

## The Impact of Immersive Retail Technologies on Consumer Purchase Behaviour: Evidence from Extended Reality Commerce Platforms

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### Abstract

The rapid expansion of XR (Extended Reality) technology has dramatically affected digital retail because XR features and capabilities allow consumers to engage with a retailer in a more immersive and interactive way, bridging the gap between shopping online and shopping in-person. In this study, IRT (Immersive Retail Technologies) and their influence on CPB (Consumer Purchase Behaviour) were examined using PSE (Perceived Shopping Experience) as a mediator and TR (Technology Readiness) as a moderator. The method employed for this research was quantitative in nature, with 451 consumers used for data collection, each with prior experience using XR-enabled retail applications. PLS-SEM (Partial Least Squares Structural Equation Modelling) was then used to evaluate the proposed framework. Overall, it was found that IRT greatly affect both the perceived shopping experience and consumer purchase behaviour. The perceived shopping experience was identified to mediate the relationship between immersive retail technologies and purchase behaviour partially, and technology readiness intensified this relationship significantly. The paper is a contribution to the expanding amount of literature on immersive commerce that incorporates technological, experiential, and consumer-specific variables in a unitary framework. The results have significant implications for retailers wishing to improve their customers' experience, shopping experience, and purchasing results by utilizing XR technology in today's highly competitive online shopping environment.

**Keywords:** Immersive Retail Technologies, Extended Reality, XR Commerce, Consumer Purchase Behaviour, Perceived Shopping Experience, Technology Readiness, PLS-SEM.

### 1. Introduction

The booming growth of digital technologies has radically altered the retail environment, changing the way consumers seek information, consider goods and services, and make buying choices. Although the traditional e-commerce sites have greatly enhanced accessibility and convenience, they still have the drawback of failing to reproduce the sensory richness and interactive experience of the physical shopping experience. When individuals buy products online, they are often faced with uncertainty about the quality, fit, functionality, and general appropriateness of the product, which often leads to reduced confidence and a higher risk of making a decision (Hoyer et al., 2020; Javornik, 2021). As a result, retailers are moving towards new technologies that can be used to improve consumer interaction and make the shopping experience more realistic and interactive. Other major changes in this respect are the advent of Extended Reality (XR), which includes Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) technologies. These technologies have brought about the immersive retail spaces that allow consumers to virtually test products, interact with three-dimensional displays of products and simulate shopping spaces before they make purchasing decisions. These possibilities allow consumers to engage with products in a manner that is closely related to real-life shopping experiences, minimising uncertainty and boosting trust in their buying decision (Hilken et al., 2022; Wedel et al., 2023). Consequently, immersive retail technologies are finding more and more acceptance in different sectors like fashion, cosmetics, furniture, electronics, and luxury retailing. The available literature indicates that immersive retail technologies can enhance consumer interaction, telepresence, product knowledge, and enjoyment during shopping, which eventually has an impact on purchase-related behaviour (Rauschnabel et al., 2022; Yang et al., 2024). XR-enabled platforms enable consumers to make better decisions and reduce perceived risk by offering them more efficient visualisation and interactive experiences. Moreover, immersive shopping experiences have been discovered to form more intense emotional bonds between consumers and brands, which provide retailers with a better chance to shape purchase behaviour compared to traditional online platforms (Pessoa de Amorim et al., 2022; Pizzi et al., 2023). Although

XR commerce is becoming increasingly popular, there are critical research gaps. Most of the research done has been on technology adoption, acceptance intentions, user satisfaction or system usability. Little effort has been placed on the interpretation of the way immersive retail technologies are converted into the actual consumer purchase behaviour by the underlying psychological processes (Erensoy and Baumann, 2024; Fan et al., 2025). Specifically, little is known about how the perceived experience of shopping is used as a mechanism of immersive technologies influencing buying decisions by consumers. Likewise, the personal variations in technology readiness can have a profound influence on how consumers react to XR-powered shopping experiences, but there is a lack of empirical data that studies this moderating effect. These gaps are significant to address since technological investments might not necessarily lead to good consumer results. Retailers are becoming more and more interested and engaged in evidence of how immersive technologies affect the desire to make meaningful shopping experiences and in what circumstances these experiences result in a greater purchasing behaviour. These relationships will be critical to understanding how to develop successful XR commerce strategies and gain maximum returns on investing in digital retail. In line with this, this paper constructs and analyses a moderated-mediated model of Immersive Retail Technologies, Perceived Shopping Experience, Technology Readiness, and Consumer Purchase Behaviour. The research aims to offer an extensive description of the impact of immersive retail technologies on the purchasing behaviour in the context of XR commerce platforms and, at the same time, determine the behavioural processes and individual factors that determine such effects.

Specifically, the study pursues the following objectives:

**RO1:** To examine the influence of Immersive Retail Technologies on Consumer Purchase Behaviour.

**RO2:** To investigate the effect of Immersive Retail Technologies on Perceived Shopping Experience.

**RO3:** To examine the mediating role of Perceived Shopping Experience in the relationship between Immersive Retail Technologies and Consumer Purchase Behaviour.

**RO4:** To assess the moderating effect of Technology Readiness on the relationship between Immersive Retail Technologies and Consumer Purchase Behaviour.

The paper helps to fill the emerging body of research on XR commerce and immersive retailing by incorporating technological, experiential, and consumer-specific variables into a single empirical model.

## **2. Literature Review and Hypothesis Development**

Extended Reality (XR) technologies have greatly changed the nature of digital retailing by offering immersive shopping experiences based on the integration of virtual and physical components. Consumers are able to see products, engage with online content, and experience simulated shopping experiences using technologies like Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR). Such immersive features overcome the majority of the limitations related to traditional online shopping, especially the impossibility to touch and feel items and assess their appropriateness in relation to a purchase (Hoyer et al., 2020; Hilken et al., 2022). With the growing use of XR-enabled platforms by retailers, the effects of immersive retail technologies on consumer behaviour have emerged as a significant research topic.

### **2.1 Immersive Retail Technologies and Consumer Purchase Behaviour**

Consumer purchase behaviour describes the behaviour and decision-making that goes on in purchasing products and services. In online retail settings, the quality of information that a consumer has and trust in the ability to make purchases online are highly likely to affect the decision to purchase. These assessments are augmented by Immersive Retail Technologies (IRT) that give believable product display, virtual product testing, interactive demonstrations, and customised shopping experiences. These features minimise uncertainty, enhance product knowledge, and enhance consumer confidence in the decision-making process (Javornik, 2021; Smink et al., 2022). Available literature indicates that immersive technologies have a positive effect on the purchase-related outcomes. Use of XR-enabled applications enhances telepresence, engagement, and interactivity that translate to higher purchase intentions and behavioural responses (Yang et al., 2024). Moreover, product experiences allow consumers to assess the features of the product better, which results in perceived risk reduction and willingness

to buy the product (Pessoa de Amorim et al., 2022). The more consumers take a closer part in the shopping process, the more they are likely to be more favourable in their attitudes towards products and brands, which leads to more positive purchase behaviour.

**H1:** Immersive Retail Technologies positively influence Consumer Purchase Behaviour.

## **2.2 Immersive Retail Technologies and Perceived Shopping Experience**

Shopping experience: Perceived shopping experience is the overall appraisal of the interaction between consumers and shopping, which encompasses enjoyment, involvement, satisfaction, convenience and confidence. The modern retail research industry is becoming more and more aware of experience as a key source of competitive edge since customers are interested in not just the product but also the experience and the experience of the shopping process. Immersive technologies have become a potent instrument of building such experiences as they allow consumers to engage with products in the most realistic and interactive environment (Lavoye et al., 2021). The XR technologies offer sensory engagement, realism, and involvement that make shopping experiences much better. Virtual product exploration and immersive interaction allow consumers to experience products in a manner that is similar to the physical retail experiences. Past research has demonstrated that immersive technologies enhance consumer enjoyment, satisfaction, and engagement and, at the same time, minimise uncertainty related to online shopping (Kang et al., 2020; Rauschnabel et al., 2022). As a result, consumers who shop online with XR-enabled retail platforms will probably have a more positive shopping experience in comparison to traditional online shopping platforms.

**H2:** Immersive Retail Technologies positively influence Perceived Shopping Experience.

## **2.3 Perceived Shopping Experience and Consumer Purchase Behaviour**

A connection between the shopping experience and purchase behaviour has been established extensively in the literature of consumer behaviour. According to the experiential marketing theory, positive shopping experiences create emotional, cognitive, and behavioural reactions which lead to buying decisions. When consumers experience shopping as enjoyable, informational and satisfactory, they have a higher propensity to adopt positive attitudes towards products and show a greater purchase intention (Batat, 2022). In XR commerce settings, the ability to have immersive shopping can enhance consumer confidence in assessing product offerings and boost their readiness to buy. Studies show that the involvement in experience at the retail level enhances emotional engagement, lessens decision-making ambiguity, and promotes positive behavioural responses (Pizzi et al., 2023). In the same line, Guo et al. (2024) observed that the positive impact of improved shopping experiences in immersive commerce settings on the buying behaviour is increased by understanding of the product and the quality of the decision made. Thus, consumers who share positive shopping experiences in XR platforms will have a stronger purchase behaviour.

**H3:** Perceived Shopping Experience positively influences Consumer Purchase Behaviour.

## **2.4 Mediating Role of Perceived Shopping Experience**

Even though immersive retail technologies have a direct effect on consumer purchase behaviour, it is probable that the effects will work via experiential processes. The XR technologies are uniquely set to develop immersive and engaging shopping experiences that contribute to the perception of enjoyment, realism, and satisfaction of consumers. Such experiences, in turn, affect behavioural outcomes such as purchases. According to previous studies, immersive technologies generate value by enhancing the experiences of consumers as they go through the shopping experience and not just by making them technologically functional (Wedel et al., 2023). Strong purchasing behaviour is formed through higher confidence, engagement and emotional attachment due to enhanced shopping experiences. Therefore, Perceived Shopping Experience can be an influential process according to which immersive retail technologies can be transformed into consumer purchases. Immersive technologies can indirectly promote positive purchase results by enhancing the overall assessment of consumers of the shopping experience.

**H4:** Perceived Shopping Experience mediates the relationship between Immersive Retail Technologies and Consumer Purchase Behaviour

### 2.5 Moderating Role of Technology Readiness

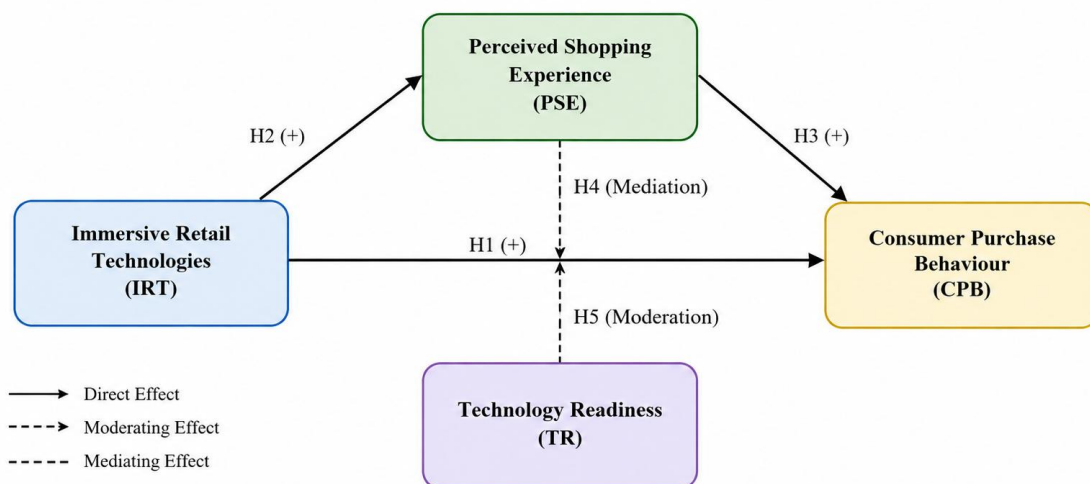
Technology Readiness is a characteristic of a person to accept and utilise new technologies in everyday life (Parasuraman and Colby, 2021). The willingness to use emerging technologies varies significantly among consumers, and these differences can affect the reaction to the XR-enhanced retail setting. High technology readiness individuals tend to be more at ease with trying new technologies and tend to see value in immersive digital experiences. Studies show that technology preparedness affects consumer acceptance of more sophisticated digital systems and increases their capacity to reap the benefits of technology-enabled services (Blut et al., 2021). In the context of XR commerce settings, the use of immersive retail technologies and experience transfer into a more robust purchase behaviour should be more likely among highly technology-ready consumers. On the other hand, consumers with lower technological readiness can find engaging with XR platforms uncomfortable or unpredictable, thus decreasing the usefulness of immersive technologies. In line with this, technology preparedness is likely to enhance the positive association between in-store technology and consumer buying behaviour.

**H5:** Technology Readiness positively moderates the relationship between Immersive Retail Technologies and Consumer Purchase Behaviour

### 2.6 Conceptual Framework

According to the discussion above, the proposed framework will indicate that the Immersive Retail Technologies have a direct effect on Consumer Purchase Behaviour and an indirect one on it via Perceived Shopping Experience. Moreover, Technology Readiness is a moderating variable that enhances the association between Immersive Retail Technologies and Consumer Purchase Behaviour. The framework combines both technological and experiential and individual-level aspects to give an extensive account of how consumer behaviour can be explained in the context of XR commerce.

**Figure 1:** Proposed Conceptual Framework



**Figure 1. Proposed Conceptual Framework**

The framework proposes that Immersive Retail Technologies (IRT) positively influence Consumer Purchase Behaviour (CPB) directly (H1) and indirectly through Perceived Shopping Experience (PSE) as a mediator (H2, H3, H4). Additionally, Technology Readiness (TR) is expected to strengthen the direct relationship between IRT and CPB (H5).

The conceptual model in Figure 1 illustrates the effect of Immersive Retail Technologies (IRT) on Consumer Purchase Behaviour (CPB) of XR commerce platforms. The model suggests that the direct impact of IRT on CPB is through the greater visualisation of the products, interactivity, and consumer confidence in the shopping process.

Also, IRT will enhance the Perceived Shopping Experience (PSE), which in turn will affect CPB, therefore creating a mediating relationship. It indicates that immersive technologies influence the process of making purchases not only directly but indirectly by means of providing the shoppers with improved shopping experiences. Moreover, Technology Readiness (TR) is added as a moderating variable, which enhances the association between IRT and CPB. More technologically prepared consumers are likely to obtain more value out of the immersive retail experiences, leading to better purchasing behaviours. Comprehensively, the framework incorporates technological, experiential, and individual variables in explaining consumer behaviour in immersive commerce settings.

### **3. Research Methodology**

#### **3.1 Research Design**

The research design of the current study is quantitative, cross-sectional, and explanatory and aims to examine how Immersive Retail Technologies (IRT) affect Consumer Purchase Behaviour (CPB) in Extended Reality (XR) commerce platforms. Quantitative approach was deemed suitable since the research is to empirically test the relationships between several latent constructs and test a moderated-mediated conceptual model. The cross-sectional design allowed to gather data on consumers at one point in time, which could give insights into their perceptions and behavioural reactions to immersive retail technologies. Since the proposed framework is predictive and exploratory, the use of Partial Least Squares Structural Equation Modelling (PLS-SEM) as the main analytical tool was deemed fitting.

#### **3.2 Population and Sampling**

The target group included consumers who had previously used XR-enabled retail applications, such as augmented reality product visualisation, virtual try-on apps, virtual stores, and immersive shopping. Probability sampling could not be done since there is no extensive sampling frame of the users of XR-commerce. Thus, purposive sampling, along with snowball sampling, was selected to define appropriate respondents with the needed experience of working with immersive retail technologies.

The minimum sample size was determined using Cochran's formula for an unknown population:

$$n_0 = (1.96^2 \times 0.5 \times 0.5) / (0.05^2)$$

$$n_0 = 384.16$$

Based on this, the sample size of 384 respondents was a minimum. The study aimed to recruit around 450-500 respondents to increase the statistical dependability and cover the non-responders. The ultimate dataset included valid responses received among consumers in large urban areas in India, such as Delhi NCR, Mumbai, Bengaluru, Hyderabad, Chennai and Pune, where digital retail technologies are relatively more adopted.

**Table 1:** Sampling Design

| <b>Component</b>    | <b>Description</b>                    |
|---------------------|---------------------------------------|
| Target Population   | Consumers using XR-commerce platforms |
| Sampling Technique  | Purposive and Snowball Sampling       |
| Confidence Level    | 95%                                   |
| Margin of Error     | 5%                                    |
| Minimum Sample Size | 384                                   |
| Target Sample Size  | 450–500                               |
| Unit of Analysis    | Individual Consumer                   |

### 3.3 Instrument Development and Measurement Scale

In order to collect data, a structured questionnaire was used, which had two sections. Part 1 included demographics, and the second part included the measurement of the study constructs. Measurement items were all based on those that had been used in the previous literature and adapted to fit the XR-commerce context. The measure of responses was a five-point Likert scale of 1 = Strongly Disagree to 5 = Strongly Agree. Four latent constructs were used in the study, including Immersive Retail Technologies (IRT), Perceived Shopping Experience (PSE), Technology Readiness (TR), and Consumer Purchase Behaviour (CPB). Five items of measurement were used to operationalise each construct.

**Table 2:** Construct Operationalization

| Construct                     | Code | Number of Items |
|-------------------------------|------|-----------------|
| Immersive Retail Technologies | IRT  | 5               |
| Perceived Shopping Experience | PSE  | 5               |
| Technology Readiness          | TR   | 5               |
| Consumer Purchase Behaviour   | CPB  | 5               |

Before full-scale data collection, the questionnaire was reviewed by subject experts and pilot-tested among a small group of respondents to ensure clarity, content validity, and contextual relevance.

### 3.4 Data Collection Procedure

The gathering of data was carried out via the online survey that was conducted using Google Forms. The survey link was shared on social media, professional networking, online retailing communities and consumer forums where the users of XR-commerce might be active. Respondents were also screened to make sure that they had experience with at least one immersive retail technology application. They were asked to take part on a voluntary basis, and the participants were informed of the study's academic objective. The information collected by the study was done so that the data would be confidential, and the data collection process will not have identifiable information linking any particular participant to their response.

### 3.5 Data Analysis Technique

The data collected was analysed with the help of SPSS and SmartPLS 4. Preliminary analyses were done using SPSS, such as data screening, demographic profiling, and descriptive statistics. To evaluate the measurement model as well as the structural model, SmartPLS 4 was used. Analyses on this study were done using a measurement model to measure the reliability of indicators via Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE), Fornell-Larcker Criterion, and Heterotrait-Monotrait Ratio (HTMT), followed by analysing the structural model in terms of path coefficients, bootstrapping, coefficient of determination ( $R^2$ ), effect size ( $f^2$ ), predictive relevance ( $Q^2$ ), and mediation/moderation. A bootstrapping of 5,000 resamples was run to establish the statistical significance of the hypothesised relationships. The analytical process adopted gives a systematic evaluation of the quality of measurement as well as the structural relationships, thus guaranteeing the strength and validity of the proposed moderated mediated framework.

## 4. Results and Analysis

The proposed conceptual framework was assessed through Partial Least Squares Structural Equation Modelling (PLS-SEM) via SmartPLS 4. The recommended two-step analysis method was followed in that the measurement model was first assessed for reliability and validity measurement; and then after establishing the reliability and validity of the measurement model, the structural model was assessed to examine the relationships between Immersive Retail Technologies (IRT), Perceived Shopping Experience (PSE), Technology Readiness (TR), and Consumer Purchase Behaviour (CPB). The results are presented sequentially, beginning with respondent

demographics, followed by measurement model assessment, structural model evaluation, mediation and moderation analysis, and model predictive power.

#### 4.1 Respondent Profile

A partial least squares structural equation modelling (PLS-SEM) approach was taken using SmartPLS 4 to evaluate the proposed conceptual framework. Following the two stage analytical approach recommended, the measurement model was evaluated for reliability and validity, and the structural model evaluated for the hypothesised association between immersive retail technologies (IRT), perceived shopping experience (PSE), technology readiness (TR) and consumer purchase behaviour (CPB). The findings are reported linearly, starting with the demographics of the respondents, measurement model analysis, structural model analysis, mediation and moderation analysis and model predictive power. The online survey received a total of 472 responses. Upon screening and elimination of unreliable answers, 451 valid questionnaires were left to be analysed. The respondents were consumers who had used XR-enabled retail experiences in the past, including virtual try-on, AR, product display features, immersive product demonstrations, and virtual shopping experiences.

**Table 3. Demographic Profile of Respondents (N = 451)**

| Characteristic                 | Category                 | Frequency | Percentage (%) |
|--------------------------------|--------------------------|-----------|----------------|
| Gender                         | Male                     | 258       | 57.2           |
|                                | Female                   | 193       | 42.8           |
| Age                            | 18–25 Years              | 104       | 23.1           |
|                                | 26–35 Years              | 187       | 41.5           |
|                                | 36–45 Years              | 102       | 22.6           |
|                                | Above 45 Years           | 58        | 12.8           |
| Education                      | Undergraduate            | 138       | 30.6           |
|                                | Graduate                 | 174       | 38.6           |
|                                | Postgraduate             | 111       | 24.6           |
|                                | Doctorate/Other          | 28        | 6.2            |
| Frequency of XR Shopping Usage | Occasionally             | 196       | 43.5           |
|                                | Monthly                  | 151       | 33.5           |
|                                | Weekly                   | 104       | 23             |
| Primary XR Retail Experience   | AR Product Visualisation | 167       | 37             |
|                                | Virtual Try-On           | 142       | 31.5           |
|                                | Virtual Showrooms        | 87        | 19.3           |
|                                | VR Shopping Environment  | 55        | 12.2           |

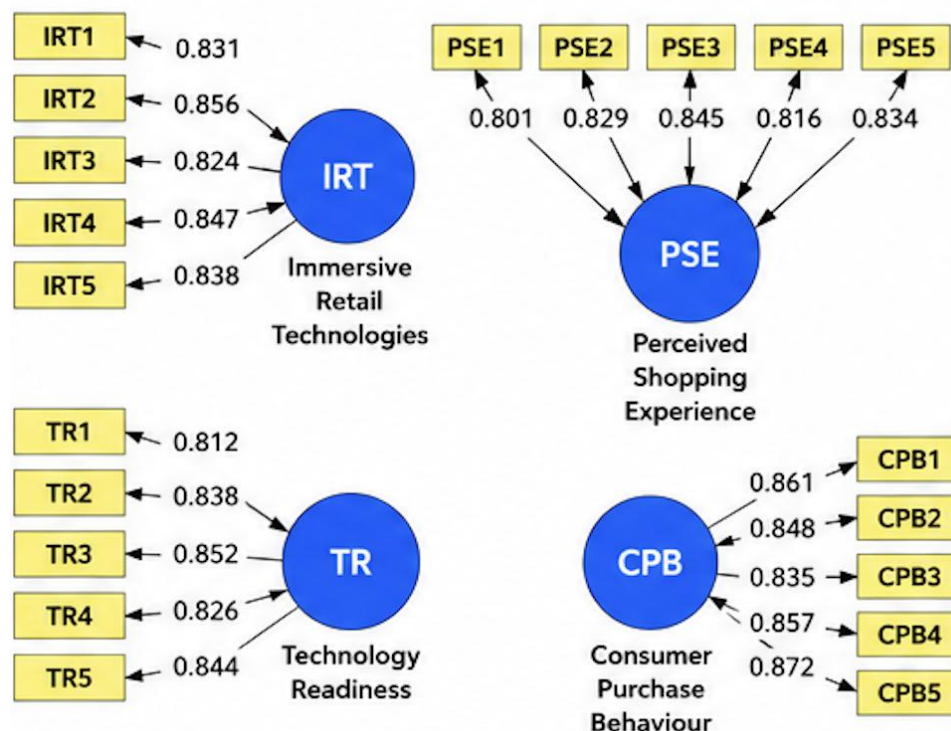
Table 3 shows that the sample consisted of a heterogeneous sample of XR-commerce users. Of the sample, 57.2 per cent were male and 42.8 per cent were female. The largest proportion of respondents were in the 26-35 age category (41.5%) followed by the 18-25 age category (23.1%). This is consistent with more recent studies that found that younger consumers generally have greater acceptance of both immersive retail technology and digital shopping technology. With regard to education levels, the majority of respondents indicated they had educational qualifications at or above a graduate or postgraduate degree, indicative of a substantial number of digitally literate consumers with the ability to access and utilise advanced retail technologies. Concerning the patterns of XR use,

around 43.5% claimed to use immersive retail applications occasionally, whereas 23.0% stated that they used them once a week. This result shows that the respondents were exposed enough to XR-enabled shopping spaces to have assessed the constructs that were studied in the research. The analysis also showed that AR-based product visualisation was the most commonly used immersive retail technology, then virtual try-on applications. This fact represents the tendencies of the present industry, where AR technologies have become more widely used in the business world, thanks to their availability via smartphones and mobile commerce applications. In general, the demographic data show that the sample presents a suitable foundation through which one can investigate the consumer reactions to immersive retail technologies in XR commerce settings.

**4.2 Measurement Model Assessment**

Before testing the hypotheses, the measurement model was tested to determine the reliability and validity of latent constructs. As per the authors' recommendations (Hair et al., 2022), reliability was evaluated through the assessment of indicator reliability, internal consistency reliability, convergent validity and discriminant validity. Specifically, the following measures were evaluated: outer loadings, Cronbach's alpha ( $\alpha$ ), composite reliability, average variance extracted (AVE), Fornell-Larcker criterion and Heterotrait-Monotrait ratio (HTMT).

**Figure 2:** Measurement Model



The measurement model comprises four reflective constructs: Immersive Retail Technologies (IRT), Perceived Shopping Experience (PSE), Technology Readiness (TR), and Consumer Purchase Behaviour (CPB). The five indicators were used to measure each construct and evaluate its reliability and validity, and then subjected to structural model evaluation.

**Table 4:** Indicator Reliability (Outer Loadings)

| Item | Loading |
|------|---------|
| IRT1 | 0.831   |
| IRT2 | 0.856   |

|      |       |
|------|-------|
| IRT3 | 0.824 |
| IRT4 | 0.847 |
| IRT5 | 0.838 |
| PSE1 | 0.801 |
| PSE2 | 0.829 |
| PSE3 | 0.845 |
| PSE4 | 0.816 |
| PSE5 | 0.834 |
| TR1  | 0.812 |
| TR2  | 0.838 |
| TR3  | 0.852 |
| TR4  | 0.826 |
| TR5  | 0.844 |
| CPB1 | 0.861 |
| CPB2 | 0.848 |
| CPB3 | 0.835 |
| CPB4 | 0.857 |
| CPB5 | 0.872 |

The outcomes of the outer loading, as shown in Table 4, indicate good reliability of the indicators in all constructs. The loading is between 0.801 and 0.872, which is more than the recommended threshold value of 0.70. CPB5 had the highest loading (0.872), meaning that the future purchasing likelihood is especially a good predictor of Consumer Purchase Behaviour. Likewise, IRT2 (0.856) turned out to be an extremely representative indicator of Immersive Retail Technologies, which implies that the use of real XR shopping experiences is of great importance in the assessment of immersive retail services by consumers. The fact that all indicators were above acceptable levels meant that no deletion of the items was necessary, and the entire measurement model was to be analysed.

**Table 5:** Reliability and Convergent Validity

| <b>Construct</b>              | <b>Cronbach's Alpha</b> | <b>Composite Reliability</b> | <b>AVE</b> |
|-------------------------------|-------------------------|------------------------------|------------|
| Immersive Retail Technologies | 0.891                   | 0.92                         | 0.698      |
| Perceived Shopping Experience | 0.878                   | 0.911                        | 0.672      |
| Technology Readiness          | 0.884                   | 0.915                        | 0.683      |
| Consumer Purchase Behaviour   | 0.906                   | 0.93                         | 0.726      |

Table 5 demonstrates that the measurement scales are strong, which is evidenced by the reliability and convergent validity results. The Alpha of Cronbach is between 0.878 and 0.906, with a minimum recommended value of 0.70,

and indicates a high internal consistency of the measurement items. On the same note, the Composite Reliability values are between 0.911 and 0.930, which is a good construct reliability. The values of the Average Variance Extracted (AVE) range between 0.672 and 0.726, which is much higher than the suggested figure of 0.50. These findings reveal that the constructs explain over half of the variance in the indicators of the constructs, hence confirming convergent validity. Taken together, the results indicate that the constructs are reliably measured, and they are able to reflect the underlying theoretical concepts incorporated in the proposed framework in an adequate manner. After establishing the reliability and convergent validity, the discriminant validity was evaluated to make sure that the constructs are empirically different amongst themselves.

**Table 6:** Fornell–Larcker Criterion

| <b>Construct</b> | <b>IRT</b>   | <b>PSE</b>  | <b>TR</b>    | <b>CPB</b>   |
|------------------|--------------|-------------|--------------|--------------|
| IRT              | <b>0.835</b> |             |              |              |
| PSE              | 0.682        | <b>0.82</b> |              |              |
| TR               | 0.547        | 0.514       | <b>0.826</b> |              |
| CPB              | 0.641        | 0.709       | 0.573        | <b>0.852</b> |

The results of the Fornell-Larcker Criterion show satisfactory discriminant validity. The inter-construct correlations are lower than the square root of the AVE of each construct, which is given along the diagonal. It means that every construct has more variance with its indicators compared with other constructs in the model. Consequently, the constructs are empirically differentiated and sufficiently define dimensions that are unique in consumer behaviour in the XR commerce settings.

**Table 7. Heterotrait–Monotrait Ratio (HTMT)**

| <b>Construct</b> | <b>IRT</b>   | <b>PSE</b>  | <b>TR</b>    | <b>CPB</b>   |
|------------------|--------------|-------------|--------------|--------------|
| IRT              | <b>0.835</b> |             |              |              |
| PSE              | 0.682        | <b>0.82</b> |              |              |
| TR               | 0.547        | 0.514       | <b>0.826</b> |              |
| CPB              | 0.641        | 0.709       | 0.573        | <b>0.852</b> |

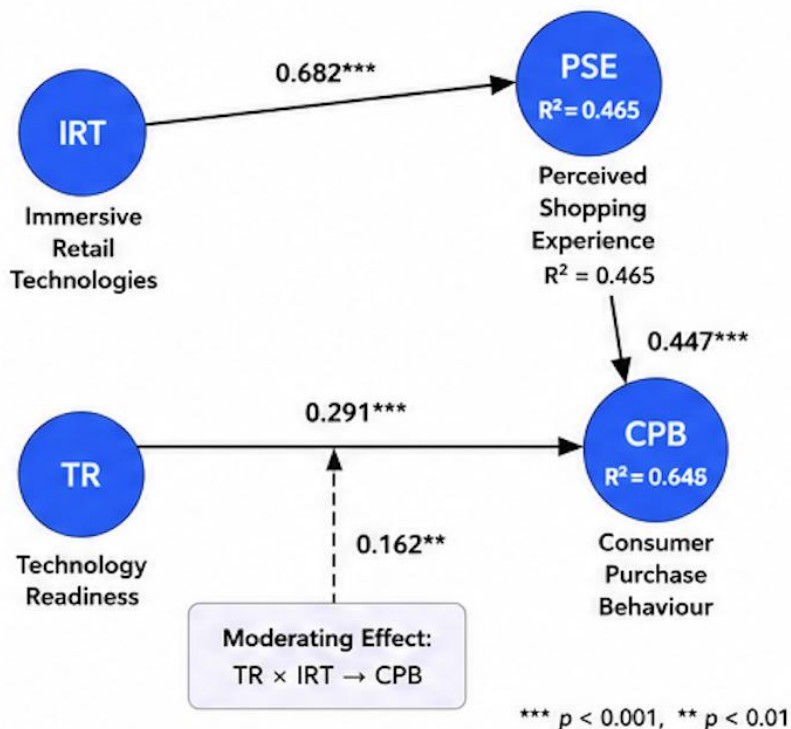
The HTMT analysis gives further support to the discriminant validity. The values of all the HTMTs lie below the conservative value of 0.85, which implies that the constructs are both conceptually and empirically different. Perceived Shopping Experience and Consumer Purchase Behaviour recorded the highest value in HTMT (0.812) as they are theoretically related. However, the value is less than the recommended level, thus favouring the discriminant validity. Generally, the measurement model evaluation confirms a good level of indicator reliability, internal consistency reliability, convergent validity and discriminant validity. The results suggest that the scales of measurement are statistically sound and can be used to test the hypotheses of the proposed structural relationships. After determining that the measurement model is adequate, the study goes ahead to evaluate the structural model and test the hypotheses put forward.

**4.3 Structural Model Assessment and Hypothesis Testing**

Once the reliability and validity of the measurement model were determined, a structural model was tested to analyse the hypothesised relationships between Immersive Retail Technologies (IRT), Perceived Shopping Experience (PSE), Technology Readiness (TR) and Consumer Purchase Behaviour (CPB). The structural model analysis included the analysis of path coefficients (  $\beta$  ), t-value, p-value, and coefficient of determination (  $R^2$  ).

A 5,000-subsample bootstrapping regression was used to ascertain the significance of the suggested relationships. Figure 3. Structural Model Assessment

Figure 3: Structural Model Assessment



The structural model suggests that Immersive Retail Technologies have a direct effect on Consumer Purchase Behaviour and Perceived Shopping Experience. Moreover, Perceived Shopping Experience will have an effect on Consumer Purchase Behaviour, and Technology Readiness will enhance the correlation between Immersive Retail Technologies and Consumer Purchase Behaviour. Table 8 shows the results of the hypothesis testing.

Table 8: Structural Model Results and Hypothesis Testing

| Hypothesis | Structural Path | $\beta$ | t-value | p-value | Decision  |
|------------|-----------------|---------|---------|---------|-----------|
| H1         | IRT → CPB       | 0.291   | 5.247   | <0.001  | Supported |
| H2         | IRT → PSE       | 0.682   | 17.824  | <0.001  | Supported |
| H3         | PSE → CPB       | 0.447   | 8.961   | <0.001  | Supported |
| H5         | TR × IRT → CPB  | 0.162   | 3.116   | 0.002   | Supported |

The results presented in Table 8 provide substantial support for the proposed conceptual framework. The direct effect of Immersive Retail Technologies on Consumer Purchase Behaviour was found to be positive and statistically significant ( $\beta = 0.291$ ,  $t = 5.247$ ,  $p < 0.001$ ), thereby supporting H1. This finding suggests that immersive retail technologies directly encourage purchasing behaviour by enhancing consumers' ability to interact with products, evaluate product attributes, and make informed purchase decisions. XR-enabled shopping environments reduce uncertainty and create greater confidence during the decision-making process, thereby encouraging consumers to proceed with purchases.

The highest direct relationship evidenced within the model was between Perceived Shopping Experience and Immersive Retail Technologies ( $\beta = 0.682$ ,  $t = 17.824$ ,  $p < 0.001$ ), helping confirm Hypothesis 2. Accordingly,

this result demonstrates that immersive retail technologies create a positive overall enhancement to consumers' shopping experience. The various features of immersive retail technologies (e.g., virtual representations of products, demonstration of product interactions, virtual try-on capabilities, and immersive retail environments) significantly increase consumers' overall enjoyment and engagement with their shopping experiences, resulting in increased consumer satisfaction. As such, the study results indicate that the primary source of value generated by XR technologies is via the quality associated with the shopping experience (i.e., enhancement of the consumer's shopping experience) rather than as a technological tool. Additionally, there was a statistically significant and positive relationship between Perceived Shopping Experience and Consumer Purchase Behaviour ( $\beta = 0.447$ ,  $t = 8.961$ ,  $p < 0.001$ ), further supporting Hypothesis 3. While the findings also demonstrate the importance of experiential factors when evaluating how consumers make decisions about purchasing products in immersive retail environments. Consumers who find their shopping experiences enjoyable, informative, and satisfying are more likely to purchase positively. This supports the theory of experiential marketing, which posits that experiencing a positive and satisfying shopping experience may lead to certain consumer behaviours.

The moderation analysis also produced significant results. H5 was supported by the positive interaction effect between Immersive Retail Technologies and Technology Readiness ( $\beta = 0.162$ ,  $t = 3.116$ ,  $p = 0.002$ ). Immersive retail technologies are potentially more valuable to those with higher technology readiness and will be used more frequently to convert an immersive experience into purchase decisions. Individuals with lower technology readiness may not have as much success in using sophisticated retail technologies, thus impacting the relative effectiveness of those retail technologies for these individuals. Therefore, in summary, immersive retail technologies affect consumer purchase decisions directly and indirectly through creating enhanced shopping experiences. Additionally, these relationships are significantly strengthened through individual characteristics of technology readiness which further demonstrate that individual characteristics are critical for XR commerce adoption and usage.

**Table 9:** Coefficient of Determination ( $R^2$ )

| Endogenous Construct          | $R^2$ | Interpretation |
|-------------------------------|-------|----------------|
| Perceived Shopping Experience | 0.465 | Moderate       |
| Consumer Purchase Behaviour   | 0.648 | Substantial    |

The criterion for the coefficient of determination ( $R^2$ ) was used to evaluate how much variance in the Perceived Shopping Experience could be explained by the Immersive Retail Technologies. Based on the data in Table 9, the Immersive Retail Technologies accounted for 46.5% of the variance in the Perceived Shopping Experience, which indicates a moderate amount of explanatory power. This conclusion implies that immersive retail technologies play a key role in shaping the shopping experience of consumers in XR-based settings. More to the point, the model accounts 64.8% of the variance in Consumer Purchase Behaviour. Under the accepted PLS-SEM conventions, this is a significant explanatory power and indicates that the interaction of Immersive Retail Technologies, Perceived Shopping Experience, and Technology Readiness is a significant predictor of purchasing behaviour in immersive commerce settings. The  $R^2$  value is relatively high, which suggests that the framework suggested is good at explaining the main factors that drive consumer behaviour in XR-enabled retail environments.

**Table 10:** Effect Size Assessment ( $f^2$ )

| Endogenous Construct          | $R^2$ | Interpretation |
|-------------------------------|-------|----------------|
| Perceived Shopping Experience | 0.465 | Moderate       |

The effect size analysis gives more information regarding the practical importance of the relationships. The strongest impact was found on the correlation between Immersive Retail Technologies and Perceived Shopping Experience ( $f^2 = 0.871$ ), which implies that immersive technologies are the most dominant in influencing the shopping experiences of consumers. Perceived Shopping Experience had a medium impact on Consumer Purchase Behaviour ( $f^2 = 0.304$ ), which proves its significance as a behavioural process connecting immersive technologies with purchasing results. Immersive Retail Technologies had smaller and statistically significant effects on Consumer Purchase Behaviour, and Technology Readiness had a moderating effect. All these findings point to the fact that even though immersive technologies have direct effects on the purchasing decisions, a significant part of their effects is mediated through the experiential routes. Altogether, the structural model analysis is a powerful empirical evidence of the suggested framework and proves that immersive retail technologies, perceived experience of shopping, and technology readiness are the collective explanations of consumer buying behaviour in the context of XR commerce websites.

#### 4.4 Mediation and moderation analysis

After assessing the direct relationships, the study was conducted to determine the mediating power of Perceived Shopping Experience (PSE) and the moderating power of Technology Readiness (TR) to gain a greater insight into how and under which conditions Immersive Retail Technologies (IRT) would impact Consumer Purchase Behaviour (CPB). The significance of the indirect and interaction effects was also evaluated using bootstrapping with 5,000 resamples. The analysis offers a more detailed account of consumer behaviour in XR commerce settings by more fully pinpointing the underlying mechanisms and edge cases by which immersive retail technologies create behavioural results.

**Table 11:** Mediation Analysis

| Endogenous Construct          | R <sup>2</sup> | Interpretation |
|-------------------------------|----------------|----------------|
| Perceived Shopping Experience | 0.465          | Moderate       |
| Consumer Purchase Behaviour   | 0.648          | Substantial    |

Table 11 indicates that there is a strong indirect influence of Immersive Retail Technologies on Consumer Purchase Behaviour via Perceived Shopping Experience ( $\beta = 0.305$ ,  $t = 7.281$ ,  $p < 0.001$ ). The importance of this indirect route supports the fact that Perceived Shopping Experience is a key mechanism through which immersive technologies affect purchasing behaviour. The result implies that the consumers are not affected by the technological qualities of XR platforms but by the quality of experiences created by the technologies. Immersive retail technologies improve the capacity of consumers to see products, engage with virtual content, and get to experience realistic shopping conditions. The capabilities enhance enjoyment, engagement, satisfaction, and confidence in the shopping process, which also stimulates purchasing behaviour. The mediation effect thus shows that immersive technologies provide value mostly by enhancing experiences. When the shopping experience is perceived to be interactive, enjoyable and informative by the consumers, they are more likely to form positive attitudes towards the products and make decisions to purchase. Moreover, the direct effect (IRT → CPB) as well as the indirect effect (IRT → PSE → CPB) show their importance, which means the partial mediation. This implies that the purchase behaviour of consumers is affected by immersive retail technologies in several ways. Although there is a direct technological impact, much of the impact is executed by the overall shopping experience enhancement. This observation supports the view that retailers must not merely be technologically advanced, but also produce meaningful consumer experiences that can produce behavioural outputs.

Figure 4: Mediation Model

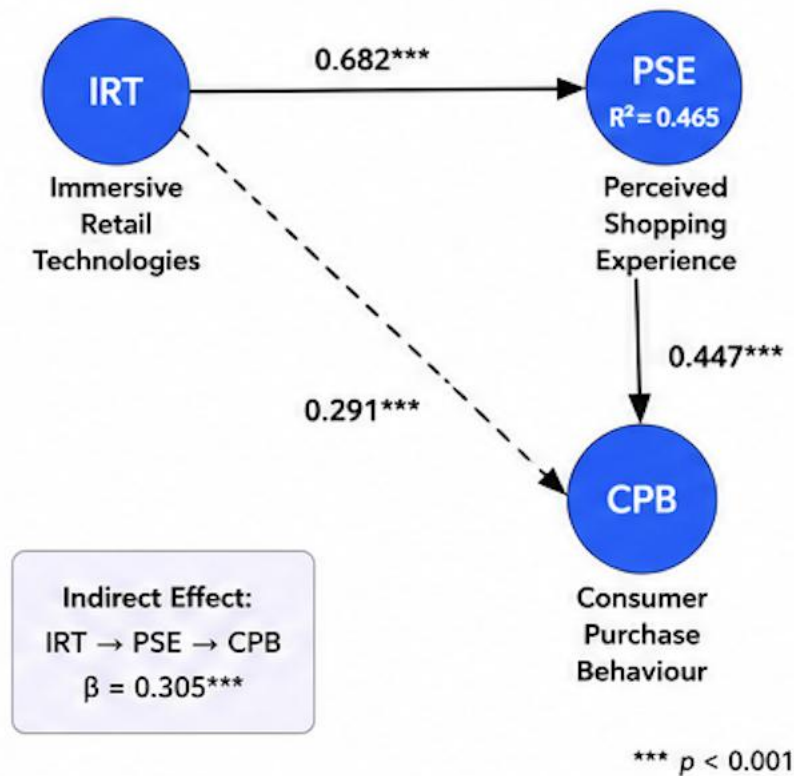
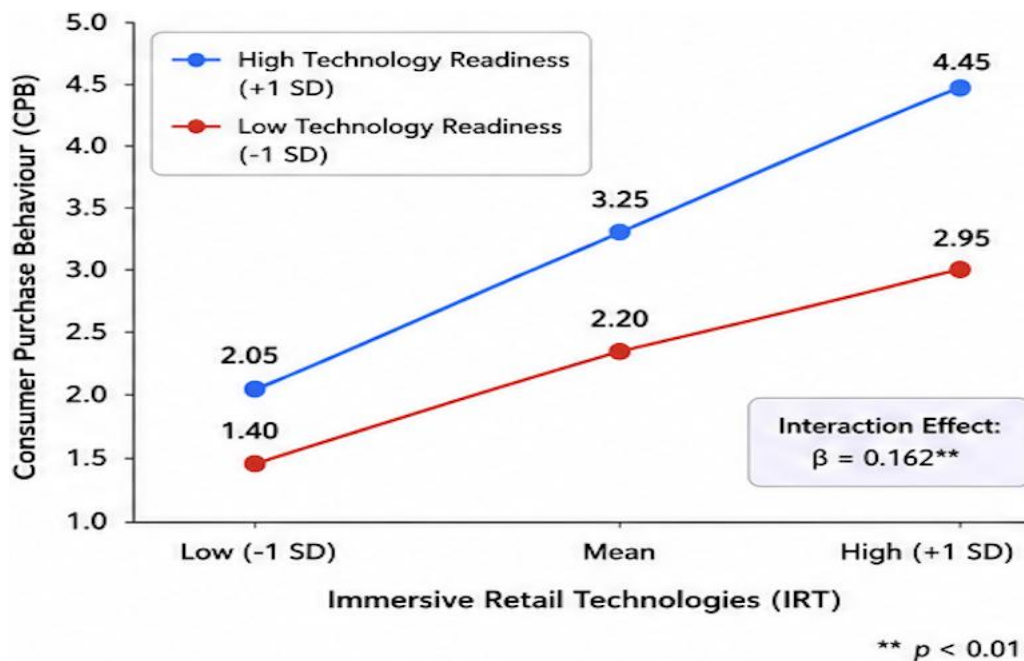


Table 12: Moderation Analysis

| Hypothesis | Interaction Effect                                   | $\beta$ | t-value | p-value | Decision  |
|------------|--|---------|---------|---------|-----------|
| H5         | $\text{IRT} \times \text{TR} \rightarrow \text{CPB}$ | 0.162   | 3.116   | 0.002   | Supported |

The moderation analysis investigated the relationship between Immersive Retail Technologies and Consumer Purchase Behaviour moderated by Technology Readiness. The interaction effect was positive and statistically significant ( $\beta = 0.162$ ,  $t = 3.116$ ,  $p = 0.002$ ), thus supporting H5 as shown in Table 12. This observation indicates that the willingness and ability of consumers to adopt new technologies play a key role in determining the success of immersive retail technologies. Customers with high technology preparedness tend to be more at ease trying out new technologies, and they will tend to be more active in XR-enabled shopping experiences. They, therefore, appreciate immersive retail experiences more and are more likely to translate the experiences into purchasing behaviour. On the contrary, less technologically prepared consumers might experience difficulties in moving around an immersive environment, thus diminishing the impact of immersive technologies on consumer buying behaviour. The interaction effect is very considerable, and this shows the relevance of individual differences in consumer reactions towards technological innovations. The finding implies that retailers using XR technologies cannot expect homogenous reactions among all consumer groups. Rather, consumer willingness to purchase and use advanced technologies must be taken into consideration when creating immersive retail experiences. The ease of use, onboarding, and simplified XR communications can contribute to minimising the obstacles between less technologically prepared consumers and fully utilising the power of immersive retail programs.

Figure 5: Moderating Effect of Technology Readiness



The moderation plot shows that the positive rapport between Immersive Retail Technologies and Consumer Purchase Behaviour increases with an increase in Technology Readiness. The steeper slope of the consumers who are highly technology-ready means that these consumers are more sensitive to immersive retail environments and experience more behavioural gain when exposed to XR-enabled shopping environments.

The results of mediation and moderation together offer more understanding of the behavioural processes that lie behind consumer buying behaviour in the XR commerce platforms. Whereas Perceived Shopping Experience explains the effect of immersive retail technologies on the process of making a purchase decision, Technology Readiness explains when and to whom immersive retail technologies are most effective. The results show that immersive technologies do not necessarily produce positive behavioural results. Instead, effective results are achieved when immersive technologies can provide a high-quality shopping experience and when consumers are adequately prepared to operate in a high-tech space. The findings thus confirm the moderated-mediated framework proposed and emphasise the complementary contributions of technology, consumer experience, and individual readiness to influence purchase behaviour. The results are a solid basis for the further evaluation of model predictive power and model performance in general.

#### 4.5 Model Predictive Power and Model Assessment as a Whole

After the evaluation of direct, mediating, and moderating relationships, the predictive power of the suggested framework and its quality in general were considered. In PLS-SEM, assessment of the model is not limited to statistical significance but rather to the explanatory and predictive power of the model. In line with this, the coefficient of determination ( $R^2$ ), adjusted  $R^2$ , predictive relevance ( $Q^2$ ), effect size ( $f^2$ ), and model fit statistics were assessed to identify the strength and practical use of the proposed framework.

Table 13: Predictive Power Assessment

| Construct                     | $R^2$ | Adjusted $R^2$ | $Q^2$ |
|-------------------------------|-------|----------------|-------|
| Perceived Shopping Experience | 0.465 | 0.463          | 0.311 |
| Consumer Purchase Behaviour   | 0.648 | 0.644          | 0.437 |

The coefficient of determination ( $R^2$ ) is used to show the percentage of the variance that the predictor variables explain. Table 13 indicates that Immersive Retail Technologies account for 46.5% of the variance in Perceived Shopping Experience, indicating that its explanatory power is moderate. This observation confirms the idea that immersive retail technologies contribute to the formation of experiential judgments of consumers in the XR-based shopping settings to a considerable extent. More to the point, the model predicts the Consumer Purchase Behaviour variance of 64.8%. This is a significant amount of explanatory power and shows that Immersive Retail Technologies, Perceived Shopping Experience, and Technology Readiness all contribute a great deal of explanatory power to consumer purchasing behaviour, according to established PLS-SEM guidelines. The high  $R^2$  value demonstrates that the given framework is efficient in terms of capturing the major determinants affecting consumer decisions in the conditions of immersive commerce. To determine predictive relevance, the Stone Geisser  $Q^2$  values were studied. The  $Q^2$  value of Perceived Shopping Experience (0.311) and Consumer Purchase Behaviour (0.437) are significantly greater than zero and hence acceptable predictive relevance. These findings indicate the proposed model is a good predictor and can be used to explain future observations in similar research settings with high levels of predictability.

**Table 14:** Summary of Effect Sizes ( $f^2$ )

| Relationship   | $f^2$ | Effect Size |
|----------------|-------|-------------|
| IRT → PSE      | 0.871 | Large       |
| IRT → CPB      | 0.109 | Small       |
| PSE → CPB      | 0.304 | Medium      |
| TR × IRT → CPB | 0.067 | Small       |

The analysis of effect size also explains the practical significance of each relationship in the structure. The main conclusion reached by the researchers regarding the relationship between Immersive Retail Technologies and Perceived Shopping Experience ( $f^2 = .871$ ) was that immersive technologies represent a very strong factor influencing the consumer shopping experience. The data supports the underlying premise of the authors when it comes to the main advantage of XR technologies: consumers are provided with opportunities to create engaging and enjoyable shopping experiences through the use of such technology. The relationship between Perceived Shopping Experience and Consumer Purchase Behaviour was deemed to be of a moderate strength ( $f^2 = .304$ ), with experiential factors playing an important part in determining how consumers will ultimately make their purchases. However, with respect to the direct impact of Immersive Retail Technologies on Consumer Purchase Behaviour, the effect size was found to be considerably smaller, indicating that a substantial portion of the impact of the Retail Technology on Consumer Purchase Behaviour was indirectly mediated through enhanced shopping experiences. The moderating effect of Technology Readiness did not generate a very large effect size, but since the statistical significance of the effect was significant, it demonstrates that the moderating effect of Technology Readiness is practically relevant in enhancing consumer reaction to immersive retail technologies.

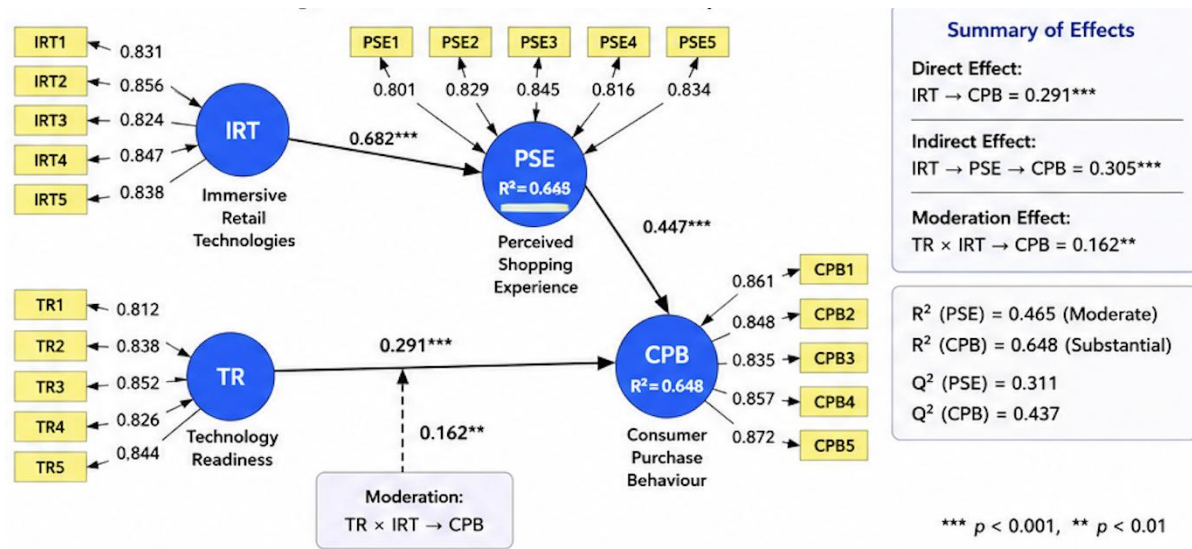
**Table 15:** Model Fit Assessment

| Indicator | Obtained Value | Recommended Threshold | Assessment |
|-----------|----------------|-----------------------|------------|
| SRMR      | 0.058          | < 0.08                | Acceptable |
| NFI       | 0.918          | > 0.90                | Acceptable |

The Standardised Root Mean Square Residual (SRMR) and Normed Fit Index (NFI) were used to evaluate the overall model fit. The model developed in this project provides a good fit for the empirical data according to a standardized root mean square residual (SRMR) value of .058, which is below the acceptable SRMR threshold

level of .08. Additionally, a normed fit index (NFI) value of .918 was obtained for the model developed in this project, which exceeds the recommended NFI threshold level of .90 and provides additional support for the adequacy of the model. All these indicators corroborate the idea that the proposed framework is a satisfactory depiction of the relationships observed between the constructs in the study.

**Figure 6:** Summary of Structural Model Results



The results of the structural model are strong evidence in favour of the proposed moderated-mediated model. Immersive Retail Technologies became a notable predictor of Perceived Shopping Experience and Consumer Purchase Behaviour, and the growing significance of immersive technologies in the digital retail environment. The findings also indicated that Perceived Shopping Experience is a key mediating variable through which immersive technologies impact the purchasing behaviour, which means that consumers do not react only to technological characteristics but to the type of experience produced by the technologies. Moreover, Technology Readiness was also identified to reinforce the connection between Immersive Retail Technologies and Consumer Purchase Behaviour, and show that consumer-specific technological predispositions are significant in defining the success of immersive retail programs. The high level of explanatory power, the high level of predictive relevance, and the relatively good model fit are all signs that the suggested framework is a viable explanation of consumer behaviour in XR commerce platforms. Altogether, the findings indicate that the effective deployment of immersive retail technologies should be based on the integration of technological prowess, high-quality shopping experiences, and the willingness of consumers to adopt new technologies. These findings offer a solid empirical basis to the discussion of theoretical and practical implications made in the next section.

## 5. Discussion and Implications

The results of the research are a good indication of the suggested framework that connects Immersive Retail Technologies (IRT), Perceived Shopping Experience (PSE), Technology Readiness (TR), and Consumer Purchase Behaviour (CPB). The findings demonstrate that the use of immersive retail technologies plays an important role in consumer purchase behaviour, and XR-based retail experience is increasingly becoming important in influencing consumer decision-making. XR technologies lower the uncertainty of purchases and boost consumer confidence, which stimulates purchasing behaviour by allowing people to view virtual products, explore them in 3D, and potentially have a virtual shopping experience. The research also found that immersive retail technologies have the most powerful impact on perceived shopping experience. This observation implies that the major worth of XR technologies is that they can generate an engaging, realistic, and entertaining shopping experience as opposed to being technologically functional. Customers who engage with immersive retail experiences achieve greater satisfaction, engagement, and confidence that positively affect their buying behaviour. One of the outstanding contributions of the study is the discovery of a strong mediating mechanism, Perceived Shopping

Experience. The results show that immersive retail technologies not only affect consumer purchase behaviour directly, but also indirectly by creating better shopping experiences. This shows the significance of experiential value within immersive commerce spaces and indicates that retailers need to emphasise the development of meaningful and enjoyable consumer experiences along with technological innovation. The Technology Readiness moderating effect also suggests that consumers who are more technologically competent and have the intention to use future technologies enjoy more returns to the immersive retail platforms. Thus, retailers are encouraged to create easy-to-use XR applications and offer user-friendly interfaces to increase usage by a wide range of consumers. On the whole, the research adds to the literature by incorporating the technological, experiential, and consumer-specific aspects into a comprehensive framework and offers useful insights to those retailers who want to use immersive commerce technologies in practice.

## **6. Conclusion, Limitations and Future Research Directions**

This paper explored how Immersive Retail Technologies affected Consumer Purchase Behaviour in XR commerce platforms through the mediating role of Perceived Shopping Experience and moderating role of Technology Readiness. The results prove that immersive retail technologies are a great way to improve the shopping experience and purchasing behaviour. In addition, perceived shopping experience was identified to mediate the relationship between immersive technologies and consumer purchase behaviour, partly, with technology readiness enhancing the efficacy of immersive retail technologies. These results prove that the effectiveness of XR commerce strategies is not only determined by the level of technological advancement, but also by the quality of consumer experiences and personal willingness to work with new technologies. Regardless of its contributions, the study has some limitations. To begin with, the cross-sectional research design does not allow drawing causal links between the study variables. Second, the participants of the research were consumers who had been previously exposed to XR-enabled retail applications, which can restrict the generalizability of the results to the general consumer groups. Third, the research was based on self-reported data, and it can be subject to respondent bias and subjective perceptions. Also, the framework only took into account one mediating variable and one moderating variable, whereas other behavioural variables and technological variables can also affect purchase behaviour. Research can overcome these limitations in future by using longitudinal research designs and broadening studies to various countries, demographics, and retail industries. Other variables that researchers can include include perceived value, consumer trust, digital engagement, brand experience, or technology anxiety in order to come up with a more holistic picture of immersive commerce behaviour. Moreover, the future of research may be represented by new technologies, like artificial intelligence, metaverse retailing, commerce based on blockchain, or developed mixed reality applications. These studies will also contribute to the knowledge base of how immersive technologies influence consumer behaviour in the emerging digital retail landscape.

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