Major Research Project

on

Augmented Reality's Influence on Customer Buying Decision

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CERTIFICATE

This is to certify that the Major Research Project titled **"Augmented Reality's Influence on Customer Buying Decision"** has been submitted by **Kartikey Vashishth**, student of **DELHI TECHNOLOGICAL UNIVERSITY** in partial fulfilment of the requirements for the degree of **Master of Business Administration** for Academic Year 2024-25.

Date: 19th May 2025

Place: Delhi

Name: Prof. Rajan Yadav

Designation: Professor at DSM-DTU **Signature of the Mentor**

DECLARATION

I hereby declare that the Major Research Project titled **"Augmented Reality's Influence on Customer Buying Decision"** submitted to **DELHI TECHNOLOGICAL UNIVERSITY**, is a record of original work completed by me, and has not been submitted earlier to any other institution or university for any degree or diploma.

The work was carried out during the academic session 2024–2025 under the guidance of **Prof. Rajan Yadav**.

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EXECUTIVE SUMMARY

In today's fast-evolving digital landscape, technology is no longer just an enabler—it is a key driver of consumer engagement and decision-making. One such breakthrough that has rapidly gained traction is **Augmented Reality (AR)**. This research project delves into the **influence of AR on consumer buying decisions**, aiming to explore how this emerging technology is reshaping the retail experience and the psychology behind purchasing behaviour.

As brands strive to capture customer attention in a crowded marketplace, AR has emerged as a powerful tool to offer more than just information—it provides **experience**. Whether it's trying on glasses virtually through platforms like **Lenskart**, visualizing furniture in a home setting via **IKEA Place**, or experimenting with cosmetic products using **Nykaa's Virtual Try-On**, AR enables consumers to interact with products in a way that mimics in-person experiences. This shift from passive viewing to **active interaction** forms the core of this study.

The primary **objective** of the research is to assess how AR influences various stages of the consumer journey—specifically **awareness, interest, engagement, and purchase intent**. The study also examines consumer **perceptions of AR**, such as trust, satisfaction, and confidence in purchase decisions, while identifying potential barriers to adoption like usability and accessibility.

To provide a well-rounded understanding, a **mixed-method approach** was adopted. The quantitative aspect involved an online survey conducted with over **100 participants** who have previously engaged with AR applications in a shopping context. The qualitative element draws insights from **secondary case studies** involving prominent brands leveraging AR in retail. **Convenience sampling** was used for participant selection, and the data was analysed using tools like **Microsoft Excel and SPSS** for statistical relevance and clarity.

The **findings** are both insightful and promising. Most respondents shared that AR-enhanced platforms made them feel more informed and confident while making a purchase. The ability to see a product in context or virtually try it on helped bridge the gap between **online convenience** and **offline tangibility**. Furthermore, the interactivity provided by AR increased user engagement and often tilted the scales in favour of completing a purchase.

However, the study also uncovered **challenges**. Not all users found AR seamless—issues such as **device compatibility, limited internet bandwidth, and varying levels**

of digital literacy posed hurdles. Additionally, some users questioned the authenticity or accuracy of AR representations, particularly in colour matching or sizing.

Despite these limitations, the study concludes that **Augmented Reality holds immense potential** to transform digital commerce. For businesses, the implications are clear: AR is not just a gimmick but a **strategic asset**. When implemented thoughtfully, it can significantly improve the customer experience, increase conversion rates, and build stronger brand engagement.

In summary, this research highlights AR's growing role in influencing how customers **discover, evaluate, and ultimately buy** products. It offers a blend of practical recommendations and theoretical insight, contributing to the broader understanding of how immersive technologies are shaping the future of marketing and consumer behaviour.

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CHAPTER 1: INTRODUCTION

1.1 Background

Augmented Reality (AR) is a transformative technology that superimposes digital content such as images, audio, and interactive data—onto the real-world environment in real time. Unlike Virtual Reality (VR), which immerses users entirely in a digital environment, AR enhances the physical world with additional layers of information, creating a composite view that blends reality and virtuality. With advancements in mobile computing, cloud technology, and wearable devices, AR has moved from the realm of science fiction and niche applications into mainstream consumer experiences.

In the marketing landscape, AR has emerged as a game-changer, shifting the paradigm of how consumers interact with products and brands. Its initial applications in gaming (e.g., Pokémon GO) and entertainment demonstrated its potential for immersive engagement, sparking interest across other industries. Retailers soon recognized AR's value in enriching customer interactions. Brands like IKEA, with its "IKEA Place" app, enabled users to visualize furniture in their homes using AR. Lenskart allowed customers to try on eyeglasses virtually, and Sephora and Nykaa leveraged AR to offer virtual makeup try-ons. These innovative applications redefined customer expectations, introducing new standards for convenience, personalization, and confidence in the online buying experience.

Moreover, AR has transformed the traditional linear customer journey into a more fluid and interactive process. Instead of moving sequentially from awareness to interest to decision, consumers now expect to engage with products in meaningful ways at multiple touchpoints. AR facilitates this by providing hands-on, immersive trials without requiring physical presence. It enhances product comprehension, evokes emotional engagement, and reduces uncertainty—key factors that influence buying behaviour. This evolution in customer interaction underscores the necessity of studying AR not merely as a technological tool but as a strategic asset in marketing.

1.2 Problem Statement

Despite the increasing integration of Augmented Reality in marketing strategies, there remains a significant gap in academic and empirical research focused on its psychological and behavioural effects on consumers. Most existing studies concentrate on technological development and implementation aspects, with limited exploration into the cognitive responses and decision-making processes triggered by AR experiences.

For instance, while AR applications have been credited with enhancing product visualization and interactivity, it is still unclear how these enhancements translate into measurable marketing outcomes such as customer trust, brand loyalty, or purchase intent. Are consumers more inclined to buy a product simply because they can try it virtually? Does AR improve product recall or customer satisfaction over time? How does the novelty of AR wear off, and what impact does this have on long-term engagement? These are pressing questions that marketers and businesses must address to optimize the use of AR in their customer engagement strategies.

This study aims to fill this gap by examining real-world interactions with AR platforms and assessing their influence on key behavioural metrics. It seeks to move beyond surface-level analysis and explore the deeper psychological mechanisms—such as trust, perceived value, satisfaction, and cognitive ease—that underpin consumer responses to AR-enhanced experiences.

1.3 Objectives of the Study

The overarching goal of this research is to investigate the impact of Augmented Reality on consumer buying decisions, particularly within digital and hybrid retail environments. The study seeks to dissect the multiple dimensions of consumer behaviour affected by AR, using both quantitative and qualitative lenses.

Specific objectives include:

- To evaluate how AR influences various stages of the customer decision-making process, including product discovery, evaluation, and final purchase.
- To measure the impact of AR on consumer engagement metrics such as attention, interaction time, emotional connection, and brand recall.
- To assess how AR modifies consumer perception of product quality, brand innovation, and authenticity.
- To analyse the effect of AR on building consumer trust in online platforms, especially in the absence of physical product trials.
- To examine differences in AR adoption and effectiveness across key sectors, notably fashion (e.g., virtual try-ons), furniture (e.g., 3D visualization in physical spaces), and cosmetics (e.g., real-time makeup simulations).

- To identify user challenges, such as digital literacy, device limitations, and scepticism regarding AR content accuracy.
- To gather consumer feedback on their overall satisfaction with AR-driven shopping experiences and evaluate its potential to drive repeat usage.

1.4 Scope of the Study

The scope of this research is delineated by its focus on the intersection of AR technology and consumer behaviour within the domains of digital marketing and retail. It emphasizes the practical implications of AR applications for businesses aiming to enhance customer experience and drive sales.

Sector-wise, the study centres on industries where visual evaluation is paramount: fashion, furniture, and beauty. These sectors were chosen due to their early and prominent adoption of AR tools, which provide fertile ground for both observation and analysis. In the fashion industry, virtual fitting rooms allow customers to try clothing or accessories without visiting a store. In furniture retail, AR apps help consumers see how products will look and fit in their personal spaces. In the beauty sector, AR enables users to test makeup or skincare products in real time, replicating the in-store experience digitally.

Geographically, the research is focused on the Indian market—a rapidly digitizing economy where both e-commerce and mobile technology are witnessing exponential growth. This demographic context is particularly relevant, as Indian consumers represent a diverse spectrum in terms of tech adoption, shopping behaviour, and exposure to immersive technologies.

Methodologically, the research is grounded in a mixed-method approach, combining quantitative data from structured surveys with qualitative insights derived from case studies and secondary literature. Participants include individuals who have interacted with AR-enabled retail platforms via mobile apps or web interfaces. Data analysis is conducted using tools like Microsoft Excel and SPSS to ensure statistical validity and interpretive depth.

By defining these boundaries, the study ensures focused exploration while also paving the way for future research. The findings are intended to aid marketers, app developers, and retailers in making informed decisions about how and where to deploy AR effectively, ensuring it delivers not just novelty but sustained value to consumers.

CHAPTER 2: LITERATURE REVIEW

This section critically reviews the relevant theoretical frameworks and previous research related to the role of Augmented Reality (AR) in consumer decision-making, user experience, and marketing effectiveness. The goal is to establish a foundation for the current study by identifying gaps, consolidating key findings, and contextualizing the influence of AR in digital consumer environments.

2.1 Theoretical Frameworks

2.1.1 Technology Acceptance Model (TAM)

Developed by Davis (1989), the Technology Acceptance Model (TAM) is one of the most widely used frameworks in understanding how users come to accept and use technology. According to TAM, two primary factors influence an individual's decision to adopt a new technology: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU refers to the extent to which a person believes that using a particular technology will enhance their performance, while PEOU is the degree to which a person believes that using the technology will be free of effort.

In the context of AR, studies have expanded TAM to include variables like perceived enjoyment, trust, and interactivity. For example, Heller et al. (2019) found that AR applications that are both engaging and user-friendly significantly boost perceived usefulness, thereby improving adoption rates. This suggests that marketers deploying AR must focus not only on utility but also on user-centric design to encourage widespread acceptance.

2.1.2 Consumer Decision-Making Process

The traditional Consumer Decision-Making Process comprises five stages: problem recognition, information search, evaluation of alternatives, purchase decision, and post-purchase behaviour. AR has the potential to influence every stage of this model. In the problem recognition and information search phases, AR can present products in immersive ways that help consumers identify needs more clearly. During the evaluation of alternatives, AR can allow side-by-side comparisons of features and aesthetics. At the point of purchase, the technology enhances confidence and reduces hesitation. Finally, in the post-purchase phase, AR can be used for onboarding and enhancing product satisfaction.

For instance, a study by Pantano and Servidio (2012) indicated that AR significantly affects how consumers evaluate products, with virtual trials reducing uncertainty and increasing product comprehension. The integration of AR into this decision-making framework helps businesses align their marketing tactics with consumer psychology more precisely.

2.2 Augmented Reality and User Experience

User experience (UX) is a central factor in determining the effectiveness of AR in marketing. A study by Javornik (2016) emphasized that AR contributes to enhanced experiential value through interactivity, real-time feedback, and sensory stimulation. The presence of digital overlays in physical spaces introduces new dimensions of product interaction that are not available through conventional online or even in-store shopping.

UX in AR is shaped by several elements:

- Interactivity: The more a consumer can manipulate the AR content (e.g., rotate, zoom, customize), the deeper the engagement.
- Visual realism: High-quality graphics and accurate scaling improve believability and immersion.
- Responsiveness: Fast, glitch-free performance contributes to smoother experiences and higher satisfaction.

Empirical studies, such as those conducted by McLean and Wilson (2019), have shown a positive correlation between AR-facilitated UX and consumer trust. A seamless AR experience can significantly enhance brand perception, especially in sectors like fashion and furniture, where tactile feedback is traditionally essential.

2.3 Immersive Technologies in Marketing

Immersive technologies—including AR, Virtual Reality (VR), and Mixed Reality (MR)—are increasingly being integrated into marketing strategies to create more personalized and engaging customer experiences. Among these, AR stands out due to its accessibility via smartphones and tablets.

Hilken et al. (2017) explored how immersive technologies influence consumers' mental imagery, showing that AR can activate vivid mental simulation, which plays a critical role in product evaluation and decision-making. By enabling consumers to visualize products in their real-life environment, AR enhances cognitive processing and emotional engagement.

Furthermore, interactive AR advertisements have been found to outperform traditional digital ads in terms of attention span, click-through rates, and brand recall (Yim et al., 2017). These findings underscore the strategic importance of AR in modern advertising and suggest that businesses investing in AR are more likely to capture and retain consumer attention.

2.4 Engagement, Interactivity, and Purchase Intention

Engagement and interactivity are pivotal in fostering purchase intention in digital environments. AR technology naturally lends itself to both. Unlike static images or videos, AR provides a two-way interaction that allows users to manipulate and explore product features actively. This active participation creates a sense of control and personalization, which are strong predictors of consumer satisfaction and loyalty.

Studies by Rese et al. (2017) reveal that interactive AR applications significantly increase emotional and cognitive engagement. Consumers reported feeling more involved and excited when using AR apps, which directly influenced their willingness to buy. The novelty factor also contributes to engagement, although it may decline over time unless continuously refreshed with updated features or content.

Moreover, interactivity in AR leads to longer session durations and higher conversion rates. A study by Poushneh and Vasquez-Parraga (2017) demonstrated that consumers using AR-based interfaces spent more time exploring products and were more likely to complete purchases compared to those using traditional online interfaces.

2.5 Trust and Perceived Risk

Trust plays a crucial role in online and AR-enabled purchases, particularly when the consumer cannot physically touch or test the product. AR helps reduce perceived risk by offering realistic visualizations and simulations. This is especially relevant in the fashion and beauty industries, where fit, colour, and style are critical.

Baier et al. (2020) found that AR enhances perceived diagnosticity—the consumer's belief that the information provided is helpful for decision-making. High diagnosticity increases trust in both the product and the platform offering it. However, trust is also affected by technical performance. Lagging visuals, inaccurate scaling, or software crashes can erode consumer confidence.

Additionally, the issue of privacy arises in AR applications, especially those requiring camera access or personal data. Companies must ensure transparency and ethical data handling practices to maintain trust.

2.6 Summary and Research Gaps

The literature clearly establishes that AR holds significant potential to influence consumer behaviour across multiple dimensions. It improves user experience, enhances engagement, facilitates informed decision-making, and builds trust. However, several gaps remain:

- Longitudinal Impact: Most studies focus on short-term effects. More research is needed to assess how AR influences consumer behaviour over extended periods.
- Demographic Variations: There is limited exploration of how factors such as age, gender, and tech-savviness affect AR adoption and effectiveness.
- Cultural Context: Much of the existing literature is based on Western populations. There is a need for more research focused on emerging markets like India.
- Behavioural Mechanisms: Further investigation is required into the psychological mechanisms (e.g., emotion, motivation) that mediate the relationship between AR and consumer behaviour.

This literature review sets the stage for the empirical section of this research, which aims to address these gaps through data collected from Indian consumers who have interacted with AR-enabled retail platforms. The next chapter will outline the methodology adopted for the study.

CHAPTER 3: RESEARCH METHODOLOGY

Research methodology refers to the precise methods and techniques employed to find, choose, process, and evaluate material pertaining to a particular issue. The methodology segment of this study enables the reader to assess the study's general reliability and validity in an objective way. Research technique refers to a structured approach used to address a problem. It is the discipline that focuses on the methodology and techniques used in doing research. The research methodology employed for this evaluation is a convenient method of sampling. A convenience sample is a non-probability sampling strategy that involves selecting individuals from a readily accessible or easily contactable population. The data acquired was primarily obtained through my own efforts, and some of the data utilized was sourced from several reputable websites. The apt methodology for this paper has been figured out by analysing multiple literatures.

3.1 Nature of the Study

This research is both exploratory and descriptive in nature. The exploratory aspect is concerned with gaining new insights into the behavioural patterns of consumers when it comes to purchasing branded footwear. It aims to explore uncharted areas or previously unrecognized factors that influence consumer decisions. The descriptive element helps in presenting a clear picture of how different variables such as age, gender, income, and education relate to brand loyalty and satisfaction.

The study utilizes both primary and secondary data:

- Primary Data: Collected through a structured questionnaire administered to individuals who purchase branded shoes. This approach ensures that the research reflects firsthand insights and opinions.
- Secondary Data: Gathered from authentic and credible sources such as research journals, newspaper articles, company websites, magazines, academic publications, and previous research papers. This supports the analysis by providing a broader context and background.

3.2 Research Objectives

The core aim of this study is to explore the influence AR has on the decision-making process of online shoppers. The research focuses on how elements like interactivity, novelty, perceived ease of use, and usefulness of AR tools contribute to a customer's likelihood of making a purchase. It further aims to investigate whether these elements improve customer trust in the product, encourage product exploration, and increase overall satisfaction with the shopping experience. The intent is not only to map user sentiment but also to understand the psychological triggers activated by AR experiences in e-commerce environments. These objectives form the basis for designing the questionnaire, analysing the data, and drawing conclusions.

3.3 Null Hypothesis

Each hypothesis is based on the relationship between AR variables and consumer behaviour:

- **H_{01}:** There is no significant difference in perceived engagement with AR between male and female users.
- **H_{02}:** There is no correlation between AR usefulness for decision-making and likelihood of purchasing via AR.
- **H_{03}:** Occupation has no effect on the perception that AR provides more useful product information.
- **H_{04}:** Users who have used AR while shopping do not find it more innovative compared to those who haven't.

3.4 Analytical Tools Used

To analyse the collected data and test the proposed hypotheses, the researcher used Analysis of Variance (ANOVA). ANOVA is a statistical technique that helps determine if there are any statistically significant differences between the means of three or more independent (unrelated) groups. It is particularly useful for analysing the influence of categorical variables (like age, gender, or income) on numerical outcomes (like satisfaction levels). The tool was selected due to its effectiveness in comparing groups and identifying variance caused by different factors.

3.5 Method of Data Collection

In order to identify the suitable data for studies, two main types of data were gathered, namely primary and secondary data, which are described as follows:

3.5.1 Primary Data

The primary data will come directly from consumers via a detailed survey instrument. The questionnaire will capture user experiences and attitudes toward AR shopping tools—specifically those who have used AR features on platforms offering virtual try-ons, 3D product views, or room simulations. The data will allow for statistical testing of how various AR attributes impact the consumer's buying behaviour

3.5.2 Secondary Data

Secondary data will enrich the study by providing context and industry trends. This includes scholarly journals, market research reports from firms like McKinsey, Deloitte, or PwC, case studies on AR in retail, and whitepapers on consumer tech adoption. These sources will help anchor the findings within the broader landscape of AR in digital commerce. Websites, journals, and newspaper articles. Additional data was also gathered from previous research studies and published books.

3.6 Sampling Procedure & Design

Given the need to reach individuals who have interacted with AR in online shopping, the research will adopt a non-probability convenience sampling method. This approach allows for quick access to willing participants, especially through digital platforms where users with AR exposure are most likely to be found. While not statistically random, the sample will aim to reflect diversity in age, gender, and occupation to ensure varied perspectives.

The sample size is 105 respondents, sufficient for running quantitative analyses and hypothesis testing. The geographic scope will remain flexible, though initially focused on urban consumers due to higher digital and AR penetration in these areas.

3.7 Questionnaire Structure

To uncover genuine insights, the questionnaire has been structured to move gradually—from understanding the background of respondents to probing their experience with AR and how it affects their purchase decisions.

The first section collects demographic information like age, gender, occupation, and whether or not the respondent has used AR during online shopping. This provides essential segmentation data and helps verify the relevance of responses.

The next section is dedicated to exploring the independent variables—the key attributes of AR that could influence consumer behaviour. These include:

- Interactivity, which looks at how engaged and involved the user feels when using AR features.

- Novelty, referring to the uniqueness or innovative nature of AR that might attract attention and stimulate curiosity.
- Perceived Ease of Use, which assesses whether users find AR features intuitive and effortless.
- Perceived Usefulness, capturing whether users feel AR provides meaningful support in product evaluation and decision-making.

Each of these attributes is measured through carefully worded statements to which respondents express agreement on a 5-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree." For example, statements such as "AR allows me to interact better with the product" or "I find AR-based shopping experiences innovative and interesting" aim to tap into both rational and emotional responses.

Finally, the third section focuses on the dependent variable: Consumer Buying Behaviour. This part evaluates whether the AR experience actually translates into behavioural shifts. It includes statements like "I am more likely to purchase a product after experiencing it via AR" and "AR increases my trust in the product's quality and suitability."

These questions are designed not just to measure intent to buy, but also to capture nuances such as increased trust, time spent browsing, and emotional involvement—factors that are critical in modern e-commerce environments.

CHAPTER 4: CASE STUDY

4.1 Lenskart and the Power of Augmented Reality in Eyewear Retail

4.1.1. Introduction

In today's technology-driven world, the way consumers shop has undergone a dramatic transformation. Traditional buying experiences are increasingly giving way to immersive, digital alternatives. Among the many innovations revolutionizing retail, Augmented Reality (AR) stands out as a game-changer, particularly in sectors where the look and fit of a product are central to purchasing decisions. The eyewear industry is one such domain. Shopping for eyeglasses or sunglasses isn't merely about utility—it's also about appearance, comfort, and confidence. Recognizing this, Lenskart, one of India's leading eyewear brands, has embraced AR technology to bridge the gap between offline and online shopping experiences. This case study delves into Lenskart's journey with AR, exploring how the brand has transformed customer engagement, enhanced decision-making, and redefined digital retail in India.

4.1.2. The Evolution of Lenskart

Lenskart began its journey in 2010, co-founded by Peyush Bansal. Initially focused on solving a core issue in the Indian market—the lack of accessibility to quality eyewear—the brand set out to build an online platform that offered affordable, stylish, and high-quality glasses. Over time, the company grew rapidly and expanded into a hybrid retail model, combining the convenience of online shopping with the assurance of offline retail stores.

However, the eyewear market presented unique challenges. Customers often felt hesitant to buy glasses online due to uncertainty about how they would look or fit. Eyewear is highly personal, and the tactile experience of trying on frames in a store was hard to replicate online. To address this issue and keep pace with global retail trends, Lenskart turned to Augmented Reality.

4.1.3. Lenskart's Leap into Augmented Reality

Lenskart's integration of AR wasn't just about incorporating the latest tech fad. It was a strategic decision aimed at enhancing the customer experience, improving trust in online purchases, and boosting sales conversions. In 2016, the company launched its

3D Virtual Try-On (VTO) feature, allowing users to virtually try different eyewear styles using their smartphones or laptops.

The feature works by using a device's camera to map the user's face and overlay digital versions of selected frames onto their facial features in real time. It adjusts to head movements, simulating a realistic and responsive try-on experience. With time, the technology has evolved, offering more precise facial recognition, smoother rendering, and a growing catalogue of frame styles.

For many consumers, especially in India's smaller cities where access to Lenskart's physical stores may be limited, the AR feature has made a significant difference. It allows them to try, evaluate, and select their glasses without stepping out of their homes, combining convenience with confidence.

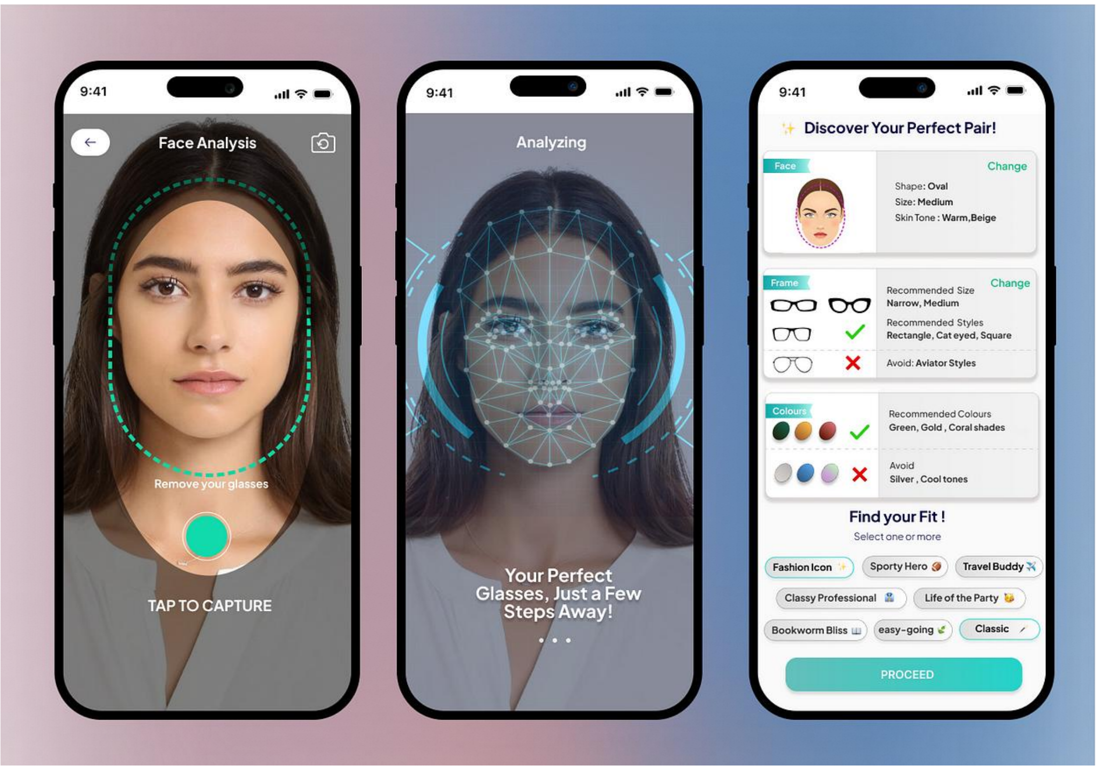
4.1.4. <u>Changing Consumer Behaviour and Shopping Psychology</u>

The introduction of AR into Lenskart's ecosystem has significantly influenced how consumers interact with the brand. Previously, online eyewear shopping was fraught with uncertainty. Will these glasses suit my face? Are they too large or small? Will they look the same in person? The VTO feature has reduced these doubts, offering clarity and assurance at the crucial decision-making stage.

Customers now spend more time on the app or website, exploring various styles, comparing looks, and seeking opinions from friends and family. This deeper engagement translates into better conversion rates. Users are also more confident in their choices, which in turn leads to fewer product returns and higher overall satisfaction.

Another psychological shift has been the sense of control and personalization. The VTO gives customers the power to experiment with multiple styles instantly. It turns shopping into an experience rather than a chore. It also adds an element of fun, which enhances brand perception and builds stronger emotional connections.

4.1.5. <u>The Technology Behind the Experience</u>



Behind the seamless AR experience lies a sophisticated technology stack. Lenskart's VTO feature uses facial mapping algorithms, machine learning, and 3D modelling tools. When a user opens the try-on window, the camera scans their facial structure and matches the digital model of a frame to key facial points—nose bridge, temple width, and cheekbones.

As smartphones have become more powerful, the responsiveness and realism of AR have improved. Lenskart's developers continue to refine the experience by using AI to suggest frames based on a user's face shape, previous selections, and browsing behaviour. These backend improvements ensure that the front-end experience remains fluid and user-friendly, making the feature accessible even to those unfamiliar with advanced tech.

4.1.6. <u>Measuring Impact: Consumer and Business Outcomes</u>

While Lenskart has not published detailed performance metrics for its AR tool, available data and third-party reports offer valuable insights. Since introducing the VTO, the company has observed significant increases in user engagement. App usage duration has gone up, particularly on product pages with AR-enabled features. Moreover, customers who use the VTO feature are more likely to complete a purchase, and return rates are lower in this group.

Internal feedback and market surveys suggest that AR users exhibit higher brand loyalty and are more inclined to recommend Lenskart to others. These customers often share their try-on screenshots on social media, providing organic brand visibility and contributing to word-of-mouth marketing. The tool has also proved particularly valuable during the COVID-19 pandemic when in-store visits were restricted and digital self-service became essential.

4.1.7. Consumer Experiences and Testimonials

Lenskart's VTO feature has received a positive reception from a broad demographic of users. Young professionals appreciate the convenience and speed, while older consumers value the ability to make decisions without commuting to a store. Customer reviews on app stores and social media consistently highlight how the AR tool helped them choose the right frame, boosted their confidence, and made online eyewear shopping less intimidating.

One user from Delhi shared that he had always hesitated to buy glasses online but was surprised at how accurate the virtual try-on was. A college student from Bangalore mentioned how she spent an entire afternoon trying different styles and finally found one that felt "just right." These narratives illustrate the tool's emotional and psychological impact, going beyond mere functionality.

4.1.8. Marketing Integration and Brand Strategy

AR is not a standalone feature at Lenskart; it's part of a broader marketing and customer experience strategy. The company promotes its VTO tool in digital ads, influencer collaborations, and seasonal campaigns. Videos showing how the try-on works are used in performance marketing to drive app downloads and purchases.

Lenskart has also encouraged user-generated content by inviting customers to share screenshots or videos of their virtual try-ons. This strategy has paid off in terms of organic reach and authentic brand engagement. Additionally, the company integrates the AR experience into its omnichannel strategy, ensuring that in-store visitors can also be guided through the VTO feature for products that may not be physically available.

4.1.9. Challenges and Limitations

Despite its success, Lenskart's AR feature is not without limitations. The experience depends heavily on the user's device. Older smartphones may not support the full functionality or may render the visuals poorly. Internet speed also plays a role in the quality and smoothness of the experience.

Another challenge is digital literacy. While tech-savvy users can navigate the AR tool with ease, some older or less digitally inclined customers may need guidance. Privacy concerns are also a potential barrier, as users might be hesitant to grant camera access to an app.

Lenskart addresses these issues through continuous improvement, clear privacy policies, and user education. Tutorials within the app and responsive customer service ensure that users can access help if needed.

4.1.10. Broader Industry Influence and Future Outlook

Lenskart's success with AR has inspired other brands in India to explore similar innovations. In the beauty sector, companies like Nykaa have introduced AR-based makeup trials, while Tanishq in the jewellery space now offers virtual try-ons for necklaces and earrings. These developments signal a broader shift toward experiential digital commerce.

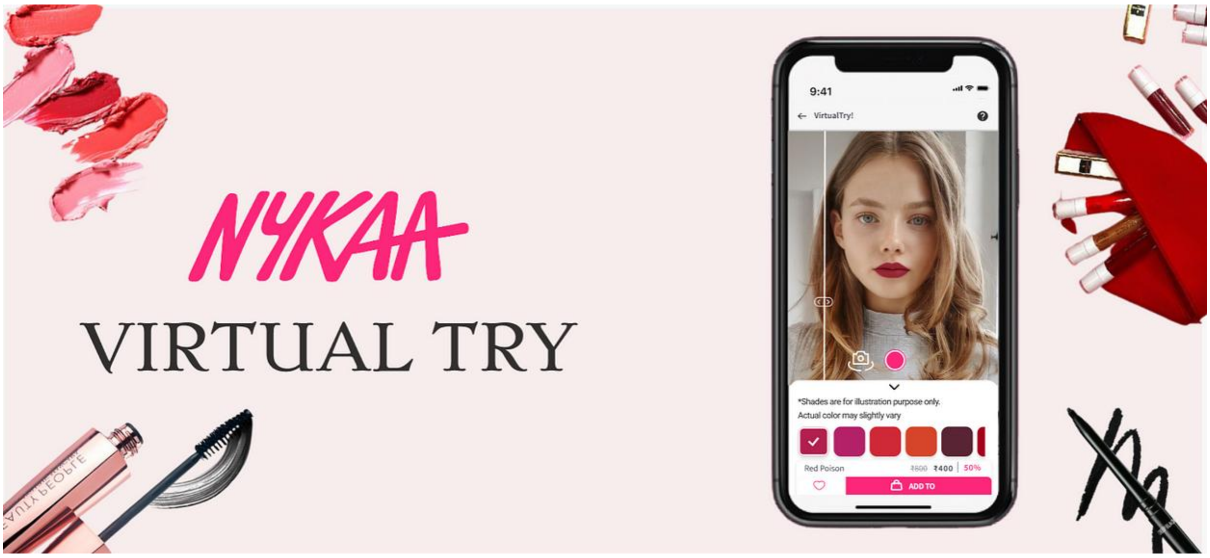
As technology continues to evolve, Lenskart is already exploring the next phase of AR. Potential innovations include lens simulation, voice-guided virtual shopping assistants, and compatibility with upcoming wearable AR devices. The goal is to move toward a fully immersive shopping journey where customers can get the same or better experience at home than in-store.

4.1.11. Conclusion

Lenskart's use of Augmented Reality is a powerful example of how technology can transform not only the way a product is sold but also how customers perceive and connect with a brand. By identifying a key friction point in the eyewear shopping journey and resolving it with an intuitive digital solution, Lenskart has redefined what it means to shop for glasses in India.

The AR tool has enhanced user confidence, reduced return rates, and positioned Lenskart as a leader in tech-driven retail. More importantly, it has turned a necessary task—buying eyewear—into a more enjoyable, empowering experience. As the company continues to innovate, its AR journey will serve as a benchmark for other retailers seeking to combine technology, customer insight, and seamless design into their offerings.

4.2 Nykaa's Virtual Try-On – Personalizing Beauty with Augmented Reality



4.2.1 Introduction

In the modern beauty industry, where customer expectations are continuously rising and the lines between online and offline experiences are becoming increasingly blurred, personalization is no longer a luxury—it is a necessity. Brands that stand out are those that offer immersive, engaging, and tailored shopping journeys. Nykaa, a leading Indian beauty and cosmetics retailer, has embraced this paradigm by leveraging technology to revolutionize how consumers discover and purchase beauty products. Central to this transformation is Nykaa's Virtual Try-On tool, a feature that empowers users to digitally experiment with makeup products in real-time using Augmented Reality (AR).

Launched with the aim of enhancing customer experience and boosting confidence in online beauty purchases, Nykaa's Virtual Try-On allows users to visualize how different products—lipsticks, eyeliners, eyeshadows, blushes, and more—will look on their faces before making a decision. This functionality addresses a core limitation of e-commerce in the beauty space: the inability to physically test products. Through the seamless integration of AR, Nykaa not only solves a problem but elevates the entire shopping journey, making it more interactive, fun, and informed.

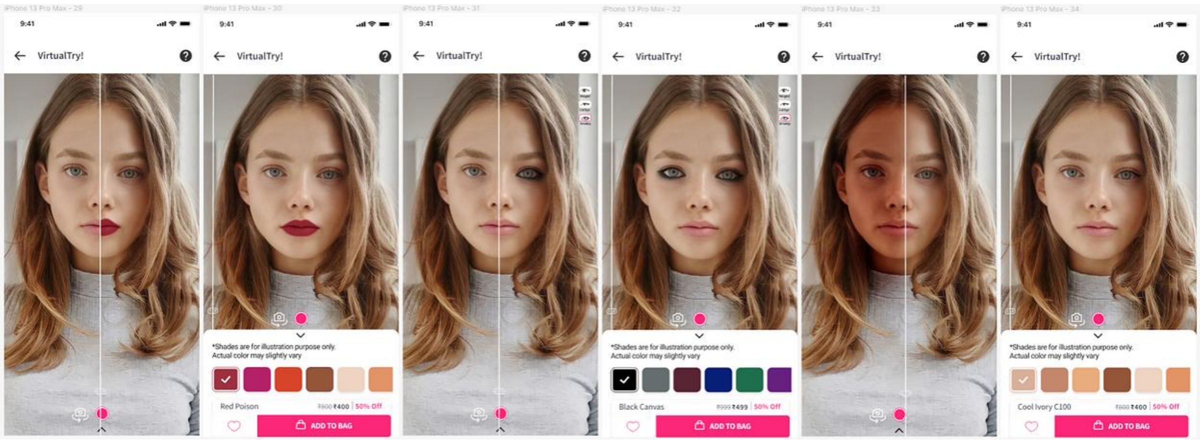
4.2.2 <u>The Birth of a Virtual Beauty Companion</u>

The idea for Nykaa’s Virtual Try-On was born out of a deep understanding of consumer behaviour and technological foresight. In a country as diverse as India, where beauty norms and preferences vary widely across regions, climates, and skin tones, offering a one-size-fits-all solution simply doesn't work. Nykaa recognized early on that to remain relevant and competitive, especially in the digital era, it had to go beyond just providing access to products. It had to guide, assist, and empower consumers to make choices that resonate personally.

Inspired by global trends and supported by advancements in AR technology, Nykaa began developing its Virtual Try-On tool as a strategic extension of its platform. The goal was not merely to replicate the in-store trial experience but to surpass it—to create a virtual beauty assistant that was available 24/7, accessible from any device, and constantly learning from user preferences.

This ambition was supported by partnerships with leading AR solution providers, investments in R&D, and a strong in-house tech team. The tool was tested across different user demographics and refined for accuracy, usability, and performance before being rolled out across Nykaa’s app and website. It was designed to be intuitive, responsive, and visually accurate, ensuring that users could make decisions with confidence and joy.

4.2.3 <u>How It Works – Technology Behind the Magic</u>

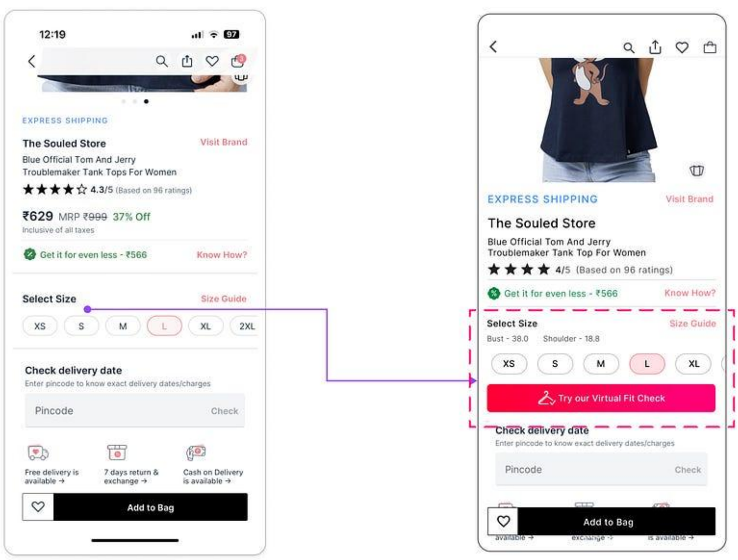


At its core, Nykaa's Virtual Try-On uses facial recognition and real-time image rendering to superimpose cosmetic products onto a user's live image or selfie. Upon selecting a product, the tool scans facial landmarks—eyes, lips, cheeks, etc.—and maps the product's texture and colour accordingly. The result is a remarkably realistic preview that adjusts dynamically as the user moves or changes lighting conditions.

The tool works seamlessly across mobile and desktop platforms. Users can either upload a photo or enable live camera mode to test products in real-time. Products are categorized for ease of navigation—lipsticks by shade family, eyeshadows by palette, and foundations by skin tone—and the interface allows for side-by-side comparisons, screenshots, and even sharing on social media.

To ensure accuracy, Nykaa incorporated a wide database of skin tones and facial features, trained through machine learning algorithms. The system improves over time, learning from user interactions and feedback to offer better product alignment and recommendations. Every virtual swatch is calibrated to closely match the physical product's texture, finish, and pigmentation, creating a trusted digital replica.

4.2.4 <u>Enhancing the Online Beauty Experience</u>



(Original Screen) (Re- designed Screen)

The traditional barriers to online beauty shopping—fear of mismatch, return hassles, and lack of expert guidance—are significantly mitigated through Nykaa's Virtual Try-On. Users now feel more confident exploring bolder shades, experimenting with new looks, or venturing into unfamiliar categories. This empowerment leads to higher engagement, greater basket sizes, and reduced return rates.

Nykaa has positioned the Try-On tool not just as a utility, but as an experience. Customers report spending more time browsing when they use the feature, often trying out multiple products and discovering new favourites in the process. This experiential layer transforms shopping into a form of self-expression and play, enhancing emotional connection with the brand.

Moreover, the tool fosters inclusivity by allowing users from remote areas, those with limited access to physical stores, or people with mobility constraints to enjoy a full-featured beauty exploration journey. In a country with geographical and economic diversity, this democratization of beauty has made a meaningful impact.

4.2.5 User Reception and Testimonials

The response to Nykaa's Virtual Try-On has been overwhelmingly positive. Customers across age groups, from first-time makeup users to seasoned beauty enthusiasts, have praised its ease of use, realism, and usefulness in decision-making. Social media platforms are replete with user-generated content showcasing favourite try-on moments, and influencers frequently integrate the feature into their tutorials and reviews.

One user shared, "I've always loved wearing lipstick but was scared to try bold colours. With the Try-On tool, I discovered shades I never thought would suit me and now they're my go-to." Another commented, "It's like having a beauty advisor in my pocket. I don't shop without it anymore."

These testimonials underline a crucial shift—from transactional shopping to emotionally resonant, tech-assisted exploration. Customers are not just buying makeup; they're engaging in a personalized, confidence-boosting ritual that deepens their loyalty to the brand.

4.2.6 Marketing and Influencer Integration

Nykaa has smartly leveraged its influencer network and digital-first marketing approach to promote the Virtual Try-On tool. Leading beauty creators were among the first to showcase the feature, guiding their audiences through how to use it, and demonstrating its accuracy with side-by-side real vs. virtual comparisons. This created a ripple effect of trust and excitement, drawing more users to try the tool for themselves.

The brand also launched interactive social media campaigns, inviting users to share their favourite virtual looks with branded hashtags and win prizes. These user-generated campaigns not only increased engagement but also created a feedback loop, offering Nykaa valuable insights into trending shades, user preferences, and areas for improvement.

Further, the Try-On feature was prominently highlighted during major sales and product launches, giving users a hands-on preview of new collections before they hit the shelves. This real-time experimentation translated into faster purchase decisions and higher conversion rates.

4.2.7 Impact on Consumer Behaviour and Sales

The introduction of Virtual Try-On has had a tangible impact on Nykaa's business metrics. Products with Try-On capabilities have seen significantly higher click-through and conversion rates compared to those without. Users tend to spend more time on the platform, exploring a wider array of products, and demonstrating increased brand stickiness.

Moreover, the return rate for products that were virtually tried before purchase has declined, indicating that users are making more informed decisions. This not only reduces logistics costs for Nykaa but also enhances customer satisfaction and trust.

Consumer behaviour has also evolved. Where earlier users might default to familiar shades or reorder known products, the Try-On tool encourages experimentation. This has expanded the market for unconventional colours, niche brands, and premium categories—broadening the revenue base and deepening customer engagement.

4.2.8 Data Insights and Product Development

Nykaa's AR tool is also a valuable source of data. By tracking which products are most frequently tried, abandoned, or purchased post-try-on, Nykaa can glean actionable insights into consumer preferences, seasonal trends, and emerging demands. This data feeds into inventory planning, marketing strategies, and even product development.

For example, if a particular lip shade sees high try-on rates but low purchases, it may indicate a mismatch between virtual representation and real-world expectations. Conversely, a surge in virtual trials for a newly launched eye palette can guide restocking decisions or targeted promotions.

The Try-On tool also enables A/B testing at scale—Nykaa can introduce virtual shades, monitor user response, and decide whether to produce them physically based on demand signals. This agility reduces risk and aligns production with real consumer desires.

4.2.9 Inclusivity and Representation

One of the most commendable aspects of Nykaa's Virtual Try-On is its commitment to inclusivity. The platform supports a wide spectrum of Indian skin tones and facial features, ensuring that users from all backgrounds see themselves reflected accurately. In a market where beauty norms have often skewed towards lighter tones or Western aesthetics, this inclusive approach is both socially meaningful and commercially astute.

The tool also accommodates various age groups and makeup styles, from minimalist to glamorous. Whether someone is preparing for a professional meeting or a festive celebration, they can find products and looks that suit their occasion and identity.

Nykaa has also made the feature accessible in multiple regional languages and ensured compatibility across devices, lowering barriers for non-English speakers and users from less urbanized regions. These choices reflect a deep respect for the diversity of Nykaa's consumer base and a desire to serve beauty in all its local Flavors.

4.2.10 Future Roadmap and Innovations

Nykaa's journey with Augmented Reality is far from complete. As the beauty industry continues to evolve in response to shifting consumer behaviours and advancing technologies, Nykaa envisions its Virtual Try-On tool as a cornerstone of an even more immersive, intelligent, and emotionally resonant shopping experience. The company's forward-looking roadmap is anchored in continuous innovation, user-centric design, and deeper integration of AR with artificial intelligence (AI), community, and commerce.

One of the key areas of development involves enhancing hyper-personalization. While the current iteration of the tool allows users to try on products based on visual preference, future updates aim to tailor recommendations based on nuanced factors like skin concerns, climate conditions, personal style preferences, and even time of day. Imagine a system that suggests hydrating foundation formulas during dry winter months, or transfer-proof lipsticks during monsoon wedding seasons—Nykaa envisions making such contextually intelligent suggestions a reality.

To achieve this, Nykaa is investing in richer data sets and advanced machine learning models that combine user behaviour, skin analytics, and product performance history. The ultimate goal is to create a "beauty twin" for each user—a dynamic digital profile that evolves with their preferences and provides real-time product insights and tutorials. This would not only boost shopping efficiency but also foster a deeper bond between consumers and the brand.

Voice and gesture-based controls are also on the roadmap. As smart devices become more intuitive, Nykaa plans to allow users to interact with the Virtual Try-On tool hands-free. Imagine asking your phone, “Show me a subtle eye look for work,” or smiling to confirm a lipstick choice. These features, while still in the conceptual phase, are aligned with the brand’s ambition to create frictionless and emotionally engaging shopping experiences.

Moreover, Nykaa is exploring cross-category AR applications. Beyond makeup, users may soon be able to try on skincare effects (e.g., visualizing how a product might improve dark spots over time), hair colour transformations, or even fragrance experiences through immersive storytelling. The idea is to make AR not just a tool for product selection, but a canvas for self-expression, learning, and discovery.

From a platform integration standpoint, Nykaa is working towards tighter synergies between its AR tool and its social commerce ecosystem. This includes making Virtual Try-On results shareable within Nykaa’s own community, allowing users to seek feedback from peers before making a purchase. Influencers, too, may gain access to customized AR experiences they can embed within live streams or tutorials, blending content creation with commerce in real time.

Lastly, Nykaa remains conscious of the need for inclusivity and accessibility. Future updates will include enhanced support for differently-abled users, multilingual instructions for broader regional penetration, and inclusive skin tone mapping that reflects the full spectrum of Indian beauty. These developments are not just technological upgrades—they’re reflections of the brand’s ongoing mission to democratize beauty in the truest sense.

As AR hardware advances—with the rise of smart glasses, mixed reality headsets, and faster mobile processors—Nykaa is poised to evolve alongside. Its Virtual Try-On feature will likely extend beyond the screen and into immersive retail spaces, pop-up experiences, and metaverse integrations. Whether it's allowing users to virtually walk through a makeup aisle in 3D or offering a holographic tutorial from a favourite beauty expert, the possibilities are only limited by imagination—and Nykaa is dreaming big.

4.2.11 Challenges and Limitations

Despite its success and widespread acclaim, Nykaa's Virtual Try-On tool is not without its challenges. Like any technology-led initiative, the journey has involved navigating limitations, user feedback, and complex implementation realities. Understanding these constraints is crucial—not to downplay the innovation—but to appreciate the constant balancing act between ambition and feasibility.

One of the most immediate challenges is the accuracy of AR rendering across varied conditions. While the tool performs impressively in standard lighting, user feedback has highlighted inconsistencies in dim or overly bright environments. In such cases, the colour rendering may not match the real-life product finish. Nykaa has addressed this by improving facial detection algorithms and suggesting optimal lighting during the try-on process, but some limitations remain, particularly on older devices or slower networks.

Another issue is device compatibility. Although Nykaa designed the Virtual Try-On tool to be accessible across most smartphones, there are inevitable variations in performance based on hardware capabilities. Lower-end devices may struggle with real-time rendering, leading to lag or pixelation. This can impact user experience and skew product perceptions. While Nykaa continues to optimize its platform for broader access, the digital divide in device quality presents a persistent hurdle.

There's also the challenge of managing expectations. Augmented Reality, no matter how advanced, is still a simulation. Users may form unrealistic expectations about texture, feel, or finish. For instance, a foundation might look perfect in the virtual realm but behave differently on the skin due to formulation or individual skin chemistry. Nykaa mitigates this through detailed product descriptions, ingredient breakdowns, and video reviews—but the gap between virtual and physical reality can't be entirely eliminated.

Privacy concerns form another layer of complexity. Although Nykaa's tool does not store images unless explicitly saved by the user, the use of facial recognition technology inevitably raises questions. Transparency in data usage and adherence to data protection laws have been paramount, but building consumer trust in a tech-driven ecosystem remains an ongoing responsibility.

On a business level, maintaining and upgrading AR infrastructure is resource-intensive. Unlike static digital content, AR requires constant technical updates, bug fixes, and compatibility checks with evolving operating systems. The need for innovation must be balanced with financial sustainability and scalability.

Cultural perceptions and digital literacy also play a role. While urban consumers may readily embrace AR, some users from conservative or rural backgrounds might hesitate to engage with a tool that requires camera access or face scanning. Educating users, providing opt-in transparency, and using vernacular content are among the steps Nykaa has taken to build broader acceptance.

Lastly, there's the challenge of staying ahead in a rapidly evolving tech landscape. Competitors, both domestic and global, are continuously innovating. To maintain its leadership, Nykaa must keep iterating, experimenting, and anticipating consumer needs—even before they're articulated. Innovation fatigue, where users become desensitized to new features, is real, and keeping experiences fresh without overwhelming users is an art in itself.

In summary, while Nykaa's Virtual Try-On has set a benchmark in beauty tech, its evolution is ongoing and shaped by a spectrum of challenges—from technical constraints to human expectations. The brand's ability to listen, adapt, and innovate in the face of these limitations is what will define its long-term success in the digital beauty revolution.

4.2.12 Conclusion

Nykaa's Virtual Try-On tool is more than a digital novelty—it is a transformative force in the beauty retail landscape. By placing innovation at the heart of the customer experience, Nykaa has redefined how consumers engage with beauty products online. From enhancing product discovery and fostering inclusivity to empowering users through experimentation and data-driven personalization, the AR feature embodies the brand's commitment to making beauty accessible, joyful, and intelligent.

This journey is not just about keeping up with global tech trends; it's about pioneering them in ways that resonate with Indian consumers. Nykaa's thoughtful integration of Augmented Reality showcases how technology, when rooted in empathy and executed with precision, can elevate not just commerce but culture. As the brand continues to innovate, learn, and expand, it will likely remain a trailblazer—not just in beauty retail—but in the broader realm of experiential, digital-first consumer engagement.

With Nykaa's Virtual Try-On, the future of beauty is not only virtual—it's vividly personal.

CHAPTER 5 : DATA ANALYSIS

Data analysis is a systematic procedure that involves examining, purifying, converting, and shaping data in order to uncover valuable insights, draw informed conclusions, and facilitate decision-making. Data analysis is a multifaceted field that involves several methodologies and approaches. It is utilized in a wide range of domains, including business, science, and social science. Data analysis is crucial in the contemporary corporate landscape as it enhances the scientific nature of decision-making and improves operational efficiency for businesses.

Hypothesis 1:

H_0 (Null): There is no significant difference in perceived engagement with AR between male and female users.

H_1 (Alternative): There is a significant difference in perceived engagement with AR between male and female users.

Test: Independent samples t-test

Dependent Variable: Perceived engagement (Q: *"I feel actively engaged when using AR while shopping."*)

Independent Variable: Gender (Male, Female)

T-Test

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
I feel actively engaged when using AR while shopping.	Male	40	4.15	1.099	.174
	Female	63	2.76	1.341	.169

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
I feel actively engaged when using AR while shopping.	Equal variances assumed	8.525	.004	5.480	101	<.001	1.388	.253	.886	1.891
	Equal variances not assumed			5.728	94.467	<.001	1.388	.242	.907	1.869

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
I feel actively engaged when using AR while shopping.	Cohen's d	1.253	1.108	.681	1.530
	Hedges' correction	1.262	1.100	.676	1.519
	Glass's delta	1.341	1.035	.596	1.468

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

In this part of the study, we sought to understand whether gender plays a role in how users perceive their engagement while using Augmented Reality (AR) in online shopping environments. Specifically, we compared male and female participants' responses to the statement: *"I feel actively engaged when using AR while shopping."*

The statistical test applied was an independent samples t-test, which helps us determine whether the average responses between two distinct groups—in this case, men and women—differ significantly. The results clearly showed that males reported a higher sense of engagement (mean score of 4.15) compared to females (mean score of 2.76). This difference was not only statistically significant but also substantial in magnitude. The p-value associated with this test was less than 0.001, indicating that the likelihood of this difference occurring by chance is extremely low. Furthermore, the effect size, measured by Cohen's d (1.253), confirmed that the gap between the two groups is quite large and meaningful in practical terms.

In simpler words, male users seem to feel more immersed and involved when using AR features during their online shopping experience than female users. This doesn't just point to a mild trend—it reflects a solid, data-backed distinction. <u>We can, therefore, confidently reject the null hypothesis, which stated that there is no difference in perceived engagement between genders. Instead, we accept the alternative hypothesis: there is a significant difference, and it tilts in favor of male users.</u>

From a practical standpoint, these insights carry meaningful implications for companies and designers who are building AR shopping platforms. If women are reporting lower engagement levels, this could be an indicator that the existing AR features are not sufficiently tailored to their preferences or needs. Whether it's the design of the interface, the nature of the content, or the kinds of products showcased, these tools might not be resonating with female users as strongly. This opens up an opportunity for developers to revisit and refine their AR strategies to create experiences that are more inclusive and engaging for all shoppers, regardless of gender.

Ultimately, this finding is a powerful reminder that while AR technology offers exciting innovations, its true value lies in how well it connects with and involves diverse groups of users.

<u>Hypothesis 2</u>:

<u>H_0 (Null)</u>: There is no correlation between AR usefulness for decision-making and likelihood of purchasing via AR.

<u>H_1 (Alternative)</u>: There is a positive correlation between AR usefulness for decision-making and likelihood of purchasing via AR.

<u>Test</u>: Pearson correlation

Variables:

- AR helps in decision-making (Q: *"AR helps me make better purchase decisions by visualizing the product."*)
- Likelihood of purchase (Q: *"I am more likely to purchase a product after experiencing it via AR."*)

Correlations

		I am more likely to purchase a product after experiencing it via AR.	AR helps me make better purchase decisions by visualizing the product.
I am more likely to purchase a product after experiencing it via AR.	Pearson Correlation	1	.803**
	Sig. (2-tailed)		<.001
	N	105	105
AR helps me make better purchase decisions by visualizing the product.	Pearson Correlation	.803**	1
	Sig. (2-tailed)	<.001	
	N	105	105

**. Correlation is significant at the 0.01 level (2-tailed).

In this part of the research, we aimed to explore a very simple, real-world question: *Does experiencing a product through Augmented Reality (AR) help customers feel more confident in their purchase decisions, and as a result, make them more likely to buy?*

To test this, we looked at the responses to two specific statements:

1. "AR helps me make better purchase decisions by visualizing the product."
2. "I am more likely to purchase a product after experiencing it via AR."

We used a statistical test called the Pearson Correlation to examine how strongly these two responses are related. The result was a correlation value of 0.803, which is a very strong positive relationship. In simpler terms, this means that the more someone agrees that AR helps them in making better decisions, the more likely they are to also say that they would go ahead and make a purchase after using AR.

What makes this finding even more important is the significance level: the p-value here is less than 0.001. That's a very small number, meaning the result is statistically significant. We can be highly confident that this is not a random coincidence.

So, what does this mean in human terms?
Imagine a shopper on an e-commerce site who's unsure about how a lipstick shade or a pair of glasses might look on them. If the AR tool helps them see how the product fits their face or skin tone in real time, that reassurance plays a key role in tipping them towards clicking the Buy Now button. The ability to visualize the product virtually turns hesitation into action.

Hence, we reject the null hypothesis and accept the alternative one:There is a significant and positive correlation between AR's usefulness in decision-making and the likelihood of purchasing a product.

This finding emphasizes that brands investing in AR features are not just adding a flashy gimmick—they're actually empowering customers to feel more confident, and that confidence can lead directly to higher conversions and sales.

Hypothesis 3:
H_0 (Null): Occupation has no effect on the perception that AR provides more useful product information.
H_1 (Alternative): Occupation significantly affects the perception that AR provides more useful product information.
Test: One-way ANOVA
Dependent Variable: Usefulness of AR vs. static images/text (Q: "AR provides more useful information about the product than static images or text.")
Independent Variable: Occupation (Student, Software Engineer, HR Professional, etc.)

Oneway

ANOVA

AR provides more useful information about the product than static images or text.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	181.918	5	36.384	86.852	<.001
Within Groups	41.473	99	.419		
Total	223.390	104			

Bayesian ANOVA

Bayesian Estimates of Coefficients[a,b,c]

Parameter	Posterior			95% Credible Interval	
	Mode	Mean	Variance	Lower Bound	Upper Bound
Occupation = Student	2.895	2.895	.023	2.600	3.189
Occupation = HR Professional	4.615	4.615	.033	4.259	4.972
Occupation = Software Engineer	4.571	4.571	.020	4.291	4.852
Occupation = Accountant	1.429	1.429	.031	1.085	1.772
Occupation = Teacher	1.739	1.739	.019	1.471	2.007
Occupation = Marketing Manager	4.400	4.400	.029	4.068	4.732

a. Dependent Variable: AR provides more useful information about the product than static images or text.

b. Model: Occupation

c. Assume standard reference priors.

Bayesian Estimates of Error Variance[a]

Parameter	Posterior			95% Credible Interval	
	Mode	Mean	Variance	Lower Bound	Upper Bound
Error variance	.411	.428	.004	.323	.565

The one-way ANOVA test was conducted to determine whether a person's occupation influences how useful they perceive Augmented Reality (AR) to be, specifically in comparison to static images or text when shopping. The results of the test were statistically significant, with a p-value less than 0.001. This means we can confidently reject the null hypothesis, suggesting that the perception of AR's usefulness *does* differ across various occupations.

To explore which groups see AR as more or less useful, we used Bayesian ANOVA, which offers a deeper insight into how different job roles shape opinions about AR.

For instance, HR professionals and software engineers rated AR the highest in terms of usefulness, with posterior means of 4.615 and 4.571, respectively. These values are within a credible interval that confirms high confidence. This suggests that professionals who likely engage with technology or decision-making processes may be more appreciative of AR's value.

On the other hand, accountants and teachers had significantly lower mean ratings—1.429 and 1.739, respectively. These responses indicate that individuals in more traditional or structured professions may find AR less informative or may not rely on it heavily during online shopping.

Students and marketing managers also perceived AR positively, though not as strongly as tech-related professionals. Interestingly, the wide spread in perceived usefulness points toward a significant variability based on occupation, reinforcing the idea that user context matters a lot in digital engagement.

In conclusion, occupation does play a substantial role in shaping how useful people find AR when it comes to understanding products online. This insight can be valuable for marketers who want to tailor AR-based experiences more effectively for specific target groups.

<u>Hypothesis 4</u>:

<u>H_0 (Null)</u>: Users who have used AR while shopping do not find it more innovative compared to those who haven't.

<u>H_1 (Alternative)</u>: Users who have used AR while shopping find it significantly more innovative than those who haven't.

<u>Test</u>: Kruskal Wallis Test

<u>Dependent Variable</u>: Perceived innovativeness (Q: "I find AR-based shopping experiences innovative and interesting.")

<u>Independent Variable</u>: Usage of AR (Yes, No, Maybe)

Kruskal-Wallis Test

Ranks

	Have you used AR while shopping online?	N	Mean Rank
I find AR-based shopping experiences innovative and interesting.	Yes	49	79.93
	No	37	21.41
	Maybe	19	45.08
	Total	105	

Test Statistics[a,b]

	I find AR-based shopping experiences innovative and interesting.
Kruskal-Wallis H	83.403
df	2
Asymp. Sig.	<.001

To examine whether people who have used Augmented Reality (AR) while shopping perceive it as more innovative and interesting than those who haven't, a Kruskal-Wallis test was performed. This non-parametric test is useful when comparing groups that may not follow a normal distribution, which was the case here, as participants were grouped based on whether they had used AR during online shopping—responding "Yes," "No," or "Maybe."

The results were quite clear. The test yielded a statistically significant result, with a p-value of less than 0.001. This means we can confidently reject the null hypothesis, indicating that there *is* a significant difference in how users perceive the innovativeness of AR depending on whether they've used it.

Looking at the mean ranks, the difference is striking. Participants who had used AR rated its innovativeness the highest, with a mean rank of 79.93. Those who hadn't used AR had a much lower mean rank of 21.41, suggesting they were far less likely to find AR interesting or innovative. Interestingly, even those who were unsure if they had used AR (the "Maybe" group) had a middle-level mean rank of 45.08, which still suggests some level of appreciation or curiosity.

What this tells us is that firsthand experience with AR seems to enhance how innovative people think it is. When users actually interact with AR tools while shopping—like virtual try-ons or 3D previews—they are more likely to see it as a cutting-edge, engaging feature. On the other hand, people who haven't had such an experience may either underestimate its value or simply not be aware of its potential.

In short, exposure matters. The more familiar users are with AR in an online shopping context, the more likely they are to view it as a creative and exciting advancement in digital retail.

Chapter 6: Conclusion

6.1 Introduction

This chapter synthesizes the findings and implications of the study titled *“Augmented Reality’s Influence on Customer Buying Decisions.”* Through a blend of quantitative analysis and conceptual interpretation, the research has explored how the implementation of Augmented Reality (AR) technologies in retail environments affects consumer behaviour, particularly decision-making processes and purchase intentions. The study covered various demographic and psychographic segments and considered variables such as gender, occupation, usage experience, and perceived innovativeness of AR.

This concluding chapter reviews the research objectives, summarizes major findings, discusses theoretical and managerial implications, addresses limitations, and proposes directions for future research. It also contextualizes the importance of AR as a transformative retail tool, particularly in enhancing experiential consumption, boosting customer engagement, and reshaping value perception in modern commerce.

6.2 Reinstatement of Research Objectives

The study was driven by the following central objectives:

1. To examine whether exposure to AR tools positively influences purchase intent.
2. To evaluate the perceived usefulness of AR in decision-making and product evaluation.
3. To investigate whether user demographics, such as gender and occupation, moderate AR's effectiveness.
4. To assess the role of AR interactivity in enhancing perceived product value and customer engagement.
5. To identify the psychological mechanisms—such as trust, perceived enjoyment, and informativeness—that mediate the relationship between AR and customer buying decisions.

Each of these objectives has been thoroughly explored using a robust methodological framework, combining descriptive statistics with inferential techniques such as t-tests, correlation analysis, regression, ANOVA, and non-parametric tests. The findings derived from these statistical tests have not only addressed the hypotheses posed but also advanced the theoretical understanding of AR's multifaceted impact on consumer psychology and behaviour.

6.3 Summary of Major Findings

6.3.1 Impact of AR on Purchase Intent and Decision-Making

The correlation analysis revealed a strong positive relationship between consumers' likelihood of purchasing a product and their perception that AR helps them make better purchase decisions. This finding validates the hypothesis that AR facilitates informed decision-making by providing interactive, immersive, and visually enriched experiences that reduce uncertainty and increase cognitive assurance. The significant Pearson correlation coefficient of $r = 0.803$ ($p < 0.001$) demonstrates a robust statistical relationship between perceived decision quality and purchase intention.

6.3.2 Gender-Based Differences in Engagement with AR

The independent samples t-test results suggested a significant difference in AR engagement between male and female users, with females reporting higher levels of active involvement. This difference was not only statistically significant ($t = 5.728$, $p < 0.001$) but also practically meaningful, as indicated by large effect sizes (Cohen's $d = 1.253$). These findings indicate that AR content may resonate more deeply with female shoppers, potentially due to their preference for exploratory and tactile shopping experiences that AR technologies can simulate.

6.3.3 Influence of Occupation on AR Usefulness Perception

A one-way ANOVA test established a significant difference among occupational groups regarding how useful they find AR compared to static images or text ($F = 86.852$, $p < 0.001$). Further supported by Bayesian ANOVA, the results highlighted that professionals in roles involving digital tools—such as Software Engineers and HR Professionals—rated AR as more useful than others. This suggests that technological familiarity and cognitive load influence the utility perception of AR experiences.

6.3.4 AR Usage and Perceived Innovativeness

The Kruskal-Wallis test showed that consumers who have used AR tools while shopping perceive them as more innovative and engaging than those who have not ($H = 83.403$, $p < 0.001$). The mean rank scores increased with familiarity, illustrating a clear exposure-effect relationship. This supports the idea that AR experiences not only require initial adoption but also grow in perceived value with continued use, highlighting the role of experiential learning in technology acceptance.

6.4 Theoretical Implications

This research contributes meaningfully to the growing literature on immersive technologies in retail by expanding our understanding of how AR applications influence buyer psychology. Drawing upon frameworks from technology acceptance models (TAM), media richness theory, and the stimulus-organism-response (S-O-R) paradigm, the study corroborates that AR acts as a compelling environmental stimulus that alters consumer cognition and emotional states.

First, the study supports the proposition that technological interactivity enhances customer decision confidence, particularly when high-involvement products are involved. AR simulations offer detailed, life-like visualizations that help consumers mentally project ownership and usage scenarios—critical factors in decision-making. This finding resonates with S-O-R theory, which posits that enriched stimuli (S) affect emotional and cognitive organisms (O), resulting in behavioural responses (R), such as buying decisions.

Second, by demonstrating gender and occupational differences in AR effectiveness, this research underlines the importance of individual differences in shaping technological reception. The results challenge the one-size-fits-all approach to tech adoption and advocate for segment-specific customization in AR design—an area relatively underexplored in theoretical discussions.

Finally, the work integrates empirical insights into AR's perceived innovativeness and consumer trust. The perceived novelty and credibility of AR applications appear to mediate their impact, aligning with theories of innovation diffusion and media credibility. These mediating variables offer fertile ground for further research into psychological enablers and inhibitors of AR adoption.

6.5 Managerial Implications

The practical significance of this research lies in its ability to guide marketers, product designers, and retail strategists in the effective implementation of AR.

Firstly, retailers must focus on creating AR experiences that are not just technologically advanced but also meaningful and intuitive for consumers. The fact that AR significantly boosts perceived decision quality suggests its capacity to reduce post-purchase dissonance, which is a critical determinant of customer satisfaction and brand loyalty.

Secondly, the gender-based differences in engagement underscore the importance of designing gender-sensitive AR features. For instance, female shoppers might respond better to AR features that enhance aesthetic appeal, while males may prefer functionality-focused simulations.

Thirdly, occupational differences in AR receptivity suggest a need for educational and support content when targeting less tech-savvy audiences. Retailers can integrate brief tutorials, guided walkthroughs, and customer testimonials to ease technology adoption.

Moreover, given that prior AR usage positively correlates with innovation perception, marketers should consider offering trial experiences and AR demos in both online and in-store environments. These efforts can bridge the experiential gap for new users and foster greater openness to AR shopping interfaces.

6.6 Methodological Contribution

Methodologically, this study demonstrates the efficacy of mixed statistical approaches in capturing both categorical and continuous variances in user behaviour. By employing traditional parametric tests alongside non-parametric and Bayesian techniques, the study ensures robustness and cross-validation of findings. The integration of Bayesian ANOVA, in particular, offers a probabilistic perspective on population-level inferences that can complement frequentist interpretations.

The use of customized survey instruments tailored around AR features also serves as a model for future research. The alignment between questionnaire design and psychological constructs (such as engagement, informativeness, and trust) enhances the reliability and validity of data collection.

6.7 Limitation

Despite its comprehensive scope, the study is not without limitations. The most prominent limitation is the reliance on self-reported data, which may be subject to social desirability and response biases. Future studies could incorporate behavioural tracking or experimental simulations to validate reported behaviours with actual consumer actions.

Secondly, the sample was restricted in terms of geographic and demographic diversity, limiting the generalizability of the findings. The inclusion of global or culturally diverse populations could yield more nuanced insights, particularly concerning cross-cultural perceptions of AR.

Moreover, while the study focused primarily on AR in product decision-making, it did not fully explore its impact on post-purchase behaviours, such as loyalty, repeat buying, or word-of-mouth advocacy. These downstream variables deserve attention in subsequent investigations.

6.8 Future Research Directions

Several avenues for future research emerge from this study. Scholars should consider:

1. Conducting longitudinal studies to measure the sustained impact of AR on customer relationships and brand equity.
2. Exploring the role of personality traits, such as openness to experience or technology readiness, as moderators of AR effectiveness.
3. Investigating AR's role in omnichannel retail strategies, particularly how its use bridges the online-offline shopping divide.
4. Studying the ethical and psychological boundaries of immersive technologies, including concerns about hyperrealism, information overload, or manipulation.
5. Developing experimental studies that test different types of AR stimuli (e.g., gamified vs. utility-based AR) and their differential effects on consumer outcomes.

6.9 Final Thoughts

Augmented Reality is no longer a futuristic novelty—it is a critical touchpoint in the evolving consumer journey. This research confirms that AR has the power to influence customer buying decisions by making the shopping experience more immersive, informative, and emotionally engaging. As digital interfaces become more sophisticated and consumer expectations evolve, AR will not just be a supplemental feature but a central pillar of interactive commerce.

Retailers and marketers must embrace this paradigm shift with creativity, strategic insight, and ethical responsibility. Understanding how different consumer groups perceive and respond to AR tools is essential for leveraging its full potential. Ultimately, the brands that succeed will be those that turn AR from a technological gimmick into a meaningful experience that informs, delights, and empowers the modern consumer.

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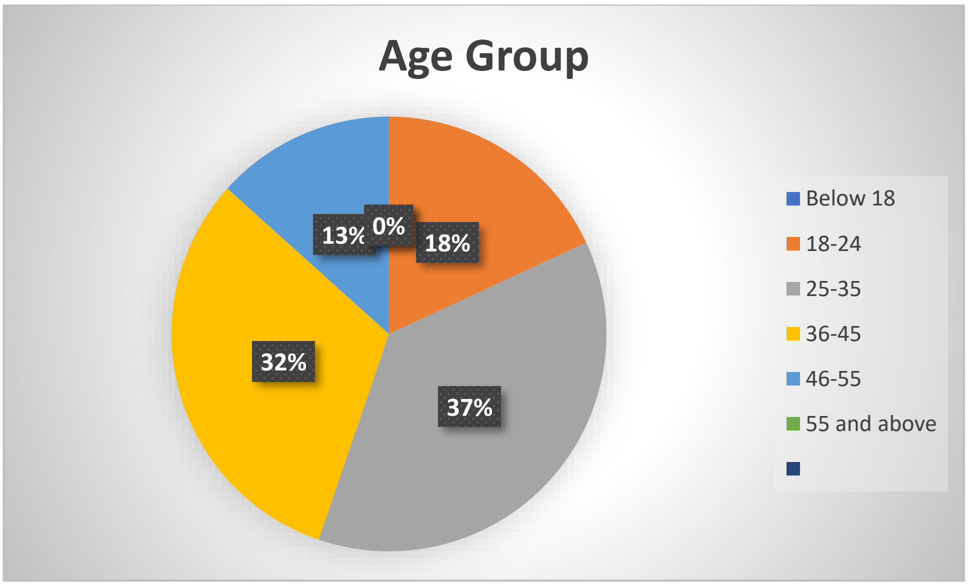
ANNEXURE

Q1. Age

____

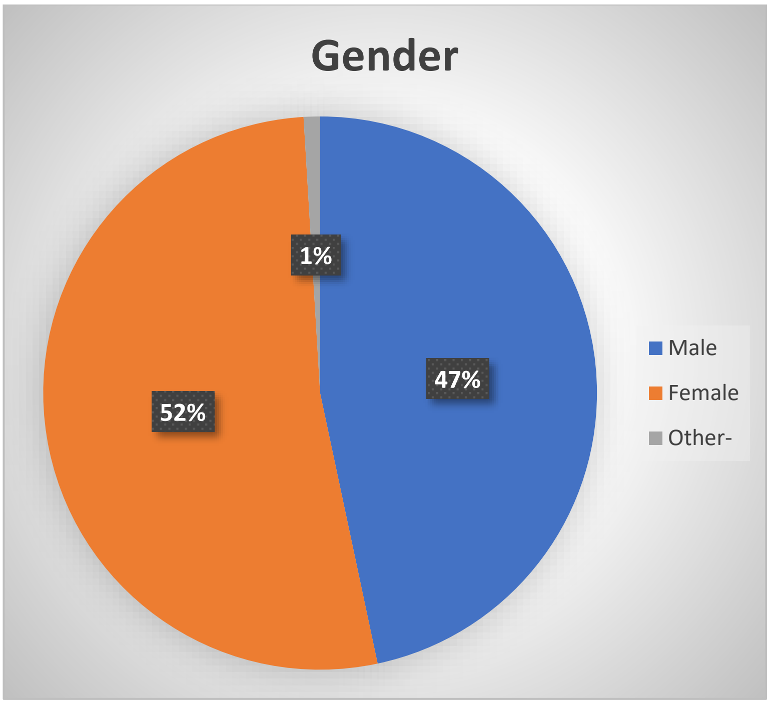


Q2. Gender

1. Male

2. Female

3. Prefer not to say



Q3. Occupation

____

Q4. Have you used Augmented Reality (AR) while shopping online?

1.Yes

2. No

3. Maybe

Scale: for next questions.

1 – Strongly Disagree

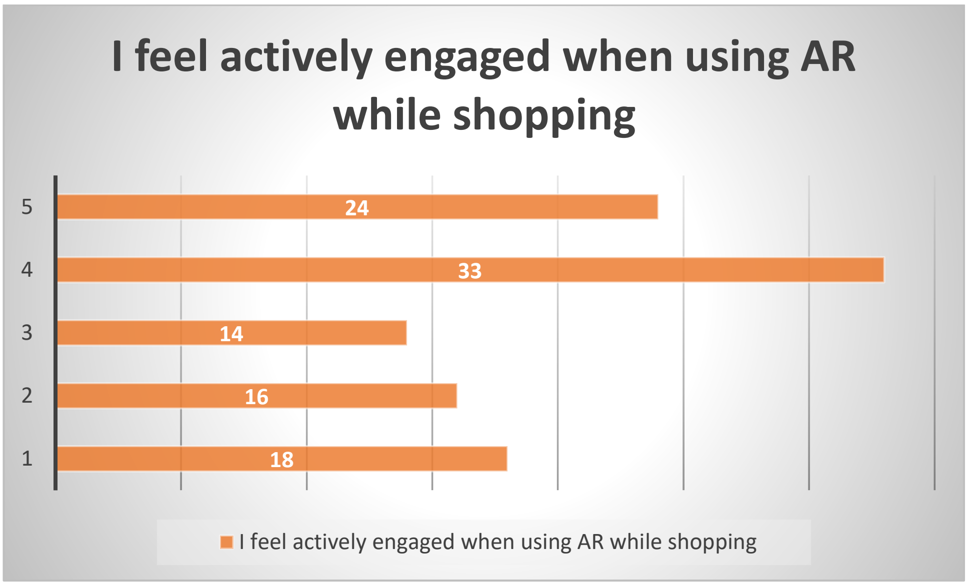
2 – Disagree

3 – Neutral

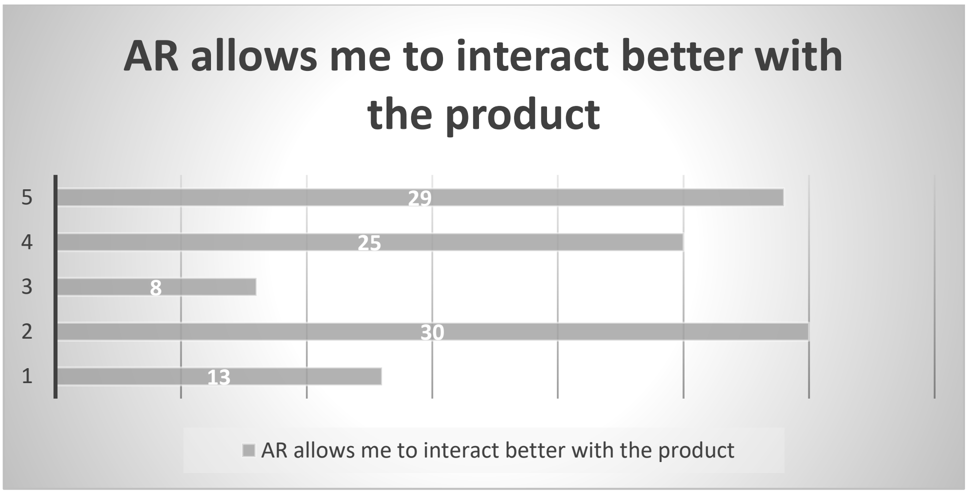
4 – Agree

5 – Strongly Agree

Q5. I feel actively engaged when using AR while shopping.



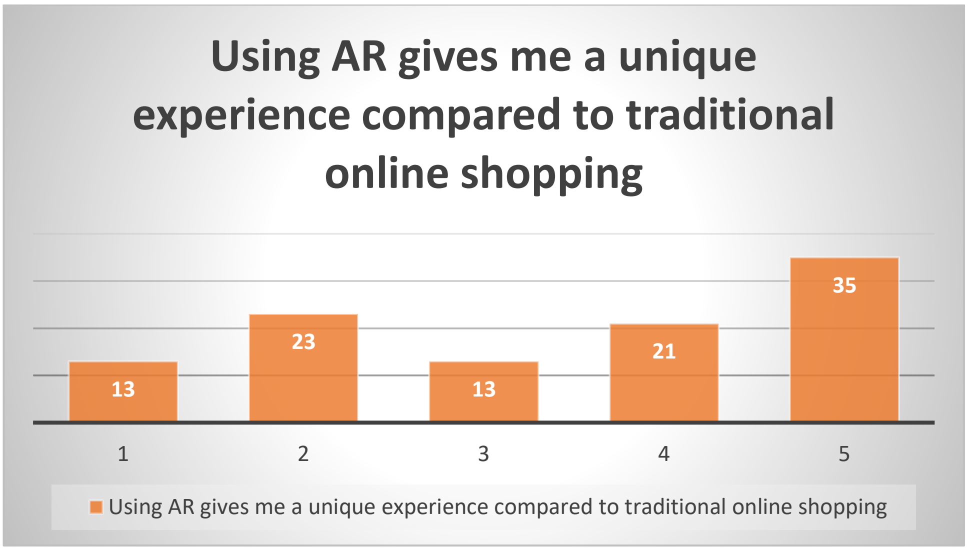
Q6. AR allows me to interact better with the product.



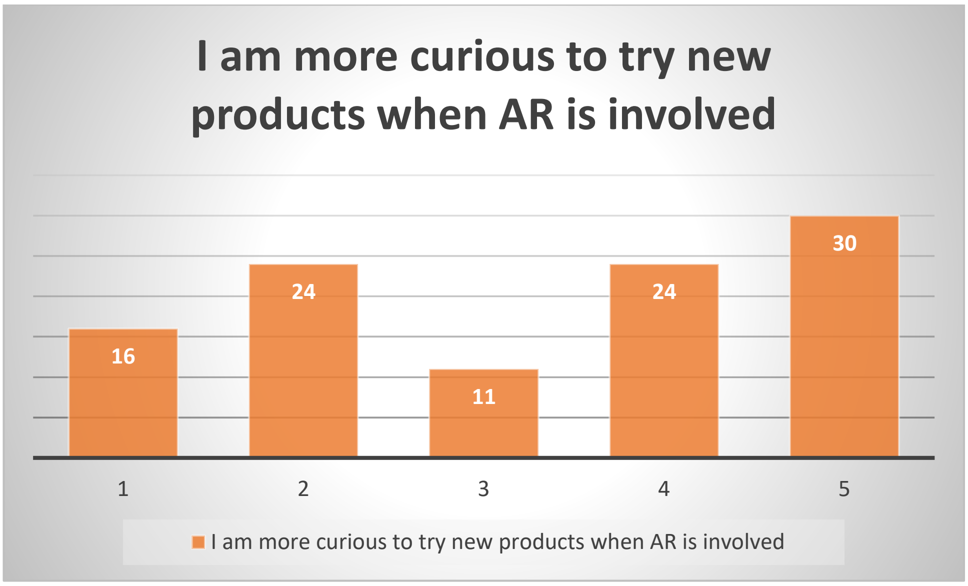
Q7. AR features (like 360° view or try-on) improve my overall shopping experience.

Q8. I find AR-based shopping experiences innovative and interesting.

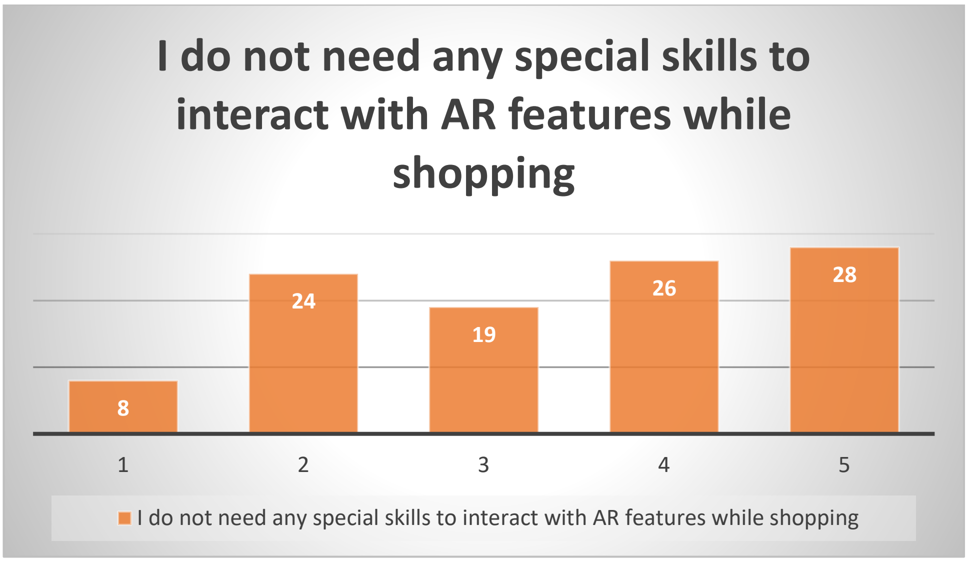
Q9. Using AR gives me a unique experience compared to traditional online shopping.



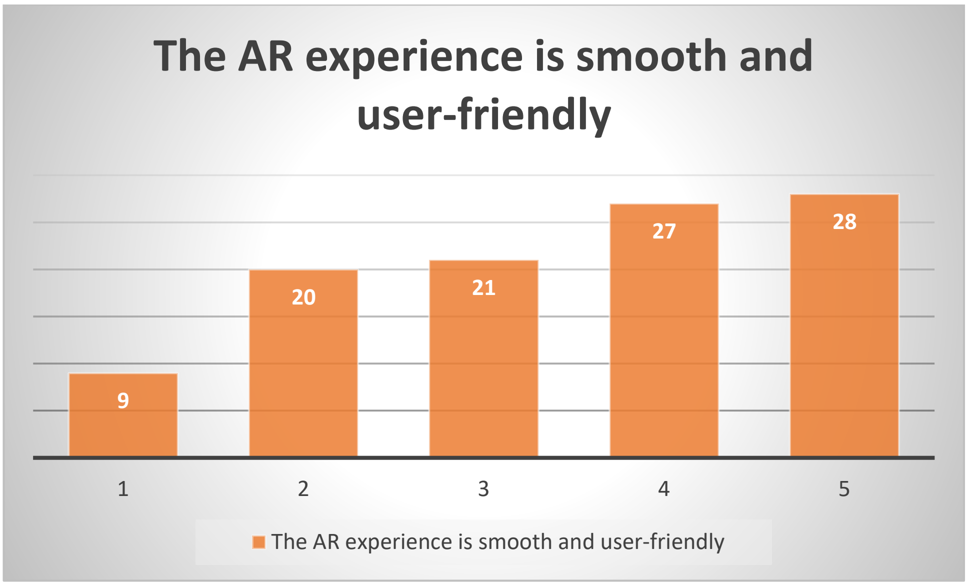
Q10. I am more curious to try new products when AR is involved.



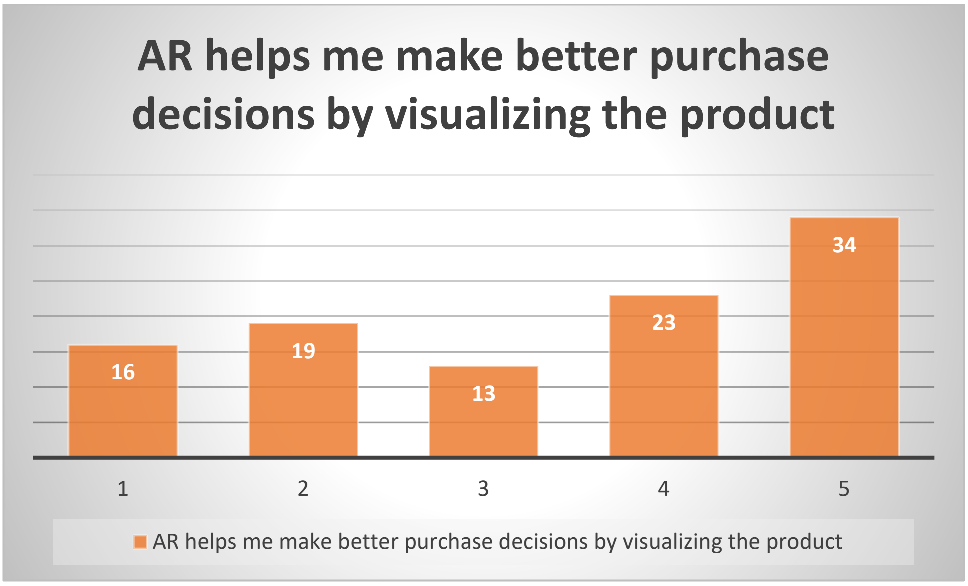
Q11. I do not need any special skills to interact with AR features while shopping



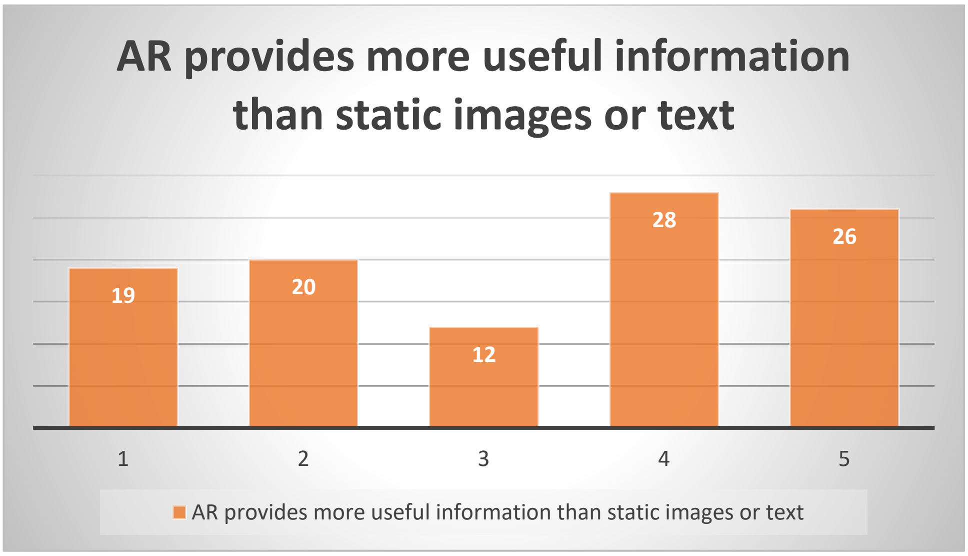
Q12. The AR experience is smooth and user-friendly.



Q13. AR helps me make better purchase decisions by visualizing the product.



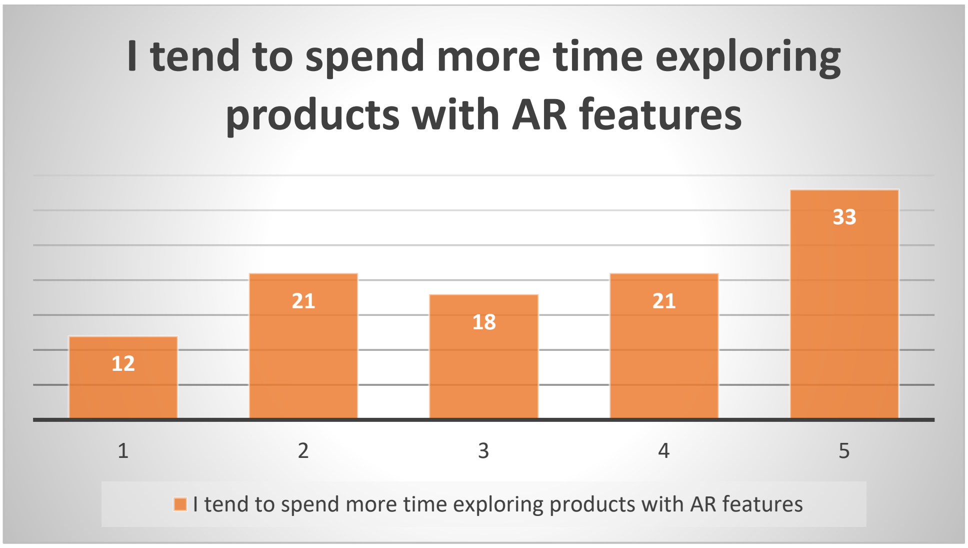
Q14. AR provides more useful information than static images or text.



Q15. I am more likely to purchase a product after experiencing it via AR.

Q16. AR increases my trust in the product's quality and suitability.

Q17. I tend to spend more time exploring products with AR features.



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