# STUDY ON THE USE OF AUGMENTED REALITY AND VIRTUAL REALITY IN ENHANCING THE RETAIL SHOPPING EXPERIENCE AMONG CONSUMERS IN ERNAKULAM CITY.

**Dissertation**

**Submitted by**

**MARIA THOMAS: (SM22COM013)**

**Under the guidance of**

**Ms. DIVYA TOMY**

**In partial fulfillment of the requirement for the Degree of**

**MASTER OF COMMERCE**


**ST. TERESA'S COLLEGE ESTD 1925**

**ST. TERESA'S COLLEGE (AUTONOMOUS), ERNAKULAM**

**COLLEGE WITH POTENTIAL FOR EXCELLENCE**

**Nationally Re-Accredited with A++ Grade**

**Affiliated to**

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# CERTIFICATE

**This is to certify that the project titled "Study on the Impact of Behavioural Disposition on Portfolio Investment Decision of Individual Investors in Ernakulam City" submitted to Mahatma Gandhi University in partial fulfillment of the requirement for the award of Degree of Master of Commerce is a record of the original work done by Ms. Maria Thomas, under my supervision and guidance during the academic year 2022-24.**

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**Viva Voce Examination held on….**

**External Examiner(s)**

# DECLARATION

**I, Maria Thomas, final year M.Com student, Department of Commerce (SF), St. Teresa's College (Autonomous) do hereby declare that the project report entitled "Study on the use of Augmented Reality and Virtual Reality in enhancing the retail shopping experience among consumers in Ernakulam City" submitted to Mahatma Gandhi University is a bonafide record of the work done under the supervision and guidance of Ms. Divya Tomy, Assistant Professor of Department of Commerce (SF), St. Teresa's College (Autonomous) and this work has not previously formed the basis for the award of any academic qualification, fellowship, or other similar title of any other university or board.**

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First of all, I am grateful to God Almighty for his blessings showered upon me for the successful completion of my project.

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**MARIA THOMAS**

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# CHAPTER – I

# INTRODUCTION

## 1.1 Introduction

The term "marketing" describes the actions a business takes to encourage the purchase or sale of a good or service. Selling, delivering, and advertising goods to customers or other companies are all included in marketing. The marketing mix, also referred to as the four Ps—Product, Price, Place, and Promotion—is used in marketing. Traditional marketing methods including radio, television, mail, and word-of-mouth campaigns used to be the main focus of marketing. Even while traditional marketing is still widely used, businesses can now use content, affiliate, social media, newsletter, and social media marketing techniques.

Any type of marketing that reaches consumers through offline media is considered traditional marketing. Advertisements in newspapers and other print media are basic examples of traditional marketing; other forms include billboards, mailers, TV, and radio commercials.

The promotion of companies to interact with potential consumers online and through other digital media is known as online, or digital, marketing. This covers text and multimedia messaging as well as social media, web-based, email, and other marketing channels.

Virtual reality is a kind of traditional marketing, and augmented reality is a kind of digital marketing. The retail purchasing experience has seen a considerable transformation because to augmented reality (AR) and virtual reality (VR). Using gadgets like smartphones or Augmented Reality glasses, shoppers may view things in their natural surroundings. They may virtually test things on, put furniture in their living room, or try on clothes before making a purchase thanks to this. Conversely, virtual reality (VR) provides customers with immersive experiences by bringing them to virtual storefronts or surroundings where they may browse products and decide what to buy. Benefits including convenience, customization, and enhanced engagement are offered by both Augmented Reality and Virtual reality. Additionally, they provide a link between online and in-store purchases, enabling clients to communicate

In the past, Augmented Reality and Virtual reality were confined to the gaming and entertainment industries; however, with the rapid advancement of technology, other

businesses are increasingly realizing the potential of Virtual reality and Augmented Reality. A picture created by a computer is superimposed on the user's perspective of the actual world in augmented reality. A 3D image simulated by a computer is called virtual reality. In the manufacturing sector, Augmented Reality and Virtual reality technology aids in threat identification and elimination, operational process optimization, staff training, and design, all of which promote worker safety through a decrease in accidents. The development and upkeep of Augmented Reality / Virtual reality systems can be challenging and demand highly skilled technical expertise. The learning process might also be interfered with by technical problems like hardware failures or connectivity concerns. Long-term Augmented Reality / Virtual reality use may be harmful to your health

## 1.2 Statement of the problem

There are a number of obstacles and potential issues with using augmented reality (AR) and virtual reality (VR) to improve in-store shopping that must be resolved. The use of augmented and virtual reality to improve retail shopping experiences is the subject of this article. It looks into whether or not customers are aware of these, examines the issues they confront, evaluates the effectiveness of both virtual and augmented reality, and finds out which ones they prefer. The purpose of the analysis is to determine whether or not customers are aware of augmented reality and virtual reality in the context of purchasing, as well as whether or not these technologies are effective enough to meet customer needs and address any issues that may arise.

## 1.3 Objectives of the Study

- To investigate whether the customers are aware of in retail shopping.
- To analyses the problem faced by customers due to Augmented Reality and Virtual Reality in retail shopping and their level of satisfaction.
- To study the difference between augmented reality and virtual reality.

## 1.4 Significance of the study

Virtual reality (VR) and augmented reality (AR) have revolutionized the retail sector by greatly improving the consumer purchasing experience. Customers can better grasp virtual and augmented reality according to this study. Additionally, it examines the efficacy of Augmented Reality and Virtual reality as well as their distinctions, dangers, benefits, and drawbacks. Future retail will be greatly impacted by Augmented Reality and Virtual reality, which present innovative ways to boost sales, improve customer interaction, and change how consumers purchase both online and offline. Understanding consumer behavior, forecasting market trends, enhancing technological integration, refining retail strategy, creating novel customer experiences, resolving ethical issues, and influencing policy formation are all aided by researching Augmented Reality and Virtual reality in the retail buying environment. Retailers, tech companies, legislators, and other stakeholders that want to fully utilize Augmented Reality and Virtual reality to transform retail in the future must read this report.

## 1.5 Scope of the Study

Understanding consumer behavior, forecasting market trends, enhancing technological integration, refining retail strategy, creating novel customer experiences, resolving ethical issues, and influencing policy formation are all aided by researching Augmented Reality and Virtual reality in the retail buying environment. Retailers, tech companies, legislators, and other stakeholders that want to fully utilize Augmented Reality and Virtual reality to transform retail in the future must read this report.

## 1.6 Research methodology

### 1.6.1 Type of research design:

The study is descriptive in nature

### 1.6.2 Collection of data:

Both primary and secondary data were used for the data collection

### 1.6.2.1 Primary data:

It was collected by means of questionnaire (Google form). There were 25 questions and data were collected from 100 respondents, who were selected according to the convenience of the study.

### 1.6.2.2 Secondary data:

The secondary data was collected out of detailed surveys of literature, books, and published sources of journals, research articles, study reports etc.

### 1.6.3 Sampling design method

This study uses the convenience sampling method.

### 1.6.4 Population

The population is limited to the consumers in Ernakulam district.

### 1.6.5 Sample size

The sample size consists of 100 respondents of consumers.

### 1.6.6 Questionnaire:

A pre structured questionnaire is prepared and circulated through Google form to collect primary data from 100 respondents were the consumers of Ernakulam district who were selected on the basis of convenience.

## 1.7 Tools of Analysis

The collected primary data were statistically processed, classified, tabulated and analyzed using various mathematical tools like pie chart, bar chart etc.

## 1.8 Limitations of the Study

- As the sampling taken was convenience sampling, so it might not necessarily be the representation of the actual population of the Ernakulam district.

- As the survey was circulated through google survey forms, which require internet connection. So, this study is limited to internet users only.
- The primary data for the study is collected through questionnaire and may be biased because it may contain the personal opinion of the consumers.
- The study is limited to time constrain.

## 1.9 Hypothesis

- **Objective 1:** To identify whether there is relationship between age and usage of Augmented Reality.

  H0: There is no significant relationship between age and usage of Augmented reality.

  H1: There is significant relationship between age and usage of Augmented reality.

- **Objective 2:** To identify whether there is relationship between age and usage of Virtual Reality.

  H0: There is no significant relationship between age and usage of Virtual Reality.

  H1: There is significant relationship between age and usage of Virtual Reality.

# CHAPTER – II

# REVIEW OF LITERATURE

**Jung-Hwan Kim, Minjeong Kim, Minjung Park, Jungmin Yoo conducted a study on Differences in consumer perceptions between Augmented reality and Virtual Reality, 2023:** The effects of AR and VR on richness/interactivity, a sense of presence, users' sensory brand app knowledge, attitude, and behavioral intention were all examined in this study. Participants downloaded an app to their phones for augmented reality. The Google Cardboard VR device was connected to smartphones that the participants had downloaded a VR app for. The ways that vividness and interaction affected brand app experience and attitude toward technology, however, was where AR and VR diverged. In general, the association between vividness and sensory brand app experience, as well as the relationship between interactivity and attitude toward technology for VR, were both significantly mediated by a sense of presence; however, no such relationship was found for AR.

**Andrii Kushnarevych, Daniela Kollárová conducted a study AR and VR as a shaping trend in consumer behaviour on 2023:** Virtual reality (VR) and augmented reality (AR) have grown in popularity recently. Particularly with regard to consumer behaviour, these technologies have had a significant impact on the marketing industry. This study looks at how AR and VR can shape consumer behaviour. It also looks at how they are used in different industries and how they affect consumers' decision-making and purchasing experiences. We are learning about the difficulties that come with the use of AR and VR in marketing and retail, including the need for creativity, privacy issues, and possible moral dilemmas. The article's primary objective is to give readers a thorough grasp of the role that augmented reality and virtual reality play in contemporary marketing, how these technologies are influencing customer behaviour.

**Rajni Bala, Rajni Saini conducted a study on AR and VR in real world 2023:** Virtual reality (VR) and augmented reality (AR) are the most popular and advanced technologies of the future. It is simple to see how a software program can create a virtual environment in virtual reality that is mostly controlled by sight and sound. The presentation of the user's virtual reality experience is designed to give the impression that it is real. Conversely, augmented reality (AR) brings elements of the virtual world into the real world. An interface between the actual and virtual worlds is provided by augmented reality. The goal of this chapter is to improve comprehension of the ideas

of virtual and augmented reality. The chapter covers the uses of AR and VR, their effects on society, the difficulties in putting them into practice.

**Ms. JingYun Zeng, Dr. Chang-Hyun Jin, Ms. Yisitie Xing conducted a study on The Impact of VR/AR-Based Consumers' Brand Experience on Consumer–Brand Relationships 2023:** To better understand the effects of VR/AR experiences on consumer-brand connections, this study intends to identify different types of VR/AR experiences. Four categories of brand encounters were identified for this study: real-escape, aesthetic, instructive, and entertaining. Customers can now engage with brands through virtual and augmented reality experiences. The findings verified that the primary brand experiences that consumers accessed using AR/VR technologies were those that were beautiful, educational, entertaining, and real-escape experiences. Additionally, it was discovered that consumer-brand relationship-building was impacted by brand experiences that made use of VR/AR technologies.

**Beatrice Romano, Sean Sands, Jason Ian Pallant conducted a study on Virtual shopping: segmenting consumer attitudes towards augmented reality as a shopping tool, 2022:** Retailers are gradually implementing augmented reality (AR) and other technology as tools to enhance the customer experience. Finding out how different consumers perceive the value of augmented reality (AR) and the trade-offs they incur when utilizing it for shopping is the goal of this research. Additionally, by dividing the sample of customers based on their awareness of and attitudes toward augmented reality as a tool for purchasing, the study investigates the individual traits that contribute to these disparities

**Yi Fang Wu, Eun Young Kim conducted a study on Users' Perceptions of Technological Features in Augmented Reality (AR) and Virtual Reality (VR) in Fashion Retailing: A Qualitative Content Analysis, 2022:** This study examines how customers view technological aspects in virtual reality (VR) and augmented reality (AR), and it evaluates the benefits and drawbacks of various technologies used in the fashion retail industry. The results are offered based on a content analysis of focus group interviews and a qualitative methodology. This study provides insightful

information about the scientific foundations of AR and VR, which aids marketers in creating fresh approaches to applying these technologies to the retail fashion industry.

**TS Kumar conducted a study on Study of Retail Applications with Virtual and Augmented Reality Technologies, 2021:** The internet buying experience and retail selling environment have significantly enhanced thanks to the rapidly evolving virtual reality (VR) and augmented reality (AR) technology. Fragmentation in VR and AR contributes to the technology's interdisciplinary roots in terms of applications, both in terms of academic research and practical applications. This article compares and analyses research projects and retail applications that use virtual reality and augmented reality technology. There is a comparison of the terminology linked to implementation, customer acceptance, applications, and difficulties.

**Tim Hilken, Mathew Chylinski, Debbie I. Keeling, Debbie I. Keeling conducted a study on How to strategically choose or combine augmented and virtual reality for improved online experiential retailing 2021:** There is a dearth of advice on integrating or selecting AR and VR technologies. We fill this research vacuum in this paper by investigating the separate and combined effects of AR and VR on important marketing goals. First, they demonstrate that because AR can assist users in creating fluid, product-focused mental representations, it is more successful than VR at encouraging purchase intentions. Secondly, they show that VR is more effective than AR at enhancing client attitudes toward brands because it facilitates the formation of coherent, context-focused mental representations. Third, we demonstrate that the combination of AR and VR can enhance brand attitudes and purchase intentions, but only if placement is done in the following order: AR first, VR second.

**HL Rhee, KH Lee conducted a study on Enhancing the Sneakers Shopping Experience through Virtual Fitting Using Augmented Reality, 2021:**
This study looked at how brand support, offline and mobile buy intentions, and virtual fitting (VF) experience satisfaction relate to each other in order to determine how augmented reality (AR)-based VF affects the customer purchase path. The study also looked into the personal characteristic of a customer's involvement with the product

and its controlling influence. The findings show that only mobile purchase intentions were positively impacted by high levels of satisfaction with the VF experience. In addition to having a beneficial impact on offline and mobile purchase intentions, brand encouragement developed following the VF experience also shown a mediation effect in the association between purchase intention and pleasure with the VF experience.

**Nannan Xi, Juho Hamari conducted a study on Shopping in virtual reality: A literature review and future agenda, 2021:** The potential of virtual reality is beginning to be seen by merchants and relevant academic fields more and more. The state-of-the-art of the literature on virtual reality shopping, the ways in which it has been studied, and the advantages that VR has been shown to have analytically for a range of marketing objectives are not well understood, nevertheless. As a result, they thoroughly review the corpus of published work on virtual reality shopping in this paper. The current study maps VR technologies, product categories, user experiences, etc., adding to the body of literature on VR shopping and marketing. The review demonstrates that there is still potential for improvement and that the literature on virtual reality purchasing is still in its early stages.

**Riar, Marc Korbel, Jakob J. Xi, Nannan Zarnekow, Rüdiger Hamari, Juho conducted a study on The Use of Augmented Reality in Retail: A Review of Literature, 2021:** In retail settings, for example, new digital technologies are making it possible to overlay perceptual information onto reality. The term "augmented reality" (AR) refers to these technological advancements that seek to enhance reality. The study area devoted to augmented reality in retail has evolved and is now developed enough to provide an overview of the most recent findings, applications, and state-of-the-art. As a result, we perform a thorough literature evaluation of the academic literature that is specifically focused on AR retail in this study. We discuss the applications of augmented reality (AR) in retail, their technological aspects that are frequently examined, and the possible behavioral and psychological effects that AR may imply.

**Abderahman Rejeb, Karim Rejeb conducted a study on How augmented reality impacts retail marketing: a state-of-the-art review from a consumer perspective, 2021:** Marketers have a lot of potential and obstacles when it comes to enhancing the in-store purchasing experience with augmented reality. The aim of this study is to create the current advancements in the field and develop research recommendations by conducting a systematic evaluation of the literature. They examine ninety-one publications and pinpoint four key drivers of augmented reality (AR) in retail marketing: enhancing the customer experience, strengthening the bond between the customer and the brand, bolstering marketing initiatives, and boosting marketing competitiveness. Technical constraints, consumer-focused issues, technological immaturity, and organizational issues are some of the obstacles to AR adoption in marketing.

**Cuauhtemoc Luna-Nevarez, Enda McGovern conducted a study on The Rise of the Virtual Reality (VR) Marketplace: Exploring the Antecedents and Consequences of Consumer Attitudes toward V-Commerce, 2021**: Examining the Causes and Effects of Consumer Perceptions of V-Commerce, 2021: A new class of e-commerce applications is looking to leverage the promising technology of v-commerce. This study offers a theoretical framework for comprehending the contexts and importance of consumer perceptions of v-commerce. This study suggests that consumer opinions toward v-commerce are moderated by processing fluency, demand for touch, predisposition toward trust, and gender. All things considered, the conclusions drawn from this research can assist marketers in determining and evaluating the elements that contribute to v-commerce's popularity. A discussion of the theoretical and managerial implications for further research completes the study.

**Anasuya Bardhan 1 conducted a study on augmented reality and virtual reality in retail - a bibliometric analysis, 2020:** Goal: "Augmented and Virtual Reality" is a retail trend that has gained a lot of attention recently. By improving the shopping experience and influencing customers' preferences for the shops, these interactive technologies improve the retail process. Retailers must adjust their business plans to account for the shifting traffic trends. Finding the most productive writers and

researchers, presenting the larger picture, and deducing patterns and topics will all be aided by this study.

**Michel Wedel, Enrique Bigné, Jie Zhang conducted a study on Virtual and augmented reality: Advancing research in consumer marketing, 2020:** Marketing academics are paying more and more attention to virtual reality (VR) and augmented reality (AR) technologies, as they are having a significant impact on a range of marketing activities. They discuss advancements in VR/AR applications as well as consumer marketing studies in this article. They look at the main ideas and elements of the conceptual framework they provide for the efficacy of these kinds of applications. Subsequently, they offer a thorough synopsis of the VR/AR applications that are currently being used in consumer marketing research and activities. Lastly, we provide an outlook for the advancement of VR/AR technology and applications in the future, based on this framework.

**Maria Grazia Violante, Enrico Vezzetti, Pietro Piazzolla conducted a study on How to design a virtual reality experience that impacts the consumer engagement: the case of the virtual supermarket, 2019:** In order to provide suggestions for designing a rich and immersive environment that can give a high-impact and memorable experience at any time or place, the paper looks at how recent VR technologies have affected consumer behaviour. First, the technological features of VR have been identified and documented in the research in order to study the impact. Then, a VR environment that possesses the technological attributes of hyper textuality, virtuality (the existence of virtual elements), mobility, connectivity, location specificity, and interactivity has been built. The findings demonstrate that integrating virtual technology into marketing initiatives enables marketers to recognize and seize opportunities through new technologies that are more affordable, efficient, and quick to respond to customer needs.

**M. Claudia tom Dieck, Timothy Jung conducted a study on Augmented reality and virtual reality: the power of AR and VR for business, 2019:** This book illustrates how augmented reality (AR) and virtual reality (VR) are changing the

business landscape by compiling the most recent technological studies on these two topics. This industry's innovations give companies the chance to supply their clients with distinctive products and experiences. The papers presented here enhance the current understanding of AR and VR technologies and how they might be used in a variety of sectors, including healthcare, travel, hospitality, events, fashion, retail, education, and gaming.

**Tanu Dang conducted a study on the influence of Artificial Intelligence, Augmented Reality and Virtual Reality on Shopping Experiences of the Indian Buyers 2019:** According to the paper's findings, the majority of the younger respondents are aware that online shopping platforms incorporate augmented reality, virtual reality, and artificial intelligence. This research paper's goal was to determine how artificial intelligence (AI), augmented reality (AR), and virtual reality (VR) affected Indian consumers' shopping experiences and whether or not these technologies were altering their purchasing habits.

**Edmanuel Cruz, Sergio Orts-Escolano, Francisco Gomez-Donoso, Carlos Rizo, Jose Carlos Rangel, Higinio Mora & Miguel Cazorla conducted a study on an augmented reality application for improving shopping experience in large retail stores, 2019:** In this research, we present a system that uses augmented reality and deep learning algorithms together to deliver the consumer relevant information. First, the system uses a deep learning architecture to learn how various portions of the store look visually. Customers can then take a picture of their current location inside the store using their mobile devices. By uploading this picture to the image classification system that has been trained, we are able to determine the customer's location. Then, we provide information about the customer's location, such as a route to a different location where a product is available, a 3D product depiction, etc., using this information and cutting-edge virtual reality technology.

**Rosy Boardman, Claudia E. Henninger, Ailing Zhu conducted a study on Augmented Reality and Virtual Reality: New Drivers for Fashion Retail, 2019:** This theoretical work focuses on two more contemporary technical innovations—augmented reality (AR) and virtual reality (VR)—that have been used in the fashion business. Using examples from contemporary fashion, the technology acceptance model (TAM) will be used to further assess the perceived utility and usability of AR and VR from the perspective of the customer. The final section of the chapter highlights potential study directions.

**Maya F. Farah, Zahy B. Ramadan, Dana H. Harb conducted a study on the examination of virtual reality at the intersection of consumer experience, shopping journey and physical retailing, 2019:** As a multisensory experience, virtual reality (VR) is widely used in today's corporate environment. This study explores the implications of brands' increasing device use and explores how virtual reality (VR) might enhance the purchasing experience for customers. Experts and customers were interviewed as part of a qualitative study design. The results indicate that there is a build-up of expectations between what could be the real general in-store experience and the use of virtual reality. The potential and risks of virtual reality in the retail and brand shopping process are examined.

**Gabriele Pizzi, Daniele Scarpi, Marco Pichierri, Virginia Vannucci conducted a study on Virtual reality, real reactions: Comparing consumers' perceptions and shopping orientation across physical and virtual-reality retail stores, 2019:** Virtual reality (VR) is generally linked to increased customer distraction as well as increased productivity. This study investigates the possibility for utilitarianism and hedonism in a virtual reality store. Participants were shown the identical shelf in both a real store and a virtual reality environment. We discovered that VR produces both utilitarianism and hedonism, which mediate the channel's impact on shop satisfaction differently but equally. Additionally, we discovered that VR has a negative impact on satisfaction that is tempered by purported collection size. Following their exposure to the virtual reality experience, customers generally reported high levels of all tested outcome variables.

**Francesca Bonetti & Lee Quinn, Gary Warnaby conducted a study on Augmented Reality and Virtual Reality in Physical and Online Retailing: A Review, Synthesis and Research Agenda, 2018:** Both virtual reality (VR) and augmented reality (AR) are quickly evolving technologies that are employed in brick-and-mortar and online retail to improve customer experience and sales. This study explores current discussions to present an up-to-date viewpoint by doing a comparative analysis of AR and VR research and applications in a retail context. It incorporates topics relating to consumer acceptability as well as retailer deployment of AR and VR as well as motivations.

**Amir-reza Asadi, Reza Hemadi conducted a study on Design of an AR/VR platform for e-Commerce, 2018:** These days, augmented reality and virtual reality are hot, and investors see enormous potential for them. must achieve this, there are a number of obstacles must be overcome. This article proposes a platform for pre-retailing and retailing of goods and services after exploring VR, AR, and eCommerce and taking the obstacles into consideration. Both buyers and sellers can utilize the features offered by this platform. Additionally, virtual business owners can use a web-based dashboard to manage their virtual offices and storefronts.

**Maria Teresa Cuomo, Maria Vincenza Ciasullo, Debora Tortora & Gerardino Metallo conducted a study on augmented reality and shopping experience: impacts on consumer behaviour, 2015:** By incorporating hidden layers of information into consumer behaviour and understanding, augmented reality is changing and integrating the commercial space. Through social networking, bottom-up and top-down content creation is altered in this way, leading to higher value interactions and, consequently, more sales. Consumers' perceived utility of new technologies is directly correlated with their level of comfort with them, and this is a key factor in their use of retail, self-scanning, and other apps.

# CHAPTER – III

# THEORETICAL FRAMEWORK

## 3.1 Augmented reality

An interactive experience called augmented reality adds computer-generated perceptual data to the physical world. Augmented reality is the process of superimposing digital content—such as apps, software, and hardware like AR glasses—onto actual locations and things. This improves the user experience and creates an interactive learning environment right in one's immediate surroundings, which is very helpful for Industry 4.0 and manufacturing processes. By combining human creativity, observation, and ingenuity with technology and networks, industrial users can become "one" with the machines and systems they operate with.

## 3.2 Process of augmented reality

- An AR-enabled device with a camera such as smart glasses, a tablet, or a smartphone parses a video feed to identify a physical object or the environment around the user, such as a piece of machinery or the layout of a warehouse.
- A digital twin – a 3D digital replica of the object in the cloud – connects the real and virtual environments. It collects information from the physical object and digital
- The augmented reality device then downloads information about the object from the cloud. It superimposes digital information over the object using markers or trackers like GPS, accelerometers, orientation and barometric sensors, and more. This creates a part-real, part-digital 3D interface.
- Thanks to real-time data flowing from products, the user can interact with the object or environment by moving around and sending commands to the cloud through a touchscreen, by voice, or with gestures.

## 3.3 Features of Augmented Reality

The main features of our Augmented Reality service are as follows:

### Augmented Social Interaction

AR facilitates augmented social interaction, allowing users to share and collaborate on

augmented experiences, interact with virtual avatars or characters, or engage in location-based multiplayer games and experiences.

## Applications Across Industries

AR finds applications in diverse industries, including gaming, entertainment, education, retail, marketing, healthcare, manufacturing, architecture, and maintenance, among others, enabling innovative experiences and practical solutions in different domains.

## Enhanced Visualization

AR enhances visualization by overlaying additional information or virtual elements onto the user's field of view, helping users visualize concepts, navigate unfamiliar environments, or understand complex data more intuitively.

## Multi-platform Compatibility

AR technology is available on various platforms, including smartphones, tablets, wearable devices, and smart glasses, making it accessible to a wide range of users across different devices and operating systems.

## Marker-based and Marker less Tracking

AR systems can utilize marker-based tracking, where predefined markers or patterns trigger the display of augmented content, as well as marker less tracking, which relies on environmental features or sensor data to anchor virtual objects in the user's surroundings.

## Integration with Sensors

AR devices often integrate various sensors, such as GPS, accelerometers, gyroscopes, and depth sensors, to track the user's movement and orientation accurately, enabling seamless interaction with augmented content.

## Contextual Information

AR provides contextual information relevant to the user's surroundings, such as location-based data, points of interest, historical facts, or product details, enhancing

the user's understanding and engagement with their environment.

### Spatial Awareness

AR systems use sensors, cameras, and other technologies to understand the user's environment and accurately place virtual objects within it, maintaining spatial coherence between the real and virtual worlds.

### Real-time Interaction

AR applications enable real-time interaction between virtual objects and the real world, allowing users to manipulate virtual elements or interact with digital content overlaid on physical objects.

### Overlay of Virtual Content

AR superimposes digital information, such as images, videos, text, or 3D models, onto the user's view of the real world through devices like smartphones, tablets, or AR glasses.

## 3.4 Different types augmented reality

Augmented reality (AR) is a technology that overlays virtual objects in a real-world environment. AR has emerged as a transformative force, revolutionizing the way we interact with the world around us. Various AR tools have been developed to create AR applications.

The different types are;

### Marker-based Augmented Reality

Marker-based AR is a type of augmented reality that relies on recognizing and tracking distinguished markers or patterns in the real world to superimpose virtual objects on it. These markers could be images, QR codes, symbols, or anything else that can be easily recognized by the AR system.

The marker is needed so the AR application can use it as a reference point and position the virtual content as accurately as possible. On detecting the marker through the camera, the AR system superimposes the graphically created content onto the marker.

### Marker less Augmented Reality

As the name suggests, marker less AR involves no markers like images or QR codes. Instead, it positions the digital objects by examining the data obtained through the sensors.

### Location-based Augmented Reality

This type of marker less AR uses the real-time location and sensors of a smart device to place the virtual object in a physical space.

### Projection-based Augmented Reality

Projection-based AR involves projecting digital content onto physical surfaces or objects in the real world. This creates an augmented experience for the user without using a headset or any other device. It uses projectors to display virtual images, animations, prototypes, or information directly in the physical space. Some project-based AR also includes sensors, allowing users to interact with the projection.

### Contour-based Augmented Reality

It detects and tracks the contours or outlines of real-world objects and overlays digital content onto them. It uses a computer vision algorithm to recognize and analyse the boundaries of physical objects, which enables proper alignment and integration of the virtual content.

## 3.5 Advantages of Augmented Reality

### Enhanced User Experience

AR enhances the user experience by overlaying digital information or virtual objects onto the real world, providing users with contextual and interactive content that enriches their perception of reality.

## Improved Engagement

AR captivates and engages users by offering interactive and immersive experiences that stimulate their senses and encourage exploration, leading to increased attention, retention, and enjoyment.

## Real-time Information

AR provide s real-time access to relevant information and data overlays, such as product details, navigation instructions, or contextual insights, enabling users to make informed decisions and complete tasks more efficiently.

## Enhanced Visualization

AR enhances visualization by overlaying virtual elements onto the user's view of the real world, helping users visualize concepts, designs, or spatial relationships more intuitively and comprehensively

## Hands-free Interaction

AR enables hands-free interaction with digital content overlaid onto the real world, allowing users to manipulate virtual objects, access information, or interact with interfaces using gestures, voice commands, or other intuitive inputs.

## Training and Education

AR facilitates immersive and interactive learning experiences by overlaying educational content, simulations, or visualizations onto real-world environments, enhancing understanding, retention, and engagement in training and educational settings.

## Remote Assistance and Collaboration

AR supports remote assistance and collaboration by enabling users to share augmented experiences, annotate real-world scenes, or provide virtual guidance and support in real-time, regardless of geographical distance.

### Product Visualization and Marketing

AR enables realistic product visualization by overlaying virtual representations of products, prototypes, or designs onto the user's environment, allowing customers to preview products in context and make more informed purchase decisions.

### Efficient Maintenance and Repair

AR aids in maintenance and repair tasks by providing technicians with augmented instructions, schematics, or overlays that guide them through complex procedures, reducing errors, downtime, and training costs.

### Innovative Business Opportunities

AR opens up new business opportunities and revenue streams by enabling the development of innovative AR applications, services, and experiences that cater to diverse market needs and preferences.

## 3.6 Disadvantages of Augmented Reality

### Cultural and Societal Impact

AR has the potential to influence cultural values, perceptions, and norms in ways that may have unintended consequences, including the reinforcement of stereotypes, biases, or discriminatory practices, which require careful consideration and mitigation strategies to address effectively.

### Digital Divide

The digital divide may exacerbate disparities in access to AR technology and skills, particularly among marginalized or underserved communities with limited internet connectivity, technological literacy, or resources to participate in the AR ecosystem.

### Legal and Regulatory Challenges

AR raises legal and regulatory challenges related to intellectual property rights, liability issues, content moderation, and compliance with existing laws and

regulations, which may hinder innovation and investment in AR development and deployment.

## Content Quality and Accuracy

The quality and accuracy of augmented content can vary depending on factors such as content creation tools, data sources, and calibration methods, leading to inconsistencies, errors, or misinformation that undermine the credibility and usefulness of AR applications.

## Safety Risks

AR experiences can pose safety risks if users become overly immersed in virtual content and lose awareness of their physical surroundings, leading to accidents, collisions, or injuries, particularly in high-risk environments such as busy streets or hazardous work areas.

## Social Acceptance and Behavior

The widespread adoption of AR technology may influence social norms, behaviors, and interactions in ways that raise ethical and cultural concerns, such as distraction in public spaces, intrusion of augmented content into private environments, or the blurring of boundaries between virtual and real-world experiences.

## Privacy Concerns

AR raises privacy concerns related to the collection, storage, and sharing of sensitive user data, including location information, visual data, and personal preferences, which may be exploited or compromised by malicious actors without adequate safeguards in place.

## Battery Life

AR applications can drain the battery of mobile devices quickly due to the intensive processing and display requirements, leading to shorter device runtime and user inconvenience, especially in situations where power sources are limited or unavailable.

### Dependency on Hardware

Effective AR experiences often require specialized hardware such as AR-enabled smartphones, tablets, or smart glasses, which may not be widely accessible or affordable for all users, limiting the adoption and reach of AR applications.

### Technical Limitations

AR technology is still evolving, and current implementations may suffer from technical limitations such as limited field of view, latency issues, tracking inaccuracies, and hardware constraints, which can impact the quality and reliability of AR experiences.

## 3.7 Virtual reality

Virtual Reality (VR) is a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. This environment is perceived through a device known as a Virtual Reality headset or helmet. VR allows us to immerse ourselves in video games as if we were one of the characters, learn how to perform heart surgery or improve the quality of sports training to maximise performance.

## 3.8 Process of virtual reality

The basis of VR technology is an end-to-end mechanism that replaces the natural environment with a deceptively real-looking simulation. This simulation is strongly oriented to the real world. In order to adapt the digital world to the real world as best as possible, modern AI algorithms are usually used. These have the task of projecting new and familiar elements onto a mathematically defined surface. The result is a virtual world that looks deceptively real to users. The hardware typically includes a headset or display, motion controllers, and sensors that track the user's movements and gestures in real-time. The software involves creating a digital environment using computer-generated graphics, audio, and other sensory inputs to simulate a fully immersive experience.

The components used for this process are

## Headset

The VR headset is one of the most important wearables for users who want to immerse themselves in digital worlds. It replaces the natural field of view with a computer-generated field of view. To make that happen, the wearable integrates infrared LEDs, motion sensors, cameras and screens. They all enable the VR headset to gather relevant information and provide it for the human eye.

## Screens and lenses

Both screens and lenses ensure that the VR experience is as real as possible. The basis for this is the distortion and overlapping of two nearly identical images. A minimal offset creates the desired spatial effect.

## Latency

The field of view and latency provide important information in the real world. Both affect the perception of distance and spatial depth, both in the real and virtual environments. In general, humans can perceive an angle of 200 to 220 degrees. This visible range is in turn subdivided into the monocular and the binocular visual field. Generating these areas accordingly is a central task for modern VR headsets.

## Frame rate

The human eye captures around 1,000images per second. However, the interpretation rate of the information recorded by the optic nerve is significantly lower. Since central content can be lost if the frame rate is too fast, it is necessary to hit the so-called sweet spot. In VR, this is usually 90 FPS. This means the transmission is decidedly higher than a cinema film, but at the same time slower than everyday life in a big city.

## Position tracking

As before, the transmitted images and sounds are among the most important elements of a successful VR experience. On the other hand, only position tracking in space is even more crucial. Particularly popular here are the so-called 6 degrees of freedom or

6DoF. With such position tracking, end users can move freely in space. In addition, common gestures such as nodding, up and down, forward and backward, but also movement in circular paths are possible. In contrast, the 3DoF only allows moving the head to the right, left, up and down.

## 3.9 Features of Virtual Reality

Some features of virtual reality are;

### Immersive Environment

VR creates a sense of immersion by surrounding users with a simulated environment that they can interact with in a seemingly real or physical way.

### 3D Visualization

Virtual reality environments are typically presented in three dimensions, allowing users to perceive depth and spatial relationships within the virtual world.

### Head-tracking and Motion Control

VR systems often track the movements of the user's head and body, allowing them to look around and interact with objects within the virtual environment as if they were in the real world.

### Real-time Interaction

VR applications allow users to interact with virtual objects or environments in real-time, enabling experiences such as manipulating objects, navigating virtual spaces, or engaging in virtual conversations.

### Sensory Feedback

Advanced VR systems may provide sensory feedback beyond visual and auditory cues, such as haptic feedback (touch sensations) or olfactory feedback (smell sensations), to enhance the sense of immersion.

### Customization and Personalization

VR experiences can be customized to suit the preferences and needs of individual users, offering options such as adjustable display settings, customizable avatars, or personalized virtual environments.

### Multi-sensory Experience

VR can engage multiple senses simultaneously, combining visual, auditory, and sometimes tactile or olfactory stimuli to create a more immersive experience.

### Application Diversity

VR technology is used in various fields and industries, including gaming, entertainment, education, healthcare, training, simulations, architecture, and virtual tourism, among others.

### Presence

VR aims to create a sense of "presence," where users feel as though they are physically present in the virtual environment, even though they are aware they are using a technological interface.

### Interconnectedness

Virtual reality systems may support interconnectedness, enabling users to engage in shared virtual experiences with others in remote locations, fostering social interaction and collaboration in virtual environments.

## 3.10 Different types of virtual reality

### None-immersive Virtual Reality

None-immersive VR allows only a minimum of interaction with the digital environment. Classic examples are video games or a driving simulator in a driving school.

### Semi-immersive Virtual Reality

In semi-immersive VR, digital components overlay real objects. The result is that these virtual elements can be used in a similar way to real objects. This makes semi-immersive VR ideal for educational purposes. Common examples are pilot training or the deepening of technical skills.

### Immersive Virtual Reality

In a fully immersive Virtual Reality, users perceive only the virtual environment. There is no fixed point of reference to the real-world during use. Currently, fully immersive VR technology is found primarily in the gaming industry. Special data glasses, gloves, treadmills or sensory detectors are used here. They all contribute to making the digital environment seem completely real. What is Virtual Reality and what is the real environment cannot be answered theoretically in such a setting.

### Augmented Reality

Augmented Reality is also a form of Virtual Reality. The main difference between the two approaches is the way developers realize the overlap of both worlds. A well-known example of the use of AR are the so-called smart glasses. With this tool, it is possible for employees to access real-time data in warehouses, for example.

### Mixed Reality

Mixed Reality combines the physical and virtual worlds. It is a special form of Augmented Reality, but is increasingly used in marketing. This technology makes it possible to visualize people or objects in a real context.

## 3.11 Advantages of virtual reality

### Immersive Experiences

VR provides users with immersive experiences that transport them to virtual environments, allowing them to interact with digital content as if they were physically present, leading to heightened engagement and emotional connection.

## Training and Simulation

VR enables realistic simulations and training scenarios across industries such as healthcare, military, aviation, manufacturing, and emergency response, providing trainees with hands-on experience in a safe and controlled virtual environment.

## Enhanced Learning

VR enhances learning experiences by offering interactive and immersive educational content, simulations, and visualizations that cater to different learning styles and preferences, leading to improved retention, comprehension, and engagement.

## Virtual Travel and Tourism

VR allows users to explore virtual replicas of real-world locations, landmarks, and destinations, providing immersive travel experiences without the need for physical travel, thereby promoting accessibility, convenience, and cultural exchange.

## Therapeutic Applications

VR is used in various therapeutic applications, including exposure therapy for phobias and PTSD, pain management, rehabilitation, cognitive therapy, and mental health interventions, offering a safe and controlled environment for therapeutic interventions and support.

## Architectural Visualization

VR enables architects, designers, and urban planners to visualize and explore architectural designs, urban spaces, and construction projects in virtual reality, facilitating collaboration, design iteration, and stakeholder engagement throughout the project lifecycle.

## Entertainment and Gaming

VR offers immersive gaming experiences that go beyond traditional screen-based gaming, allowing players to interact with virtual worlds, characters, and objects in three-dimensional space, providing heightened realism and immersion.

### Product Prototyping and Design

VR facilitates product prototyping and design iteration by enabling designers and engineers to visualize, manipulate, and test virtual prototypes in immersive 3D environments, leading to faster iteration cycles, reduced costs, and improved product quality.

### Remote Collaboration and Communication

VR enables remote collaboration and communication by creating virtual meeting spaces, collaborative environments, and social experiences where users can interact, communicate, and collaborate with others in real-time, regardless of geographical distance.

### Empathy and Social Impact

VR has the potential to foster empathy and understanding by immersing users in the perspectives and experiences of others, enabling immersive storytelling, cultural exchange, and social advocacy initiatives that promote empathy, diversity, and social change.

## 3.12 Disadvantages of Virtual Reality

### Digital Divide

The digital divide may exacerbate disparities in access to VR technology and experiences, particularly among marginalized or underserved communities with limited internet connectivity, technological literacy, or resources to participate in the VR ecosystem.

### Social and Ethical Concerns

VR raises social and ethical concerns related to issues such as digital addiction, desensitization to violence or immersive content, identity manipulation, virtual harassment, and the blurring of boundaries between virtual and real-world experiences.

## Sensory Overload

VR experiences can overwhelm users with sensory stimuli such as visual, auditory, and tactile feedback, leading to sensory overload or discomfort, particularly in highly immersive or intense VR environments with realistic graphics and sound effects.

## Content Quality and Curation

The quality and curation of VR content can vary widely, leading to inconsistencies, inaccuracies, or inappropriate content that may undermine the credibility and value of VR experiences, particularly in educational, therapeutic, or sensitive contexts.

## Privacy Concerns

VR raises privacy concerns related to the collection, storage, and sharing of personal data, biometric information, and behavioral analytics generated by VR applications, which may be exploited or compromised without adequate safeguards in place.

## Dependency and Addiction

VR has the potential to become addictive, leading to excessive use and dependency on virtual experiences at the expense of real-world activities, responsibilities, and social interactions, similar to other forms of digital media and technology.

## Health Risks

Prolonged use of VR can pose health risks such as eye strain, fatigue, headaches, and musculoskeletal discomfort, particularly if users engage in intense or extended VR sessions without taking breaks or using proper ergonomic practices.

## Isolation and Disconnection

Extended use of VR may lead to feelings of isolation and disconnection from the real world, as users become immersed in virtual environments and lose touch with their physical surroundings and interpersonal relationships.

## Technical Limitations

VR experiences may suffer from technical limitations such as visual artifacts, motion sickness, latency issues, and hardware constraints, which can impact the quality,

comfort, and usability of VR applications.

### Cost of Equipment

VR hardware, including headsets, controllers, and sensors, can be expensive, limiting access to VR experiences for individuals or organizations with limited budgets or financial resources.

## 3.13 Differences between Augmented Reality and Virtual Reality

| **Augmented Reality** | **Virtual Reality** |
|---|---|
| The system augments the real-world scene | Completely immersive virtual environment |
| In AR User always have a sense of presence in the real world | In VR, visual senses are under control of the system |
| AR is 25% virtual and 75% real | VR is 75% virtual and 25% real |
| This technology partially immerses the user into the action | This technology fully immerses the user into the action |
| AR requires upwards of 100 Mbps bandwidth | VR requires at least a 50 Mbps connection |
| No AR headset is needed. | Some VR headset device is needed. |
| With AR, end-users are still in touch with the real world while interacting with virtual objects nearer to them | By using VR technology, VR user is isolated from the real world and immerses himself in a completely fictional world |
| It is used to enhance both real and virtual worlds. | It is used to enhance fictional reality for the gaming world. |

## 3.14 Retail Shopping

Buying products or services for personal consumption or use from physical or virtual retailers is referred to as retail shopping. It includes a range of tasks like looking through merchandise, evaluating costs, choosing what to buy, and finishing up transactions. Retail shopping can happen through e-commerce platforms, where customers explore and purchase things online, or it can happen in traditional brick-and-mortar stores, when customers physically visit a retail site to make purchases. Since retail shopping entails the exchange of products and services between retailers and customers, it is both a core component of consumer behavior and a major economic driver. It includes a broad variety of goods and categories, such as groceries, electronics, apparel, home goods, and more. Experiences with retail shopping might differ greatly.

## 3.15 Features of Retail shopping

Retail shopping encompasses a variety of features that cater to the needs and preferences of consumers while also meeting the objectives of retailers. Here are some key features of retail shopping:

### Product Variety

Retail stores typically offer a wide range of products across various categories, allowing consumers to choose from different brands, styles, sizes, and price points.

### Convenience

Convenience is a significant feature of retail shopping, whether it's the proximity of physical stores to consumers' locations or the accessibility of online shopping platforms. Convenience factors also include store hours, parking availability, and the ease of navigating through products.

### Customer Service

Good customer service is essential in retail shopping, encompassing aspects such as

friendly and knowledgeable staff, prompt assistance, efficient checkout processes, and hassle-free return policies.

### Personalization

Retailers may personalize the shopping experience through targeted marketing, loyalty programs, and recommendations based on customers' preferences and purchase history.

These features contribute to a positive retail shopping experience, fostering customer satisfaction, loyalty, and repeat business for retailers.

## 3.16 Theories relating AR and VR in retail shopping

When it comes to retail shopping, particularly in the context of AR (Augmented Reality) and VR (Virtual Reality), several theories and concepts are relevant:

### Technology Acceptance Model (TAM)

TAM suggests that users' acceptance of a technology is influenced by perceived usefulness and ease of use. In the context of AR and VR in retail, this theory helps understand consumers' willingness to adopt AR/VR shopping experiences based on how useful they perceive them in enhancing their shopping experience and how easy they find them to use.

### Experiential Marketing Theory

This theory emphasizes creating memorable and immersive experiences for consumers. AR and VR can be used in retail to provide experiential marketing experiences, allowing customers to virtually try products, explore virtual stores, or engage with interactive advertisements, thereby enhancing their shopping experiences and building brand engagement.

### Environmental Psychology

Environmental psychology focuses on how physical environments influence human behavior and well-being. In AR and VR retail environments, understanding principles

such as spatial layout, lighting, colors, and design can help create virtual shopping spaces that are visually appealing, comfortable, and conducive to positive shopping experiences.

## Consumer Behavior Theory

Various theories in consumer behavior, such as the Theory of Planned Behavior or the Stimulus-Organism-Response model, can be applied to understand how consumers make purchasing decisions in AR and VR retail environments. Factors such as perception, attitudes, motivations, and emotions play a crucial role in shaping consumer behavior in virtual shopping contexts.

## Social Influence Theory

Social influence theory, including concepts like social proof and conformity, can be relevant in AR/VR retail environments where users may seek validation or recommendations from their social networks or virtual communities before making purchase decisions.

## Presence Theory

Presence theory explores the feeling of being immersed or "present" in a virtual environment. In AR/VR retail, creating a sense of presence can enhance customers' engagement and satisfaction, making them feel as if they are physically present in the store, even if they are shopping remotely.

## Technology Adoption Lifecycle

This theory suggests that consumers' adoption of new technologies follows a predictable pattern, including stages such as innovators, early adopters, early majority, late majority, and laggards. Understanding where AR and VR technologies stand within this lifecycle can help retailers tailor their strategies to different consumer segments accordingly.

By applying these theories and concepts, retailers can design AR and VR shopping experiences that are engaging, personalized, and aligned with consumers' preferences and behaviors, ultimately enhancing customer satisfaction and driving sales.

## 3.17 Augmented Reality and Virtual Reality in retail shopping

Augmented Reality (AR) and Virtual Reality (VR) have the potential to revolutionize the retail shopping experience in numerous ways:

### Virtual Try-On

AR allows customers to virtually try on products such as clothing, accessories, or makeup without needing to visit a physical store. Virtual try-on experiences provide a more engaging and convenient way for customers to assess how products look and fit before making a purchase decision.

### Virtual Showrooms

VR can recreate physical store environments in a virtual space, allowing customers to browse products and interact with virtual representations of items as if they were in a real store. Virtual showrooms provide an immersive shopping experience and can be particularly useful for retailers with limited physical space or for showcasing large or bulky items.

### Product Customization

AR and VR enable customers to personalize products according to their preferences and specifications. For example, customers can use AR to visualize how different color options or design elements would look on a customizable product like furniture or apparel, facilitating the customization process and increasing satisfaction.

### Virtual Shopping Assistants

AI-powered virtual shopping assistants integrated with AR or VR technology can provide personalized recommendations, answer customer queries, and assist with product selection and purchasing decisions. Virtual shopping assistants enhance customer service and engagement, particularly in online retail environments.

# CHAPTER – IV

# DATA ANALYSIS AND INTERPRETATION

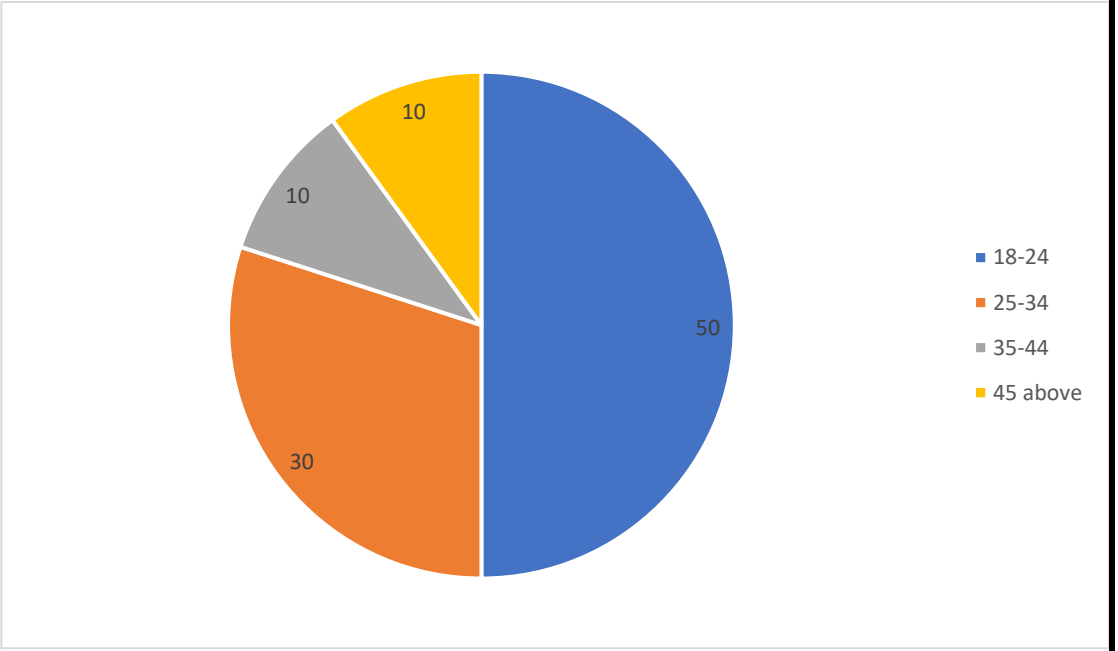
## 4.1 Age

### Table 4.1 showing the age of the respondents

| Particulars | Frequency | Percentage |
|---|---|---|
| 18-24 | 55 | 50 |
| 25-34 | 33 | 30 |
| 35-44 | 11 | 10 |
| 45 above | 11 | 10 |
| Total | 110 | 100 |

**Source: Primary Data**

### Figure 4.1 showing the age of the respondents




**Source: Primary Data**

### Interpretation:

Figure 4.1 shows that majority (50%) of the respondents belongs to 18-24 age group because those age group are involved more in retail shopping. 30% belongs to 25-34 age group. 10% belongs to 35-344 age group and 10% belongs to 45 above.

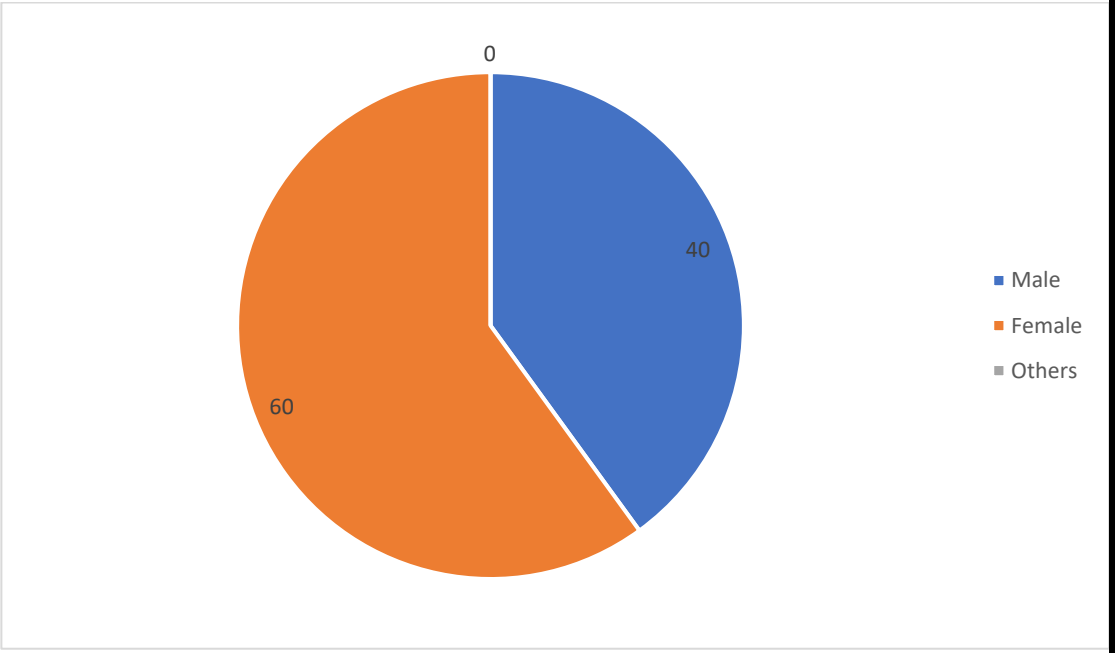
## 4.2 Gender

### Table 4.2 showing the gender of the respondents

| Particulars | Frequency | Percentage |
|---|---|---|
| Male | 44 | 40 |
| Female | 66 | 60 |
| Others | 0 | 0 |
| Total | 110 | 100 |

**Source: Primary Data**

### Figure 4.2 showing the gender of respondents




**Source: Primary Data**

### Interpretation:

Figure 4.2 shows that 60% of the respondents are female because they have a variety number of products for retail shopping. 40% of the respondents are male because of fewer variety of products. None of them belongs to others.

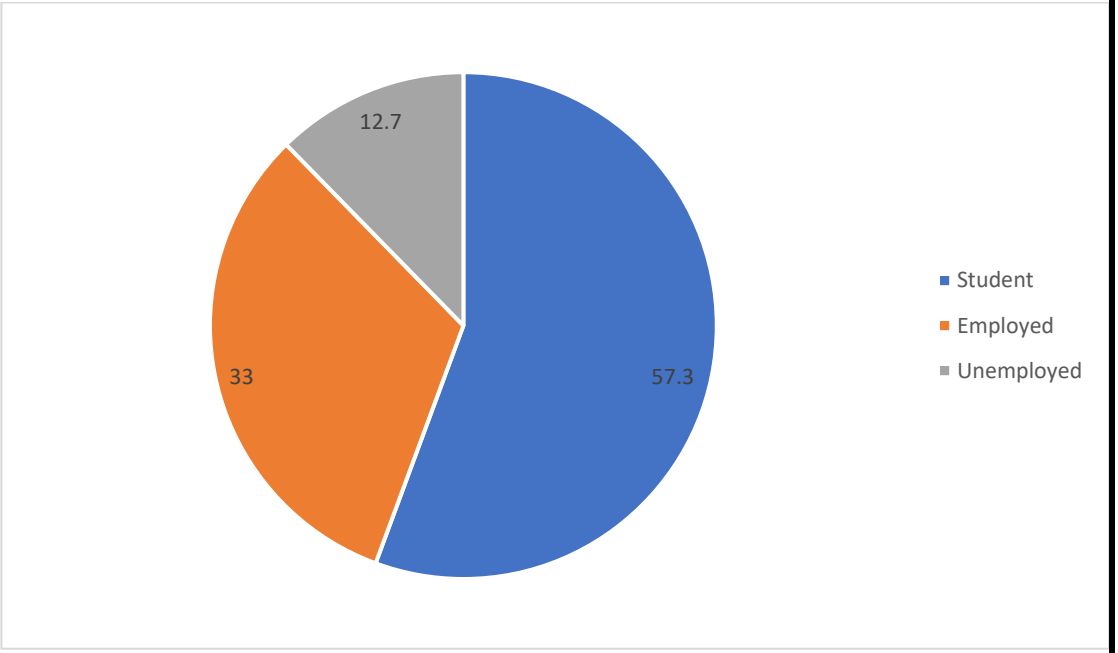
## 4.3 Employment position

### Table 4.3 showing the employment position of respondents

| Particulars | Frequency | Percentage |
|---|---|---|
| Student | 63 | 57.3 |
| Employed | 33 | 33 |
| Unemployed | 14 | 12.7 |
| Total | 110 | 100 |

**Source: Primary Data**

### Figure 4.3 showing the employment position of respondents




**Source: Primary Data**

### Interpretation:

Figure 4.3 shows that 57.3% of the respondents are students because they are easily influenced by trends, social interactions convenience etc. 33% are employed respondents and 12.7% are unemployed respondents.

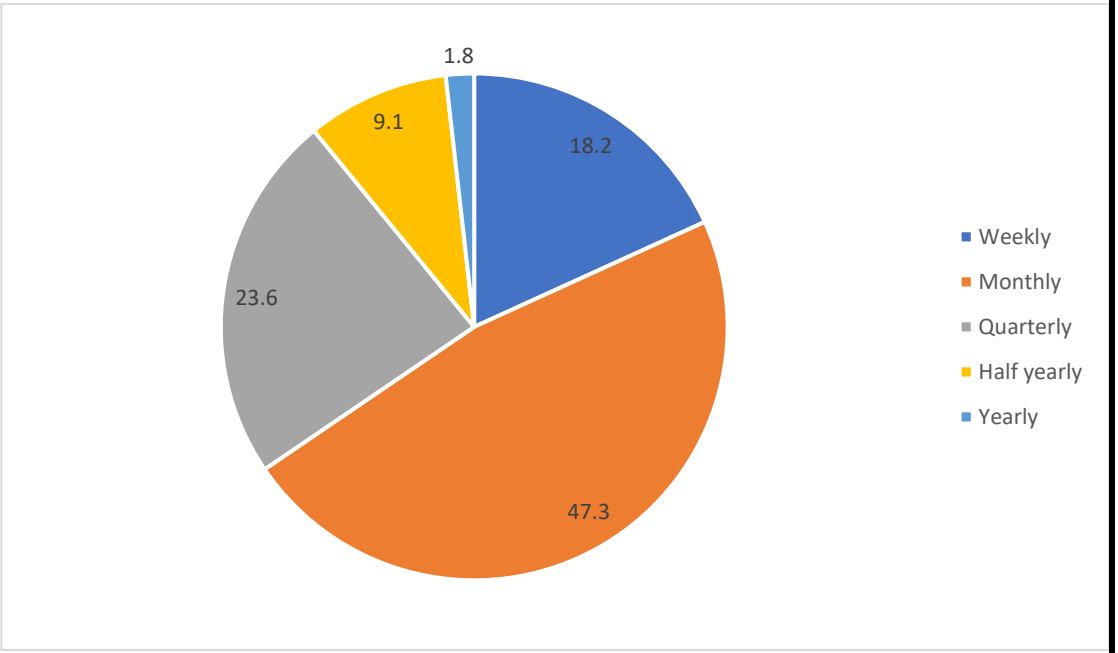
## 4.4 Involvement in retail shopping

### Table 4.4 showing the involvement of respondents in retail shopping

| Particulars | Frequency | Percentage |
|---|---|---|
| Weekly | 20 | 18.2 |
| Monthly | 52 | 47.3 |
| Quarterly | 26 | 23.6 |
| Half yearly | 10 | 9.1 |
| Yearly | 2 | 1.8 |
| Total | 110 | 100 |

**Source: Primary Data**

### Figure 4.4 showing the involvement of respondents in retail shopping




**Source: Primary Data**

### Interpretation:

Figure 4.4 shows that majority, 47.3% of respondents involve in retail shopping monthly in accordance with their budgeting strategies planning etc. 18.2% of the respondents shop weekly. 23.6% of the respondents' shops quarterly. 9.1% of the respondents' shops half yearly and 1.8% of the respondents' shops yearly.

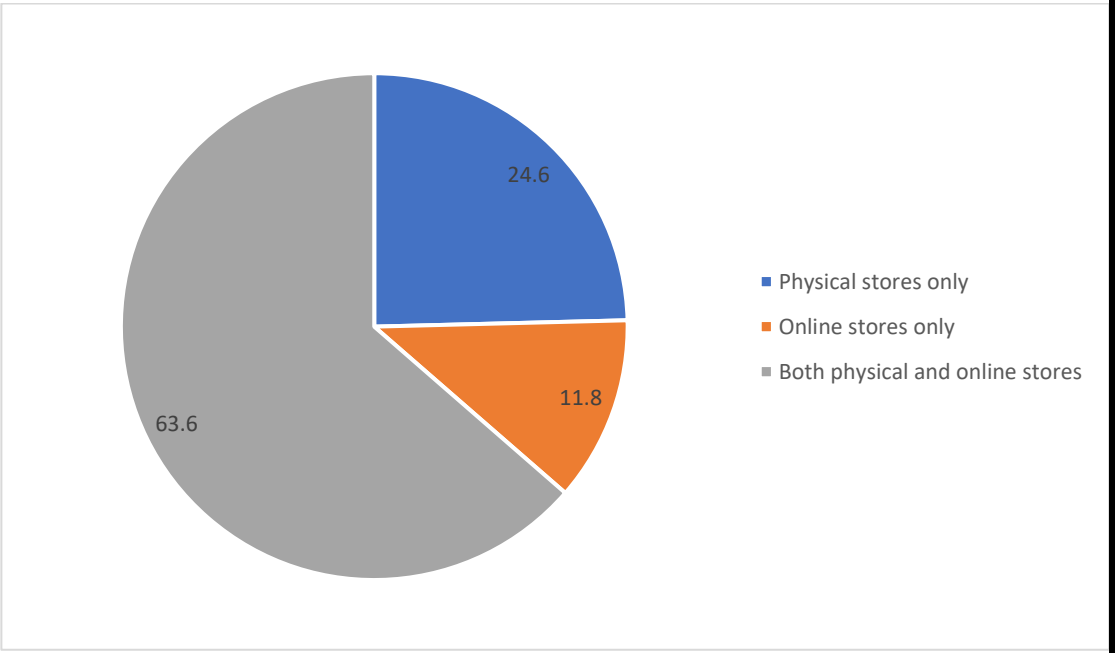
## 4.5 Preference of retail shopping

**Table 4.5 showing the preference of the respondents for retail shopping**

| Particulars | Frequency | Percentage |
|---|---|---|
| Physical stores only | 27 | 24.6 |
| Online stores only | 13 | 11.8 |
| Both physical and online stores | 70 | 63.6 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.5 showing the preference of the respondents for retail shopping**




**Source: Primary Data**

**Interpretation**:

Figure 4.5 shows that 63.6% of respondents prefer to shop in both physical and online stores due to the perception of each individual, diverse options, convenience etc. 24.6% of the respondents prefer the physical stores and 11.8% prefer online stores.

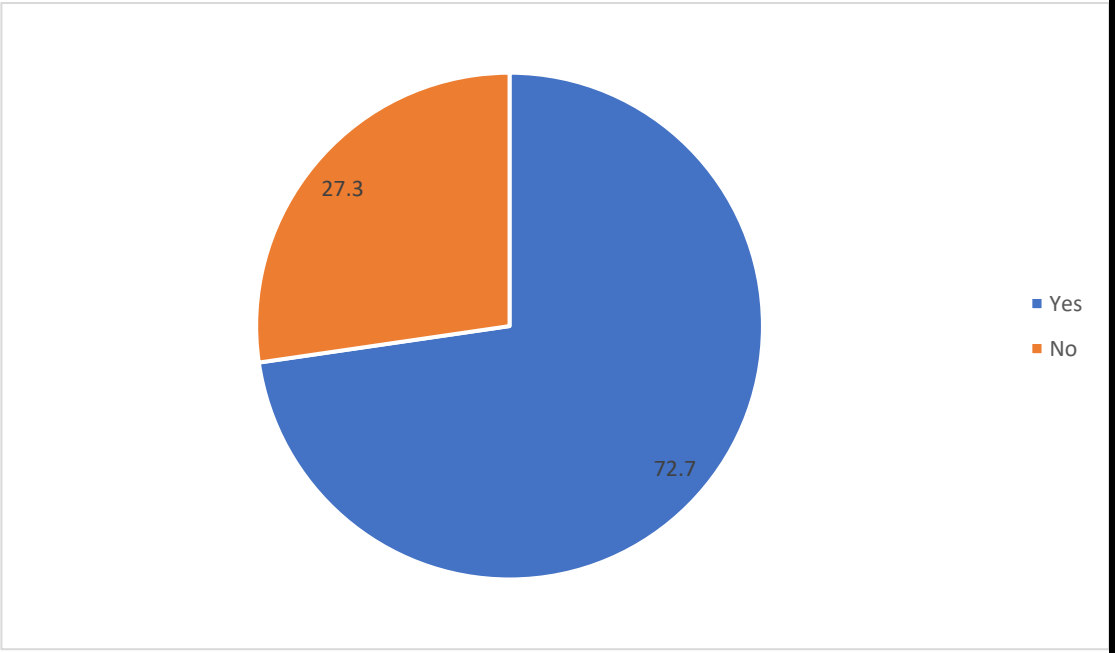
## 4.6 Awareness of Augmented Reality and Virtual Reality

**Table 4.6 showing the awareness of respondents towards Augmented Reality and Virtual Reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Yes | 80 | 72.7 |
| No | 30 | 27.3 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.6 showing the awareness of respondents towards Augmented Reality and Virtual Reality**




**Source: Primary Data**

### Interpretation:

Figure 4.6 shows that 72.7% of the respondents are aware of the term Augmented Reality and Virtual Reality due to social media and social relations and 27.3% are unaware of the term Augmented Reality and Virtual Reality.

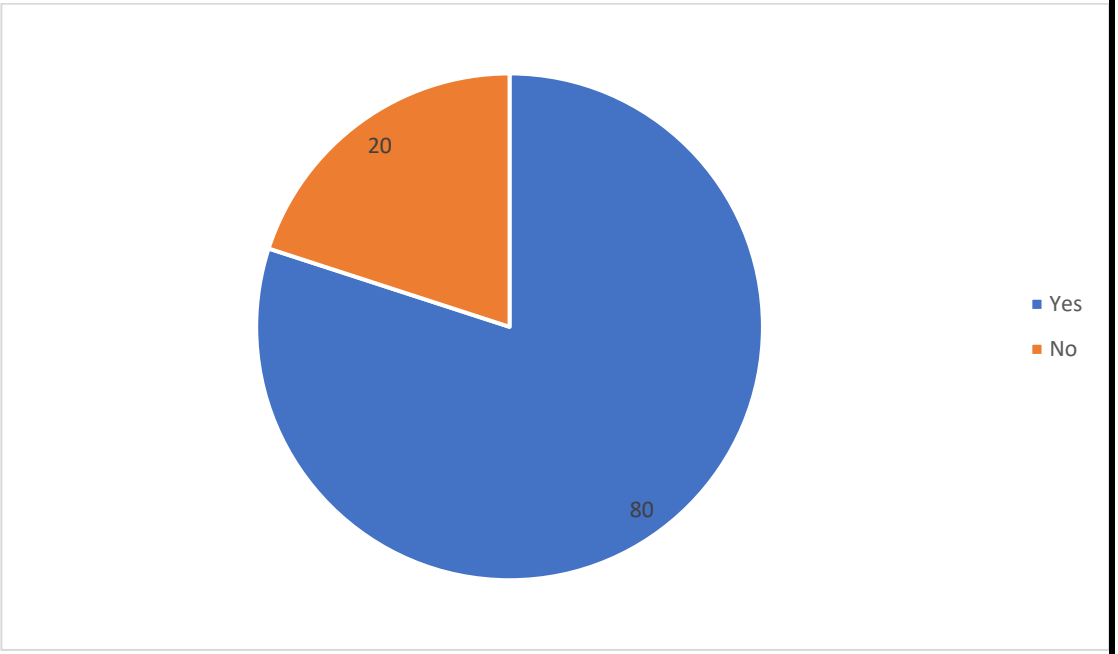
## 4.7 Usage of Augmented Reality

## Table 4.7 showing the usage of Augmented Reality by respondents

| Particulars | Frequency | Percentage |
|---|---|---|
| Yes | 88 | 80 |
| No | 22 | 20 |
| Total | 110 | 100 |

**Source: Primary Data**

## Figure 4.7 showing the usage of Augmented Reality by respondents




**Source: Primary Data**

## Interpretation:

Figure 4.7 shows that 80% of the respondents have used Augmented Reality for retail shopping because it enhances the shopping experience and 20% have not used Augmented Reality for shopping.

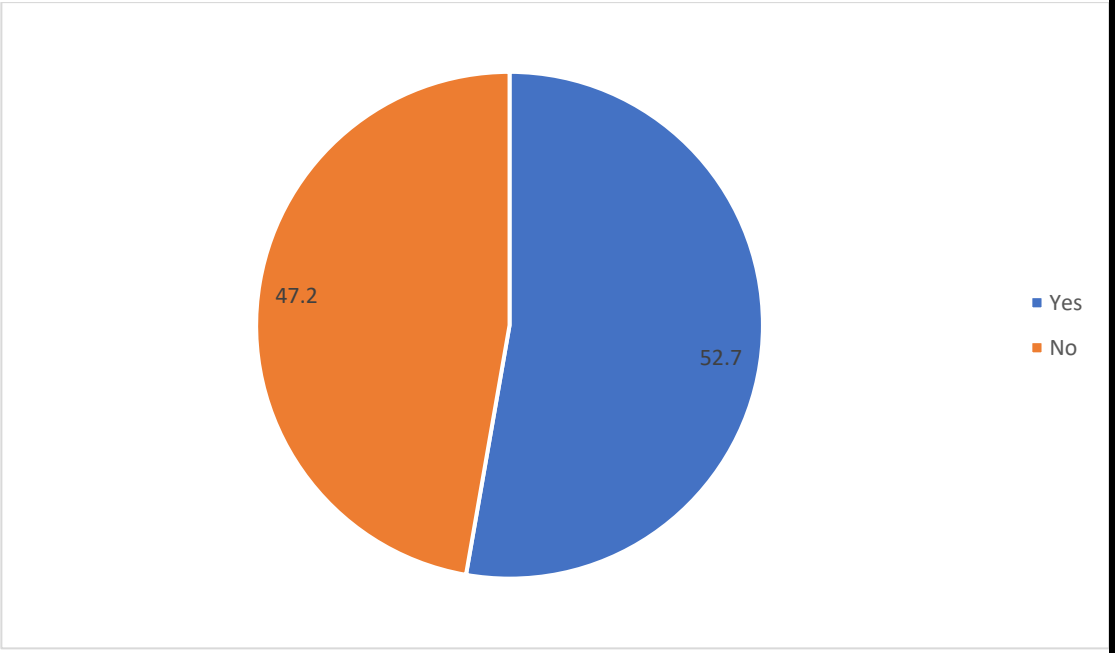
## 4.8 Usage of Virtual Reality

### Table 4.8 showing the usage of Virtual Reality by respondents

| Particulars | Frequency | Percentage |
|---|---|---|
| Yes | 58 | 52.7 |
| No | 52 | 47.2 |
| Total | 110 | 100 |

**Source: Primary Data**

### Figure 4.8 showing the usage of Virtual Reality by respondents




**Source: Primary Data**

### Interpretation:

Figure 4.8 shows that 52.7% of the respondents have used Virtual Reality for retail shopping because it offers immersive, interactive personalized experiences and 47.2% have not used Virtual Reality for shopping.

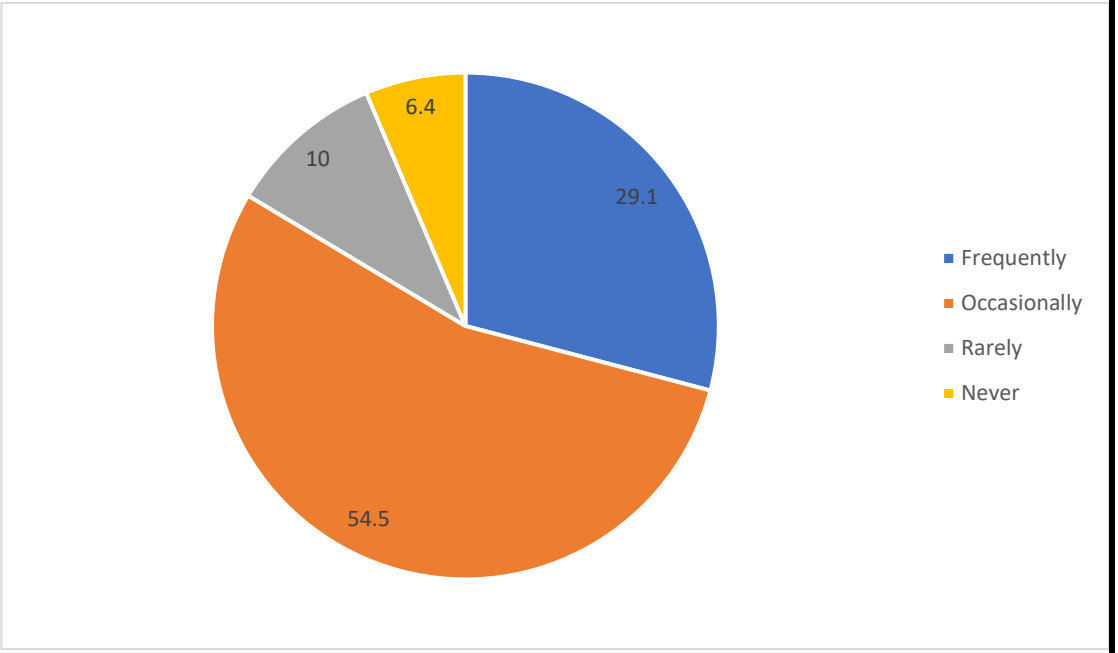
## 4.9 Level of usage of Augmented Reality and Virtual Reality

**Table 4.9 showing the level of usage of Augmented Reality and Virtual Reality in retail shopping**

| Particulars | Frequency | Percentage |
|---|---|---|
| Frequently | 32 | 29.1 |
| Occasionally | 60 | 54.5 |
| Rarely | 11 | 10 |
| Never | 7 | 6.4 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.9 showing the level of usage of Augmented Reality and Virtual Reality in retail shopping**




**Source: Primary Data**

### Interpretation:

Figure 4.9 shows that 54.5% of the respondents occasionally use Augmented Reality and Virtual Reality for retail shopping. 29.1% frequently use Augmented Reality and Virtual Reality for shopping. 10% rarely use and 6.4 % never uses Augmented Reality and Virtual Reality for shopping.

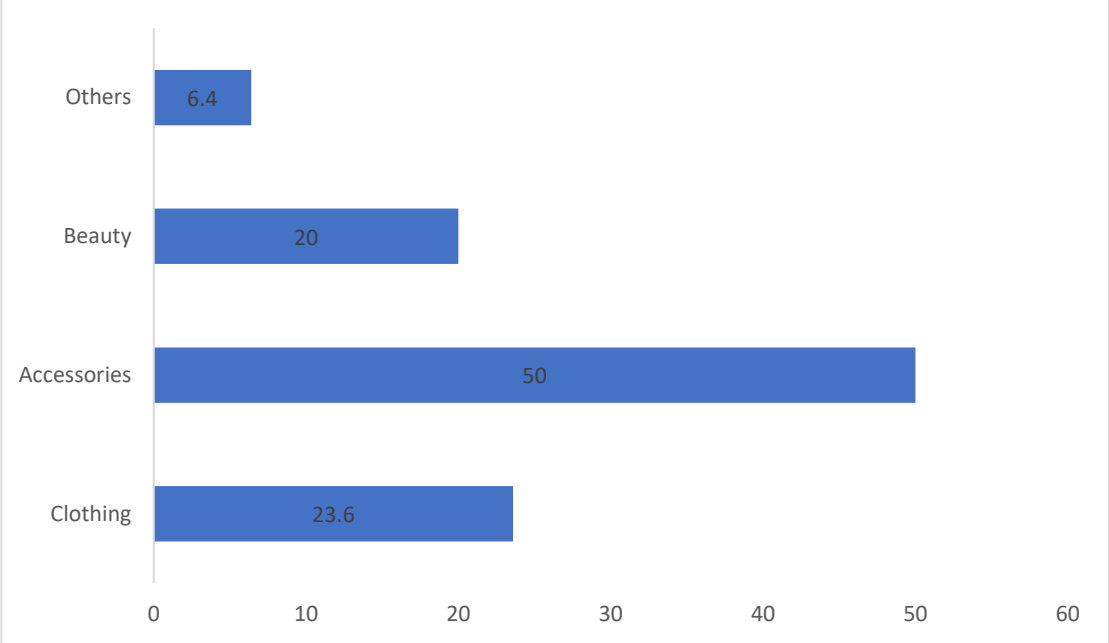
## 4.10 Types of products

**Table 4.10 showing the types of products purchased using Augmented Reality and Virtual Reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Clothing | 26 | 23.6 |
| Accessories | 55 | 50 |
| Beauty | 22 | 20 |
| Others | 7 | 6.4 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.10 showing the types of products purchased using Augmented Reality and Virtual Reality**




**Source: Primary Data**

### Interpretation:

Figure 4.10 shows that 50% of the respondents use Augmented Reality and Virtual Reality to purchase accessories due to their ability to facilitate visual assessment, convenience, personalization etc. 23.6% use it for clothing. 20% use it for beauty products and 6.4% use it for other categories.

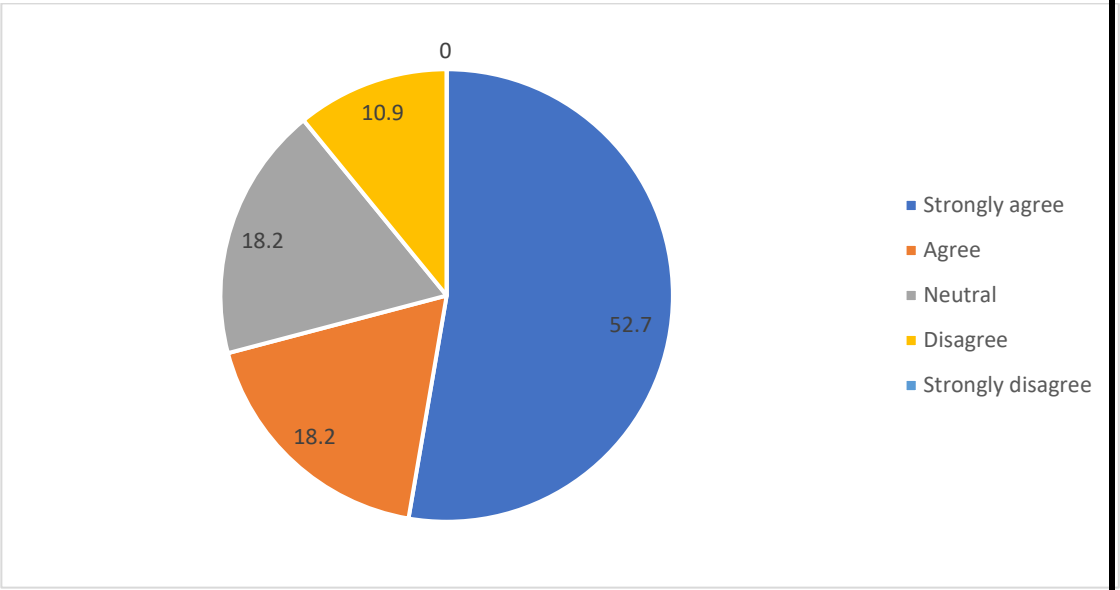
## 4.11 Improvement in retail shopping

### Table 4.11 showing whether Augmented Reality and Virtual Reality improve retail shopping experience

| Particulars | Frequency | Percentage |
|---|---|---|
| Strongly agree | 58 | 52.7 |
| Agree | 20 | 18.2 |
| Neutral | 20 | 18.2 |
| Disagree | 12 | 10.9 |
| Strongly disagree | 0 | 0 |
| Total | 110 | 100 |

**Source: Primary Data**

### Figure 4.11 showing whether Augmented Reality and Virtual Reality improve retail shopping experience




**Source: Primary Data**

### Interpretation:

Figure 4.11 shows that 52.7% of the respondents strongly agree that Augmented Reality and Virtual Reality improves retail shopping experience making it more interactive, informative for customers. 18.2% of the respondents just agrees. 18.2 % have a neutral opinion.10.2% of the respondents disagree that Augmented Reality and Virtual Reality improve retail shopping.

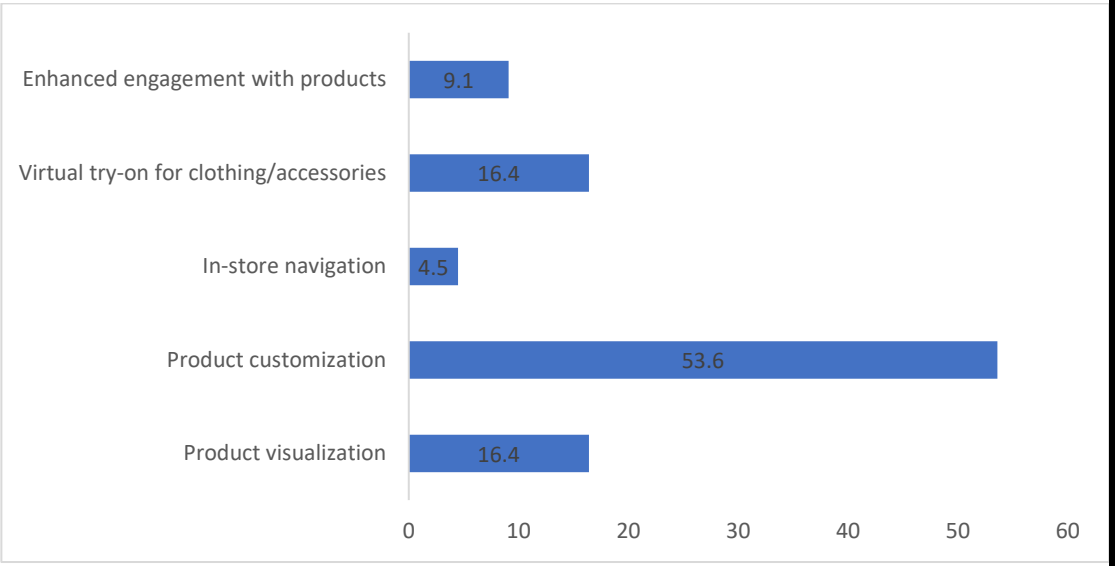
## 4.12 Improving features of retail shopping

**Table 4.12 showing the features improved in retail shopping by the usage of Augmented Reality and Virtual Reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Product visualization | 18 | 16.4 |
| Product customization | 59 | 53.6 |
| In-store navigation | 5 | 4.5 |
| Virtual try-on for clothing/accessories | 18 | 16.4 |
| Enhanced engagement with products | 10 | 9.1 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.12 showing the features improved in retail shopping by the usage of Augmented Reality and Virtual Reality**




**Source: Primary Data**

### Interpretation:

Figure 4.12 shows that 53.6% of the respondents believe that by the usage of Augmented Reality and Virtual Reality product customization has improved. 16.4% believe that product visualization has improved. 16.4% believe that has virtual try-on for clothing has improved. 9.1% believe that enhanced engagement with products has improved and 4.5% believe that in store navigation has improved.

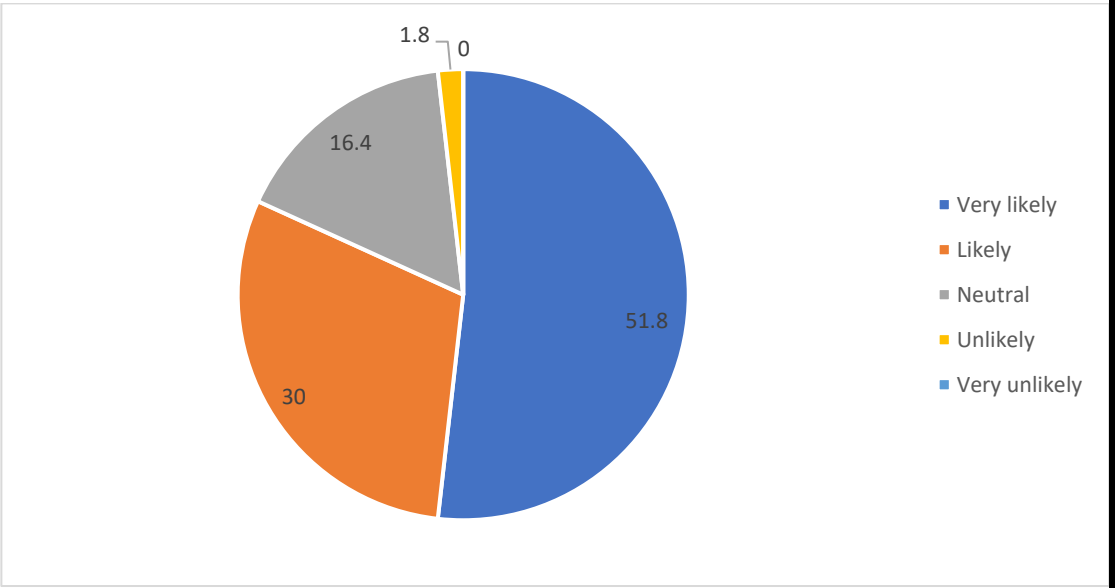
## 4.13 Probability of purchase

**Table 4.13 showing the probability of purchase after using Augmented Reality and Virtual Reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Very likely | 57 | 51.8 |
| Likely | 33 | 30 |
| Neutral | 18 | 16.4 |
| Unlikely | 2 | 1.8 |
| Very unlikely | 0 | 0 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.13 showing the probability of purchase after using Augmented Reality and Virtual Reality**




**Source: Primary Data**

### Interpretation:

Figure 4.13 shows that 51.8% of the respondents are very likely to purchase a product after using Augmented Reality and Virtual Reality because of the interaction and information they got. 30% are likely to purchase a product. 16.4% have a neutral opinion and 16.4% are very unlikely to purchase a product after using Augmented Reality and Virtual Reality.

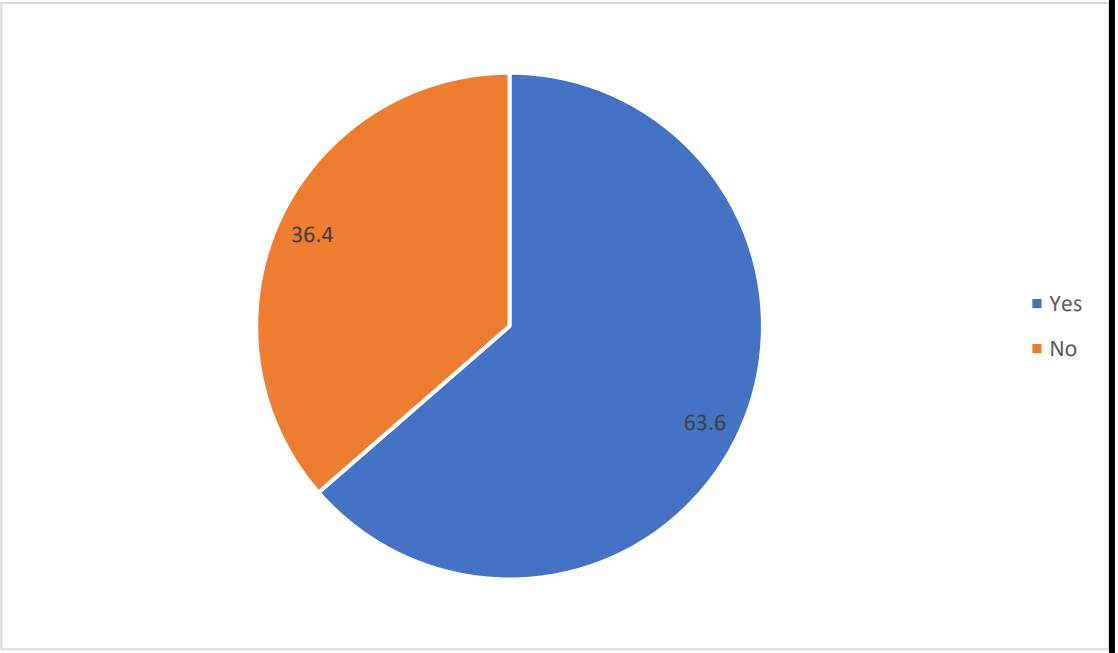
## 4.14 Payment of extra amount

**Table 4.14 showing the readiness of people to pay an extra amount for products with Augmented Reality and Virtual Reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Yes | 70 | 63.6 |
| No | 40 | 36.4 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.14 showing the readiness of people to pay an extra amount for products with Augmented Reality and Virtual Reality**




**Source: Primary Data**

### Interpretation:

Figure 4.14 shows that 63.6% are ready to pay an extra amount for products that offer Augmented Reality and Virtual Reality because it meets the preferences and expectation of consumers and 36.4% are not ready to pay an extra amount.

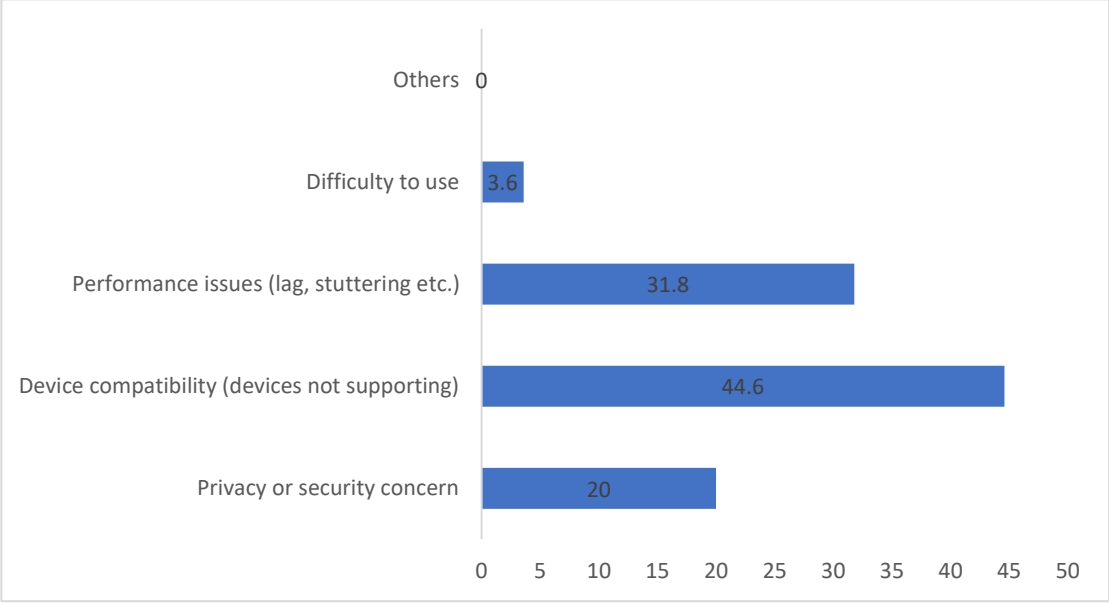
## 4.15 Technical issues or limitations

**Table 4.15 showing the technical issues or limitations while using Augmented Reality and Virtual Reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Privacy or security concern | 22 | 20 |
| Device compatibility (devices not supporting) | 49 | 44.6 |
| Performance issues (lag, stuttering etc.) | 35 | 31.8 |
| Difficulty to use | 4 | 3.6 |
| Others | 0 | 0 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.15 showing the technical issues or limitations while using Augmented Reality and Virtual Reality**




**Source: Primary Data**

### Interpretation:

Figure 4.15 shows that 44.6% of the respondent's face device compatibility in the usage of Augmented Reality and Virtual Reality due to cost, new technology etc. 31.8% of the respondent's face performance issues. 20% face privacy or security concern and 3.6% face difficulty in usage.

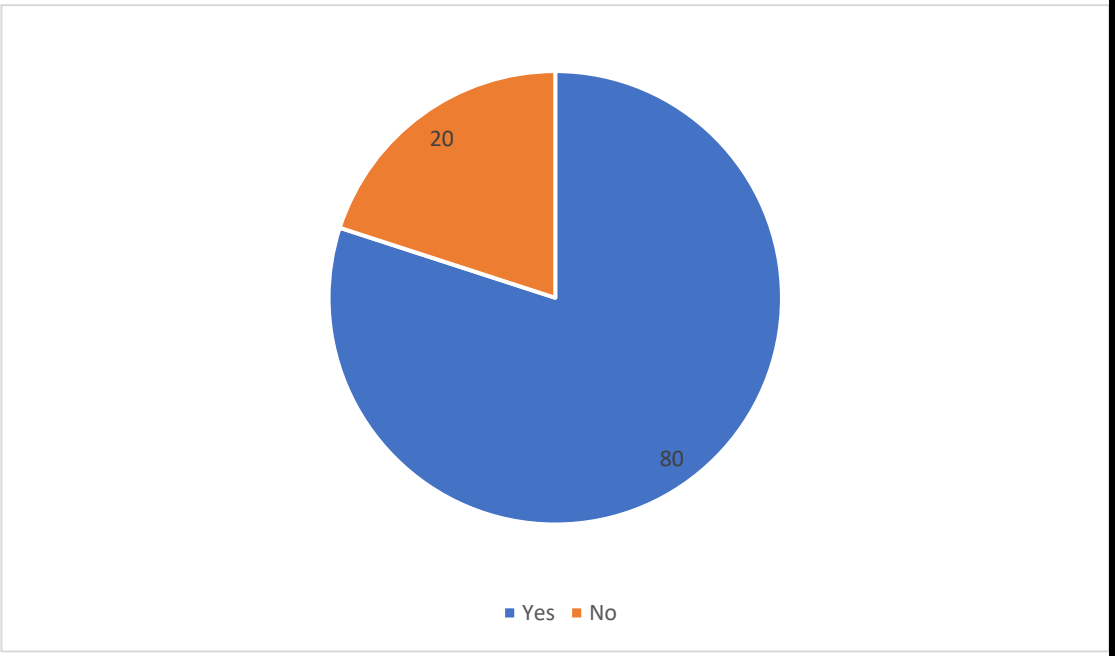
## 4.16 Reduction of gap

**Table 4.16 showing whether Augmented Reality and Virtual Reality reduce the gap between online and offline shopping experience**

| Particulars | Frequency | Percentage |
|---|---|---|
| Yes | 88 | 80 |
| No | 22 | 20 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.16 showing whether Augmented Reality and Virtual Reality reduce the gap between online and offline shopping experience**




**Source: Primary Data**

### Interpretation:

Figure 4.16 shows that 80% of the respondents believe that Augmented Reality and Virtual Reality reduce the gap between online and offline shopping experience by creating a more seamless and integrated shopping journey between online and offline and 20% do not believe that it will reduce the gap.

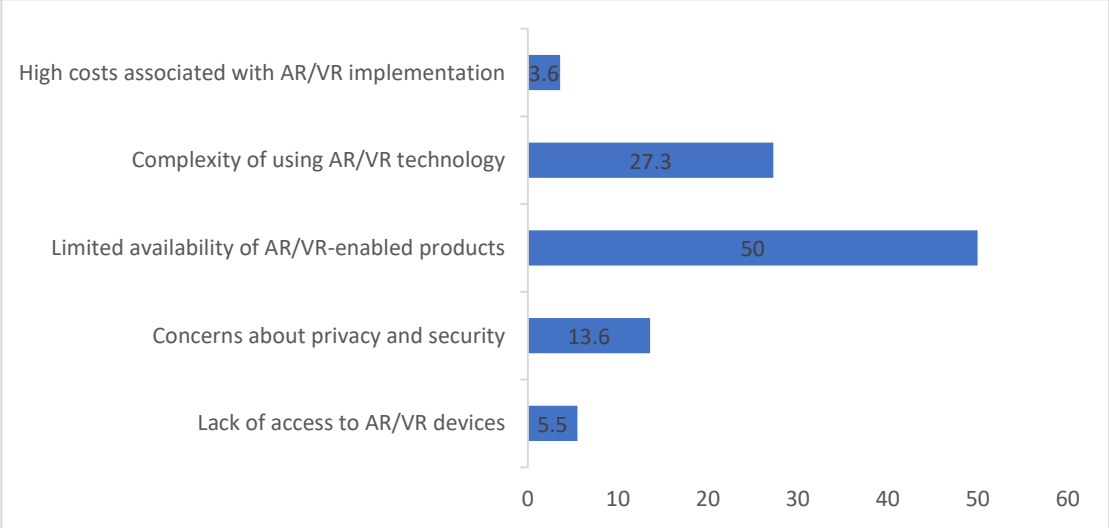
## 4.17 Factors used for choosing offline over online

**Table 4.17 showing the factors that made the respondents to choose offline shopping than online shopping**

| Particulars | Frequency | Percentage |
|---|---|---|
| Lack of access to AR/VR devices | 6 | 5.5 |
| Concerns about privacy and security | 15 | 13.6 |
| Limited availability of AR/VR-enabled products | 55 | 50 |
| Complexity of using AR/VR technology | 30 | 27.3 |
| High costs associated with AR/VR implementation | 4 | 3.6 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.17 showing the factors that made the respondents to choose offline shopping than online shopping**




**Source: Primary Data**

## Interpretation:

Figure 4.17 shows that 50% of the respondents chose offline shopping than online because of the limited availability of Augmented Reality and Virtual Reality enabled products. 27.3% chose because of complexity, 13.6% chose because of concerns about privacy and security. 5.5% of the respondents chose offline than online because of lack of access to devices and 3.6% chose because of high costs.

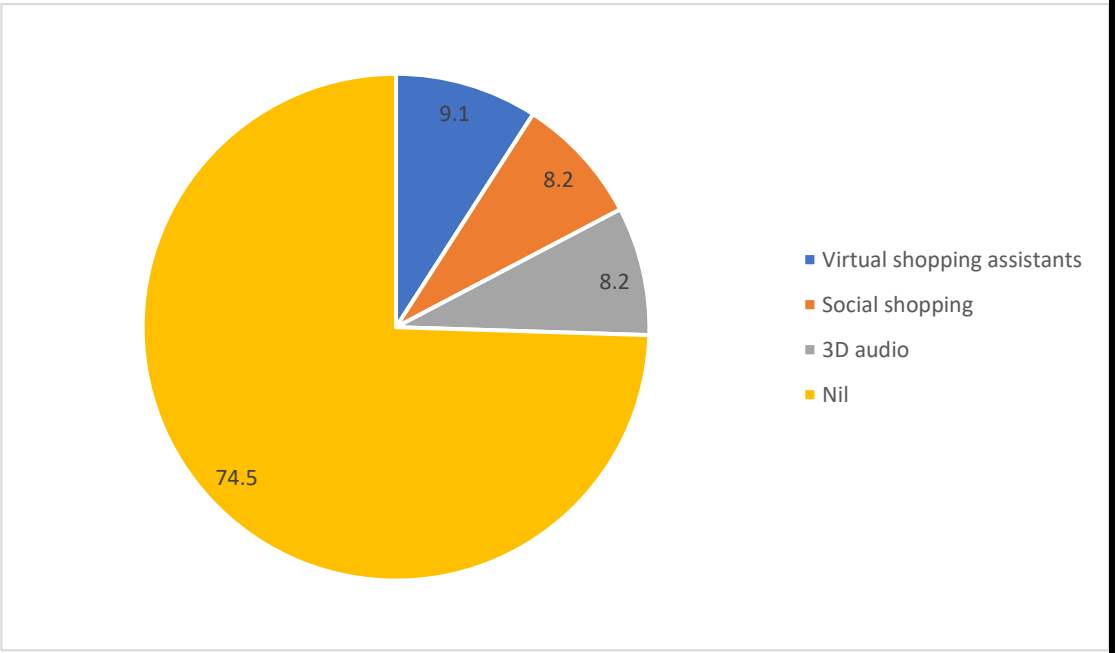
## 4.18 Improvements or additional features

**Table 4.18 showing the improvements or additional features to be added in Augmented Reality and Virtual Reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Virtual shopping assistants | 10 | 9.1 |
| Social shopping | 9 | 8.2 |
| 3D audio | 9 | 8.2 |
| Nil | 82 | 74.5 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.18 showing the improvements or additional features to be added in Augmented Reality and Virtual Reality**




**Source: Primary Data**

### Interpretation:

Figure 4.18 shows that 74.5% of respondents do not want any additional features in Augmented Reality and Virtual Reality. 9.1% of the respondents want virtual shopping assistants, 8.2% want social shopping and 8.2% want 3D audio.

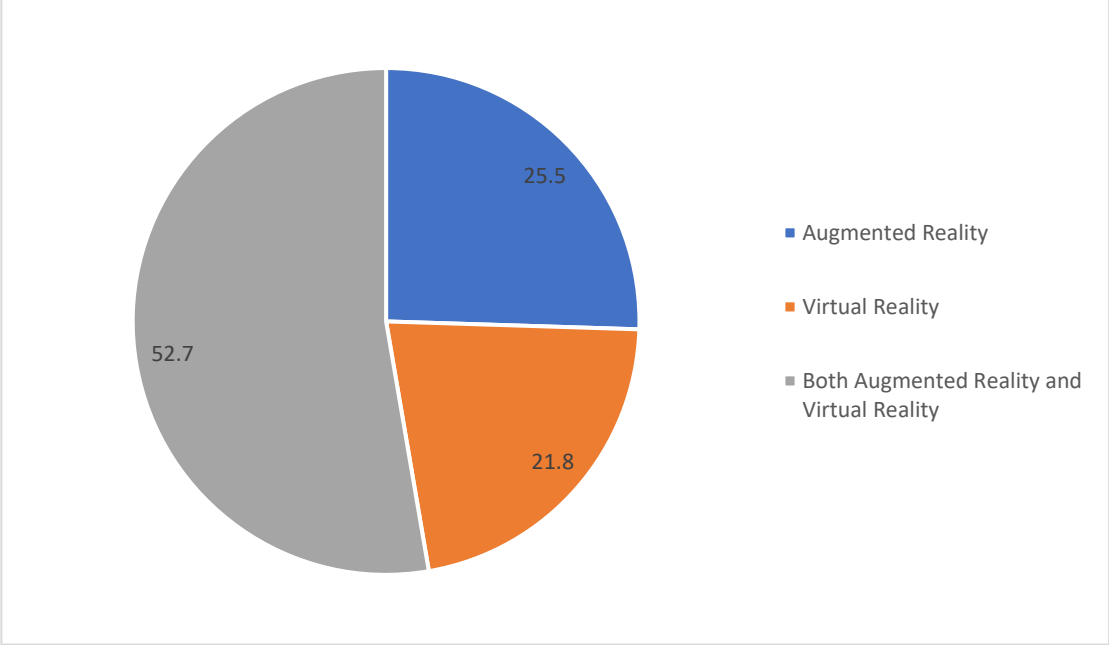
## 4.19 Efficiency

**Table 4.19 showing the efficiency of Augmented Reality and Virtual reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Augmented Reality | 28 | 25.5 |
| Virtual Reality | 24 | 21.8 |
| Both Augmented Reality and Virtual Reality | 58 | 52.7 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.19 showing the efficiency of Augmented Reality and Virtual reality**




**Source: Primary Data**

### Interpretation:

Figure 4.19 shows that 52.7% of the respondents believe both Augmented Reality and Virtual Reality is efficient in retail shopping because it enhances customer satisfaction. 25.5% of the respondents believe Augmented reality is efficient and 21.8% believe that Virtual Reality is efficient.

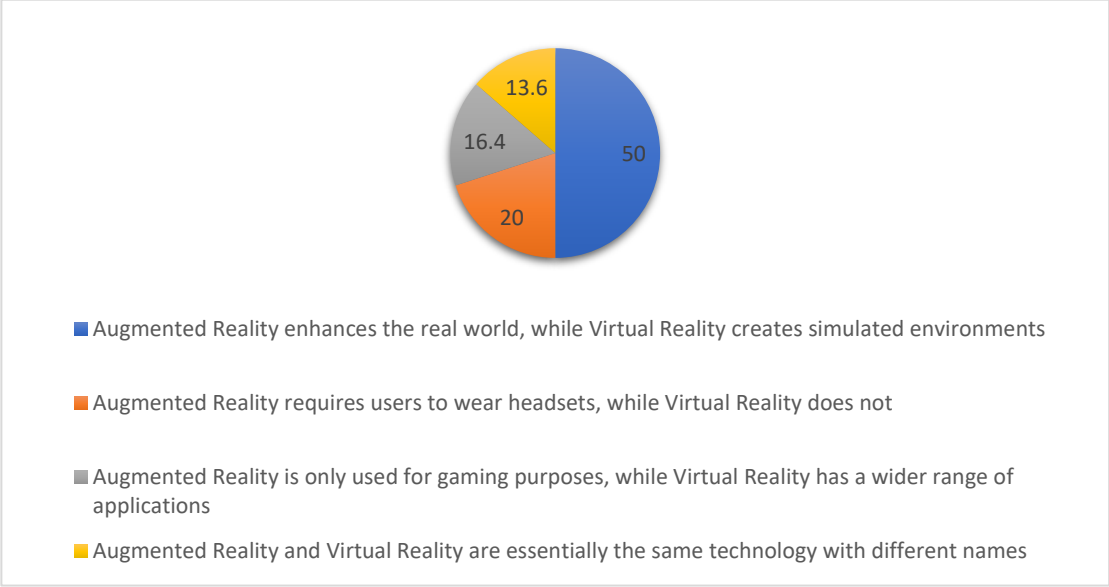
## 4.20 Difference between Augmented Reality and Virtual Reality

**Table 4.20 showing the difference between Augmented Reality and Virtual Reality**

| Particulars | Frequency | Percentage |
|---|---|---|
| Augmented Reality enhances the real world, while Virtual Reality creates simulated environments | 55 | 50 |
| Augmented Reality requires users to wear headsets, while Virtual Reality does not | 22 | 20 |
| Augmented Reality is only used for gaming purposes, while Virtual Reality has a wider range of applications | 18 | 16.4 |
| Augmented Reality and Virtual Reality are essentially the same technology with different names | 15 | 13.6 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.20 showing the difference between Augmented Reality and Virtual Reality**




**Source: Primary Data**

### Interpretation:

Figure 4.20 shows that 50% of the respondents believe that Augmented Reality enhances the real world, while Virtual Reality creates simulated environments. 20%

believe that Augmented Reality requires users to wear headsets, while Virtual Reality does not. 16.4% believe that Augmented Reality is only used for gaming purposes, while Virtual Reality has a wider range of applications. 13.6% of the respondents believe that Augmented Reality and Virtual Reality are essentially the same technology with different names.

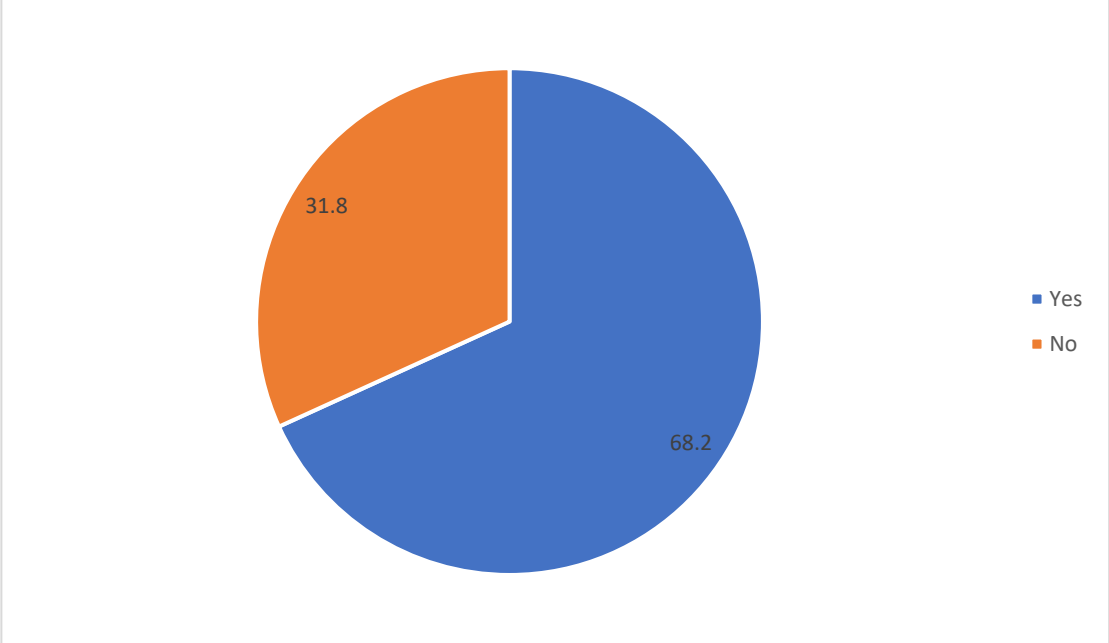
## 4.21 Change in future

**Table 4.21 showing whether Augmented Reality and Virtual Reality change the future of retail shopping experience**

| Particulars | Frequency | Percentage |
|---|---|---|
| Yes | 75 | 68.2 |
| No | 35 | 31.8 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.21 showing whether Augmented Reality and Virtual Reality change the future of retail shopping experience**




**Source: Primary Data**

**Interpretation:**

Figure 4.21 shows that 68.2% of the respondents believe that Augmented Reality and Virtual Reality will change the future of retail shopping by their accessibility, customer experiences personalized interactions etc. and 31.8% of the respondents do not believe that it will change the future of retail shopping.

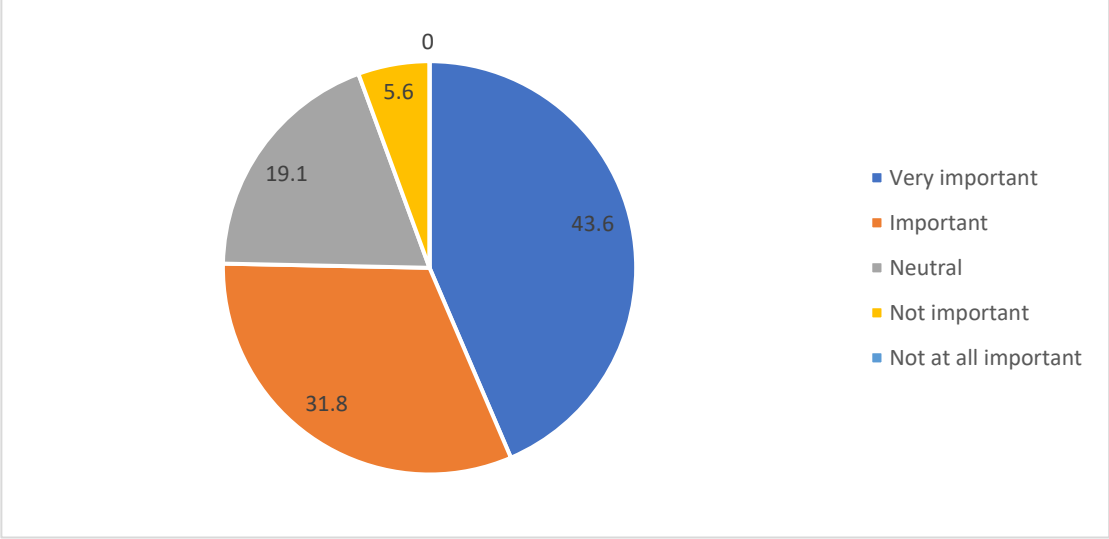
## 4.22 Importance of visual characteristics

**Table 4.22 showing the importance of visual characteristics in purchasing a product**

| Particulars | Frequency | Percentage |
|---|---|---|
| Very important | 48 | 43.6 |
| Important | 35 | 31.8 |
| Neutral | 21 | 19.1 |
| Not important | 6 | 5.6 |
| Not at all important | 0 | 0 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.22 showing the importance of visual characteristics in purchasing a product**




**Source: Primary Data**

**Interpretation:**

Figure 4.22 shows that 43.6% of respondents believe visual characteristics is very important in purchasing a product because it influences the quantity, quality, expectations and there by increasing the sales. 31.8% of the respondents believe that visual characteristics is just important and 19.1% have a neutral opinion. 5.6% of the respondents believe that visual characteristics is not important in purchasing a product.

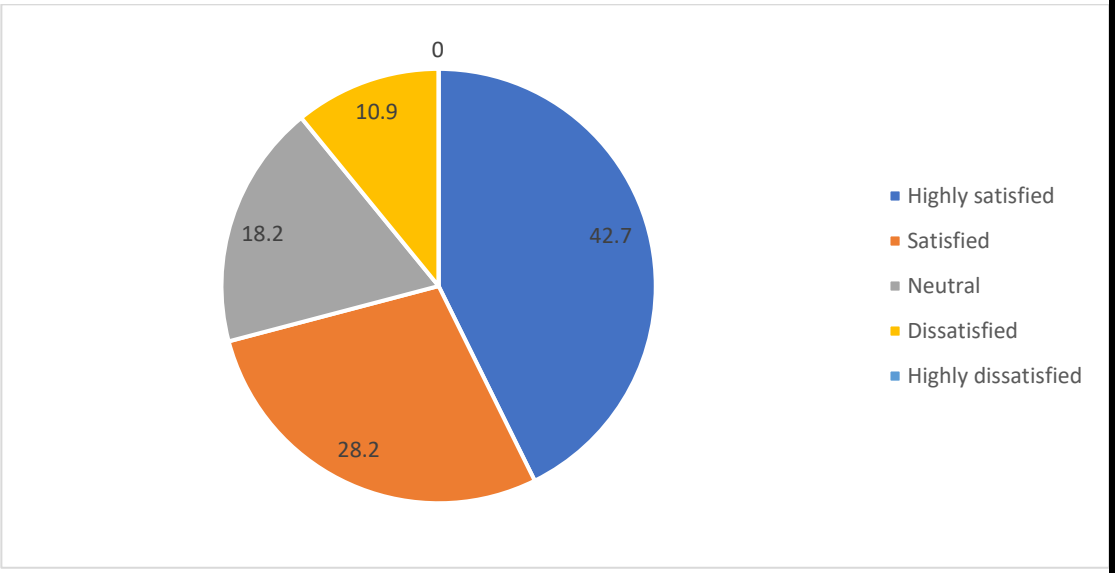
## 4.23 Satisfaction of Augmented Reality

**Table 4.23 showing the satisfaction level of Augmented Reality of respondents**

| Particulars | Frequency | Percentage |
|---|---|---|
| Highly satisfied | 47 | 42.7 |
| Satisfied | 31 | 28.2 |
| Neutral | 20 | 18.2 |
| Dissatisfied | 12 | 10.9 |
| Highly dissatisfied | 0 | 0 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.23 showing the satisfaction level of Augmented Reality of respondents**




**Source: Primary Data**

**Interpretation:**

Figure 4.23 shows that 42.7% of the respondents are highly satisfied with Augmented reality due to enhanced retail shopping experience, convenience, reduction in uncertainty etc. 28.2% are just satisfied, 18.2% are neither satisfied nor dissatisfied and 10.9% are dissatisfied.

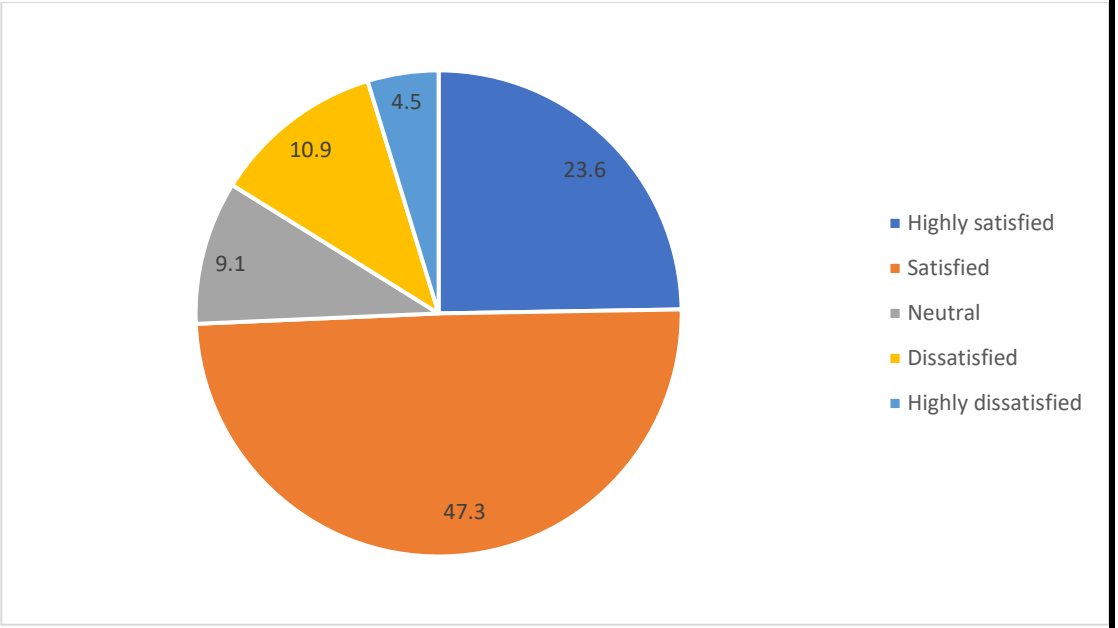
## 4.24 Satisfaction of Virtual Reality

**Table 4.24 showing the satisfaction level of Virtual Reality of respondents**

| Particulars | Frequency | Percentage |
|---|---|---|
| Highly satisfied | 26 | 23.6 |
| Satisfied | 52 | 47.3 |
| Neutral | 10 | 9.1 |
| Dissatisfied | 12 | 10.9 |
| Highly dissatisfied | 5 | 4.5 |
| Total | 110 | 100 |

**Source: Primary Data**

**Figure 4.24 showing the satisfaction level of Virtual Reality of respondents**




**Source: Primary Data**

**Interpretation:**

Figure 4.24 shows that 47.3% of the respondents are satisfied with Virtual reality because of product exploration, personalized experience etc. 23.6% are highly satisfied, 9.1% have a neutral opinion, 10.9% are dissatisfied and 4.5% are highly dissatisfied.

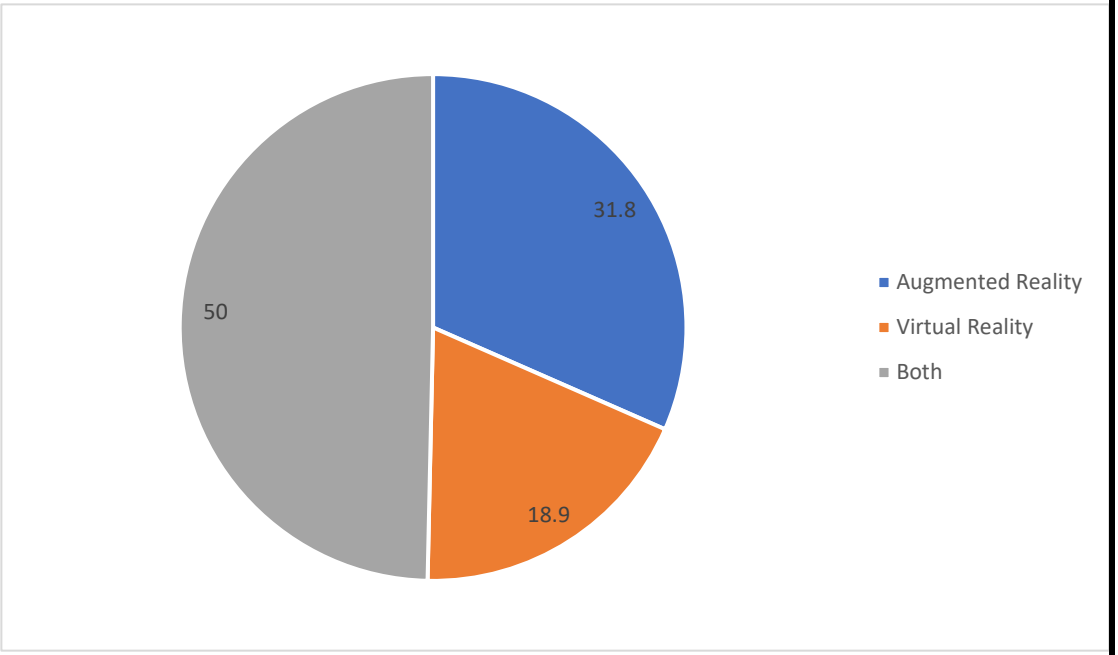
## 4.25 Preference for retail shopping

### Table 4.25 showing the preference of respondents for retail shopping

| Particulars | Frequency | Percentage |
|---|---|---|
| Augmented Reality | 35 | 31.8 |
| Virtual Reality | 20 | 18.9 |
| Both | 55 | 50 |
| Total | 110 | 100 |

**Source: Primary Data**

### Figure 4.25 showing the preference of respondents for retail shopping




**Source: Primary Data**

## Interpretation:

Figure 4.25 shows that 50% of respondents choose both Augmented Reality and Virtual Reality for retail shopping because these technologies have increased the retail shopping experience by delivering innovative and impactful solutions. 31.8% of the respondents chose Augmented Reality and 18.9% chose Virtual Reality for retail shopping.

**Testing of Hypothesis using Chi-Square test**

**H0: There is no significant relationship between age and usage of Augmented Reality in retail shopping**

**1. Age * 7. Usage of Augmented Reality (AR) expertise while shopping Crosstabulation**

Count

| | | **7. Have you ever used Augmented Reality (AR) expertise while shopping?** | | Total |
|---|---|---|---|---|
| | | No | yes | |
| 1. Age | 18-24 | 21 | 34 | 55 |
| | 25-34 | 2 | 31 | 33 |
| | 35-44 | 2 | 8 | 10 |
| | 45 and above | 2 | 10 | 12 |
| Total | | 27 | 83 | 110 |

**Chi-Square Tests**

| | Value | Df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 12.124[a] | 3 | .007 |
| Likelihood Ratio | 13.548 | 3 | .004 |
| N of Valid Cases | 110 | | |

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.45.

**Interpretation:**

The relationship between age and usage of Augmented Reality in retail shopping is tested through chi square, where the p value is less than 0.05, that is 0.007<0.05 hence the null hypothesis is accepted thus there is no significant relationship between age and usage of Augmented Reality

**H0: There is no significant relationship between age and usage of**

## Augmented Reality in retail shopping

**1. Age * 8. Usage of Virtual Reality (VR) expertise while shopping Crosstabulation**

Count

| | | 8. Have you ever used Virtual Reality (VR) expertise while shopping? | | Total |
|---|---|---|---|---|
| | | no | yes | |
| 1. Age | 18-24 | 12 | 43 | 55 |
| | 25-34 | 0 | 33 | 33 |
| | 35-44 | 0 | 10 | 10 |
| | 45 and above | 4 | 8 | 12 |
| Total | | 16 | 94 | 110 |

## Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 13.067[a] | 3 | .004 |
| Likelihood Ratio | 18.261 | 3 | .000 |
| N of Valid Cases | 110 | | |

a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is 1.45.

## Interpretation:

The relationship between age and usage of Virtual Reality in retail shopping is tested through chi square, where the p value is less than 0.05, that is 0.004<0.05 hence the null hypothesis is accepted thus there is no significant relationship between age and usage of Virtual Reality

# CHAPTER – V

# FINDINGS, SUGGESTIONS AND CONCLUSION

## 5.1 Findings

- Majority of the respondents are female (60%) students (57.3%) that belongs to 18-24 age group (50%) because of their wide variety of products and they are easily influenced by trends, social interactions convenience
- Respondents involve in retail shopping monthly (47.3%) and prefer to shop in both physical and online stores (63.6%) due to the perception of each individual, diverse options, convenience etc.
- Majority of the respondents (72.7%) are aware of the term Augmented Reality and Virtual Reality due to social media and social relations and they (54.5%) have occasionally used both Augmented Reality and Virtual Reality in retail shopping
- Majority of the respondents (50%) use Augmented Reality and Virtual Reality to purchase accessories due to their ability to facilitate visual assessment, convenience, personalization etc.
- The respondents (52.7%) believe that Augmented Reality and Virtual Reality improves retail shopping experience by making it more interactive, informative for customers.
- According to the response, they (53.6%) ensure that by the usage of Augmented Reality and Virtual Reality product customization has improved
- The respondents (51.8%) are very likely to purchase a product after using Augmented Reality and Virtual Reality because of the interaction and information they got.
- The respondents (63.6%) are ready to pay an extra amount for products that offer Augmented Reality and Virtual Reality because it meets the preferences and expectation of consumers
- Majority of the respondents (44.6%) face device compatibility in the usage of Augmented Reality and Virtual Reality due to cost, new technology etc.
- The respondents (80%) believe that Augmented Reality and Virtual Reality reduce the gap between online and offline shopping experience by creating a more seamless and integrated shopping journey between online and offline
- Consumers (50%) chose offline shopping than online because of the limited availability of Augmented Reality and Virtual Reality enabled products

- Respondents (52.7%) believe both Augmented Reality and Virtual Reality is efficient in retail shopping because it enhances customer satisfaction
- The majority of the respondents (50%) believe, the major difference is that Augmented Reality enhances the real world, while Virtual Reality creates simulated environments
- According to respondents (68.2%) Augmented Reality and Virtual Reality will change the future of retail shopping by their accessibility, customer experiences personalized interactions
- Respondents (43.6%) believe visual characteristics is very important in purchasing a product because it influences the quantity, quality, expectations and there by increasing the sales
- The respondents (42.7%) are highly satisfied with Augmented Reality due to enhanced retail shopping experience, convenience, reduction in uncertainty etc. and are just satisfied (47.3%) with Virtual reality because of product exploration, personalized experience
- Respondents (50%) choose both Augmented Reality and Virtual Reality for retail shopping because these technologies have increased the retail shopping experience by delivering innovative and impactful solutions
- From testing of hypothesis, it is found that there is no relationship between age and usage of Augmented reality, age and usage of virtual reality

## 5.2 Suggestions

- Majority of the respondents are aware of the term Augmented Reality and Virtual Reality but more measures should be taken to reach the term to people
- More products should be available for purchase which offer Augmented Reality and Virtual Reality
- More measures should be taken by manufactures to improve Augmented Reality and Virtual Reality retail shopping
- The major issues or limitation faced by the consumers are device compatibility. More Augmented Reality and Virtual Reality enabled devices should be produced
- Including additional features or improvements will lead the people to choose online purchase than offline

- More startups are required to flourish Augmented Reality and Virtual Reality

## 5.3 Conclusion

In summary, the retail shopping experience has been greatly improved by augmented reality (AR) and virtual reality (VR), which have completely changed how customers engage with companies and products. Augmented reality and virtual reality technologies enable immersive and personalized experiences that boost engagement, enhance revenue, and build consumer loyalty by seamlessly fusing the digital and physical worlds.

Customers can see things in their homes thanks to augmented reality, which helps them make better judgments and lowers the chance of buying regrets. Moreover, customers can digitally test items like apparel, cosmetics, and accessories thanks to AR-powered try-on capabilities, which increases customer happiness and lowers return rates.

Virtual reality allows customers to transcend physical boundaries and access a wider variety of goods and experiences by taking them to virtual stores and locations. With the help of this immersive technology, which enables in-depth product exploration and personalized suggestions based on user behavior and interests, consumers may be informed as well as entertained.

Additionally, virtual and augmented reality retail experiences can strengthen the emotional bonds that exist between customers and brands, encouraging advocacy and brand loyalty. Retailers can stand out in a competitive market and develop closer bonds with their clientele by providing unique and engaging shopping experiences.

The study's findings indicate that virtual reality and augmented reality have enhanced in-store shopping and will have a significant impact on it going forward. Customers select between virtual reality and augmented reality because they are both as effective. Future prospects for retail become even more promising as Augmented Reality and Virtual Reality technology continue to progress. Retailers have the chance to significantly improve the consumer experience, boost sales, and influence the direction of commerce as these technologies become more widely available and easily incorporated into the buying process. In summary, virtual reality and augmented reality are revolutionary tools that are revolutionizing the way we interact with brands and shop online.

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# ANNEXURE

# Questionnaire

1. Age
   - 18-24 years
   - 25-34 years
   - 35-44 years
   - 45 years and more

2. Gender
   - Male
   - Female
   - Others

3. Employment Position
   - Student
   - Employed
   - Unemployed

4. How often do you involve in retail shopping (either online or in physical stores)?
   - Weekly
   - Monthly
   - Quarterly
   - Half yearly
   - Yearly

5.Where do you prefer to shop for retail products?
   - Physical stores only
   - Online stores only
   - Both physical and online stores

6.Are you aware of the term Augmented Reality and Virtual Reality in retail shopping?
   - Yes
   - No

7. Have you ever used Augmented Reality (AR) expertise while shopping?

- Yes
- No

8. Have you ever used Virtual Reality (VR) expertise while shopping?

- Yes
- No

9. How often do you use Augmented Reality or Virtual Reality technology for shopping purposes?

- Frequently
- Occasionally
- Rarely
- Never

10.What types of products have you used Augmented Reality or Virtual Reality to shop for?

- Clothing
- Accessories
- Beauty
- Others (please specify)

11.Do you believe that Augmented Reality and Virtual Reality technologies improve the retail shopping experience?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

12.Which features of the retail shopping experience do you think AR and VR technologies improve?

- Product visualization

- Product customization
- In-store navigation
- Virtual try-on for clothing/accessories
- Enhanced engagement with products
- Others

13.How probable is you to make a purchase after using Augmented Reality or Virtual Reality technology to visualize or try-on a product?

- Very likely
- Likely
- Neutral
- Unlikely
- Very unlikely

14.Would you be ready to pay an extra amount for products that offer Augmented Reality or Virtual Reality-enabled features?

- Yes
- No
- Maybe

15.Have you met any technical issues or limitations while using Augmented Reality or Virtual Reality for shopping purposes?

- Privacy or security concern
- Device compatibility (devices not supporting)
- Performance issues (lag, stuttering etc.)
- Difficulty to use
- Others

16.Do you think Augmented Reality and Virtual Reality technologies can help to bridge the gap between online and offline shopping experiences?

- Yes
- No
- Maybe

17.Which of these factors made you chose offline shopping experience over online shopping?

- Lack of access to AR/VR devices
- Concerns about privacy and security
- Limited availability of AR/VR-enabled products
- Complexity of using AR/VR technology
- High costs associated with AR/VR implementation
- Others (please specify)

18.What improvements or additional features would you like to see in Augmented Reality and Virtual Reality retail shopping experiences?

19.In your opinion which is more efficient in retail shopping?

- Augmented Reality
- Virtual Reality
- Both Augmented Reality and Virtual Reality

20. In your opinion how does Augmented Reality differ from Virtual Reality?

- Augmented Reality enhances the real world, while Virtual Reality creates simulated environments
- Augmented Reality requires users to wear headsets, while Virtual Reality does not.
- Augmented Reality is only used for gaming purposes, while Virtual Reality has a wider range of applications.
- Augmented Reality and Virtual Reality are essentially the same technology with different names.

21. Do you think Augmented Reality and Virtual Reality technologies will significantly change the future of retail shopping?

- Yes
- No

22. How important is the visual characteristic of a product when making a purchasing decision?

- Very important
- Important
- Neutral
- Not important
- Not at all important

23. Overall are you satisfied with Augmented Reality technologies in retail shopping?
    - Highly satisfied
    - Satisfied
    - Neutral
    - Dissatisfied
    - Highly dissatisfied

24. Overall are you satisfied Virtual Reality technologies in retail shopping?
    - Highly satisfied
    - Satisfied
    - Neutral
    - Dissatisfied
    - Highly dissatisfied

25. What will you chose for better retail shopping?
    - Augmented Reality
    - Virtual Reality
    - Both