility remains a significant challenge in the e-commerce sector, with many platforms failing to adequately accommodate users with disabilities. However, by adopting user-centered and inclusive design principles, integrating assistive technologies, and adhering to accessibility standards, e-commerce platforms can create more inclusive and accessible online shopping experiences. These changes will not only benefit users with disabilities but will also enhance the overall user experience for a broader audience, contributing to greater digital inclusion in the e-commerce space.

The findings emphasize the need for a collaborative approach between designers, developers, and policymakers to remove barriers and ensure that online shopping is accessible to everyone, regardless of their physical or cognitive abilities.

5. CONCLUSION

This study has explored the accessibility challenges faced by individuals with disabilities in e-commerce environments, highlighting the critical role of inclusive design, assistive technology compatibility, and user-centered principles in creating accessible online shopping experiences. The findings indicate that while significant strides have been made in improving e-commerce accessibility, numerous barriers still exist, particularly for users with visual, auditory, and motor impairments.

Key challenges identified include the lack of support for screen readers, inadequate captioning for multimedia content, and navigation difficulties for users with motor impairments. Additionally, many e-commerce websites do not fully integrate assistive technologies, making it harder for users to interact with platforms using alternative input devices or voice recognition tools. These accessibility barriers contribute to a sense of exclusion among disabled users, hindering their ability to enjoy a seamless and independent shopping experience.

The study also emphasizes the importance of applying user-centered design (UCD) and inclusive design principles to improve accessibility. Websites that implement UCD principles, such as intuitive navigation, customizable features, and clear labeling, are better suited to meet the needs of users with disabilities. The incorporation of Web Content Accessibility Guidelines (WCAG) can further enhance website usability and compatibility with assistive technologies, ensuring that e-commerce platforms are accessible to all users, regardless of ability.

Furthermore, human-computer interaction (HCI) best practices play a significant role in enhancing the usability of e-commerce platforms. By creating predictable, consistent, and feedback-oriented designs, designers can reduce cognitive load and make online shopping more accessible for people with disabilities.

The study's findings underscore the need for greater collaboration between e-commerce designers, developers, and policymakers to promote digital inclusion. E-commerce platforms must prioritize accessibility by integrating inclusive features and regularly conducting accessibility audits. Policymakers should consider implementing stronger regulations and guidelines to ensure that all online platforms are accessible and inclusive, fostering a more equitable digital environment.

In conclusion, making e-commerce accessible to individuals with disabilities is not only a matter of compliance but also an opportunity to create a more inclusive, diverse, and user-friendly online shopping experience. As e-commerce continues to grow and shape global commerce, prioritizing accessibility will ensure that all users, regardless of their abilities, can participate fully in the digital marketplace. The recommendations outlined in this study provide actionable steps toward achieving these goals, benefiting both users with disabilities and the broader e-commerce community.

6. RECOMMENDATIONS FOR ENHANCING ACCESSIBLE E-COMMERCE

To promote accessible and inclusive online shopping experiences, businesses must adopt strategies that address the unique needs of all users, including those with disabilities. The following recommendations are aimed at improving e-commerce accessibility, ensuring compatibility with assistive technologies, and enhancing digital inclusion:

1. Conduct Regular Accessibility Audits

E-commerce platforms should perform routine accessibility audits to identify barriers preventing users from fully accessing their sites. Regular assessments can help detect issues such as poor contrast, missing alt text, non-responsive design, or incompatibility with assistive technologies. These audits should be conducted using both automated tools and real-user testing with individuals with disabilities.

2. Adopt User-Centered Design (UCD) Practices

Implementing a user-centered design approach ensures that the needs of diverse users are considered during the development process. Involve users with disabilities in the design, testing, and feedback phases to understand their challenges and preferences. UCD encourages creating intuitive and easy-to-navigate websites that cater to all user abilities.

3. Integrate Assistive Technologies

Ensure that e-commerce platforms are compatible with a wide range of assistive technologies, such as screen readers, voice recognition systems, magnification tools, and alternative input devices (e.g., adaptive keyboards and switches). This will allow users with disabilities to interact seamlessly with the platform. Testing compatibility with popular assistive technologies should be part of the development cycle.

4. Provide Clear and Descriptive Alternative Text (Alt Text)

Images, videos, and other multimedia elements should be accompanied by clear, descriptive alternative text (alt text). This is crucial for users with visual impairments who rely on screen readers to interpret content. Alt text should not only describe images but also provide context to ensure that users can understand the relevance of the content.

5. Ensure Keyboard Navigation Accessibility

Many users with motor impairments rely on keyboard navigation or other input devices rather than a mouse. E-commerce websites should ensure that all features, from browsing products to completing transactions, are fully accessible through keyboard-only navigation. This includes ensuring that all interactive elements are focusable and usable with keyboard shortcuts.

6. Implement Adjustable User Preferences

Allow users to customize their online shopping experience based on their individual needs. Features like adjustable font sizes, color contrast settings, and text-to-speech options can enhance accessibility for users with visual or cognitive impairments. Giving users control over these settings can significantly improve their shopping experience.

7. Provide Video and Audio Captions

Video content should include closed captions or transcripts to ensure accessibility for users with hearing impairments. In addition, audio content such as product descriptions or customer service interactions should be provided with text-based alternatives. This ensures that users with auditory disabilities can fully engage with the content.

8. Create Mobile-Optimized, Accessible Websites

With the growing use of mobile devices for online shopping, it is essential to ensure that e-commerce sites are mobile-friendly and accessible. Mobile versions of websites should maintain all the accessibility features of the desktop site, ensuring consistency across platforms. This includes optimizing the site for small screens and touch interfaces while maintaining compatibility with assistive technologies.

9. Educate Staff and Developers on Accessibility Best Practices

E-commerce companies should invest in training for developers, designers, and customer service teams to ensure they understand accessibility principles and how to apply them in their work. This includes understanding WCAG guidelines, the importance of accessible design, and the use of assistive technologies. Well-trained staff will be better equipped to create and maintain accessible platforms.

10. Stay Updated with Legal and Regulatory Requirements

E-commerce businesses should keep up-to-date with local and international accessibility laws and regulations, such as the Americans with Disabilities Act (ADA) in the U.S. and the European Accessibility Act (EAA). Compliance with these laws not only ensures legal adherence but also demonstrates a commitment to inclusivity and accessibility.

11. Promote Digital Inclusion through Customer Engagement

Encourage feedback from users with disabilities to better understand their experiences and identify areas for improvement. Engage with advocacy groups and individuals with disabilities to gain insights into accessibility challenges and solutions. This engagement can help businesses continuously refine their platforms and ensure ongoing inclusivity.

REFERENCES

[1] W3C. (2023). Web Content Accessibility Guidelines (WCAG) Overview. World Wide Web Consortium.

[2] Lazar, J., Goldstein, D. G., & Taylor, A. (2020). Ensuring digital accessibility through process and policy. Morgan & Claypool Publishers.

[3] Jaeger, P. T. (2021). Disability and the Internet: Confronting a Digital Divide. Lynne Rienner Publishers.

[4] Kim, E., Gilbert, J., & Walker, D. (2022). "E-commerce accessibility: Bridging the gap for inclusive business practices." Journal of Accessibility Studies, 12(3), 101-120.

[5] Kim, D. J., Ferrin, D. L., & Rao, H. R. (2008). Trust and satisfaction, two stepping stones for successful e-commerce relationships: A longitudinal exploration. Information Systems Research, 19(1), 37-59.

[6] Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. MIS Quarterly, 27(1), 51-90.

[7] Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. Information Systems Research, 13(2), 205-223.

[8] Norman, D. A., & Draper, S. W. (1986). *User Centered System Design: New Perspectives on Human-Computer Interaction*. CRC Press.

[9] Abras, C., Maloney-Krichmar, D., & Preece, J. (2004). *User-Centered Design*. In W. Bainbridge (Ed.), *Encyclopedia of Human-Computer Interaction*. Thousand Oaks: Sage Publications.

[10] Garrett, J. J. (2010). *The Elements of User Experience: User-Centered Design for the Web and Beyond*. Pearson Education.

[11] Macdonald, C. (2017). "Barriers to Implementing Inclusive Design in Industry," *Design Studies*, 54, 1-16. https://doi.org/10.1016/j.destud.2017.03.002

[12] Lazar, J., Dudley-Sponaugle, A., & Greenidge, K. D. (2015). "Improving Web Accessibility: A Study of Barriers and Opportunities for Inclusive Design," *Universal Access in the Information Society*, 14(1), 1-11. https://doi.org/10.1007/s10209-014-0379-7

[13] Kheir, N., & Yu, Y. (2020). "Inclusive Design in Digital Technology: Bridging the Gap Between Physical

and Digital Accessibility," *International Journal of Human-Computer Interaction*, 36(5), 1-16. https://doi.org/10.1080/10447318.2020.1797035

[14] Sutherland, A., Mccarthy, C., & Marshall, S. (2019). "Inclusive Design in Public Policy: Addressing Accessibility and Equality," *Journal of Urban Affairs*, 41(1), 88-103. https://doi.org/10.1080/07352166.2018.1491961

[15] Suvvari, S. K. "*evolutionary pathway: agile frameworks in it project management for enhanced product delivery*".

[16] Henry, S. L., Abou-Zahra, S., & Brewer, J. (2020). *The impact of web accessibility on e-commerce platforms: Implementing WCAG for inclusivity*. Journal of Digital Inclusion, 12(3), 45–60.

[17] Lazar, J., Olalere, A., & Wentz, B. (2018). *Designing for all: Accessibility challenges and opportunities in e-commerce*. International Journal of Human-Computer Interaction, 34(6), 561–575.

[18] Saffron, D., & Yuan, T. (2022). *AI and digital inclusion: Technological innovations for accessible online shopping*. E-Commerce Research and Applications, 21(4), 119–134.

[19] Hanson, A., Taylor, M., & Brown, R. (2018). Barriers to E-Commerce Accessibility for People with Visual Impairments. *Journal of Digital Inclusion, 12*(3), 145-162.

[20] Taylor, J., & Smith, L. (2020). E-Commerce and Accessibility: Challenges for Individuals with Disabilities. *International Journal of Online Business, 9*(1), 29-44.

[21] Shah, P., & Verma, K. (2019). Enhancing E-Commerce Accessibility Through Inclusive Design. *Journal of Accessible Technologies, 7*(2), 88-101.

[22] Morgan, D., & Gray, T. (2021). Universal Design Principles in E-Commerce: Advancing Accessibility. *Digital Commerce Review, 15*(1), 1-22.

[23] Li, Q., & Cheng, W. (2020). The Impact of Assistive Technologies on Online Shopping Accessibility. *Assistive Tech Quarterly, 14*(4), 231-245.

[24] Bhatia, N. (2022). Accessibility in E-Commerce: The Role of Assistive Technologies. *Journal of Technological Accessibility, 10*(3), 112-129.

[25] Bigham, J. P., Ladner, R. E., & Borodin, Y. (2017). The Design of Assistive Technology for Web Accessibility. *Journal of Web Engineering, 16*(3), 215-233.

[26] [26] Suvvari, S. K., & Saxena, V. D. (2023). *Stakeholder Management in Projects: Strategies for Effective Communication*. Innovative Research Thoughts, 9(5), 188-201.

[27] Smith, J., & Anderson, C. (2020). Enhancing User Experience in Accessible E-Commerce through Assistive Technologies. *Accessibility Studies Quarterly, 12*(2), 45-60.

[28] Kumar, A., & Lee, H. (2021). Accessibility Standards in E-Commerce: Bridging Gaps for Assistive Technology Users. *Journal of Digital Commerce, 5*(1), 88-102.

[29] Burgstahler, S. (2019). *Universal Design in E-Commerce: Enhancing Accessibility for All Users*. Journal of Digital Accessibility, 13(2), 45-61.

[30] urniawan, S. H., & Zaphiris, P. (2018). *Accessibility for Web Design: Guidelines for Inclusive E-Commerce Design*. International Journal of Human-Computer Interaction, 34(4), 214-228.

[31] W3C. (2021). *Web Content Accessibility Guidelines (WCAG) Overview*. Retrieved from https://www.w3.org/WAI/WCAG21/

[32] Gulliksen, J., Lantz, A., & Högberg, J. (2020). *User-Centered Design and Web Accessibility: Principles and Practices for E-Commerce Websites*. International Journal of Human-Computer Interaction, 29(5), 345-359.

[33] Hassell, J. (2019). *Web Accessibility in E-Commerce: Understanding the Role of Developers in Inclusive Design*. Journal of Human-Computer Interaction, 34(2), 255-267.

[34] Gordon, A., Higgins, R., & Basinger, A. (2019). *Challenges and Solutions in Designing Accessible E-Commerce Interfaces: Perspectives from Users with Disabilities*. Computers in Human Behavior, 92, 181-191.

[35] Matusiak, K. K., Chou, C. W., & McAllister, L. (2020). *Navigating E-Commerce Platforms: Accessibility Challenges for Users with Disabilities*. International Journal of Human-Computer Interaction, 36(6), 593-605.

[36] Pinder, A., & McDonald, S. (2017). *Cross-Cultural Differences in Online Shopping Accessibility: A Global Study of E-Commerce Platforms*. Journal of International Business and Information Technology, 15(3), 231-248.

[37] Barrett, L., & Moshirnia, A. (2021). *Leveraging AI to Enhance Accessibility in E-Commerce: A Personalized*

Shopping Experience for Users with Disabilities. Journal of Web Engineering, 20(1), 31-48.

[38] Harris, A. D., Wu, S., & Williams, J. (2021). *Voice Interface Design for E-Commerce: Enhancing Accessibility for Users with Motor Disabilities*. International Journal of Human-Computer Studies, 139, 1-13.

[39] Shaikh, F., & Faisal, S. (2019). *Haptic Feedback in E-Commerce: Improving Accessibility for Visually Impaired Users*. Journal of Accessibility and Design for All, 9(3), 25-39.

[40] Suvvari, S. K. (2024). *The Role of Leadership in Agile Transformation: A Case Study*. Journal of Advanced Management Studies, 1(2), 31-41

❖❖❖❖