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Analyzing the **Virtual Reality Experiential Dimensions** at the Game Centers of **Tourist Destinations**

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Abstract | Virtual Reality (VR) games have attracted the attention of customers lately since they have been offering the most immersive experience through amusement park rides such as VR roller coasters and VR games related to adventure, thrill, scare, etc. Bangalore being a gem of the tourist destination and an IT hub was chosen for the study as it has the greatest potential of offering various VR experiences to the customers. The top 6 of Bangalore's VR game centers were selected based on the popularity and review count from Trip Advisor and Google reviews websites. Analyzing user-generated content has become an intriguing part of business research to find valuable marketing insights for better decision-making. The empirical findings show that the majority of the customers are extremely satisfied with the VR experiences and illusion emerges to be the major influencing factors for experiential satisfaction and customers are ready to spend for VR when the VR experiential dimensions meet the expected standards.

Keywords | Virtual reality, sentiment analysis, VR games, customer satisfaction, VR experience

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1. Introduction

Technologies like Augmented Reality (AR) and Virtual Reality (VR) have created a unique immersive experience for customers through Augmented games, VR games, VR rides, VR tours, VR amusement park rides, etc (Balakrishnan et al., 2024; Burt & Louw, 2019; Camps-Ortueta et al., 2021). Different visualization environments such as pure real presence, augmented reality, augmented virtuality, and pure virtual presence (Wang et al., 2018) are created by different combinations of virtual and real constructs. Experience is one of the key elements that entice the entertainment industries' (gaming, tourism, etc.) customers whereas technology plays a significant part in uplifting these experiences to the horizon (Vynogradova, 2014). Virtual Reality (VR) is one of the leading immersive technologies and provides a plethora of benefits in marketing, education, adventure, attractions, tours, conservation, awareness, promotions, gamification, etc (Daline & Thomas, 2024). Virtual Reality emerged as a powerful tool in marketing and attracted potential customers through effective communication and immersive experience (Beck & Egger, 2018).VR technologies that stimulate immersive experiences belong to pure virtual presence and they are quite popular in the gaming and tourism industries (Beck et al., 2019 & Tussyadiah et al., 2018). The dimensions of VR experiences are classified into four namely presence, content, component, and factors (Goodwin, 2019; Park & Ko, 2022; Trabelsi-Zoghlami & Touzani, 2019; Wu et al., 2020).

VR technologies are used in the tourism industry to create an immersive VR experience and these experiences are categorized into various dimensions such as basic virtual reality, 360-degree photos, videos, and interactive and haptic VR (Goodwin, 2019). Virtual Reality has been used in the tourism industry to create and enhance the immersive tourism experience (Beck et al., 2019; Fan et al., 2022). European and Asian researchers are showing interest in the adoption of new digital technologies such as Virtual Reality integrated into the tourism industry (Cifuentes-Correa, 2023). Immersive technologies such as Augmented Reality and Virtual Reality are identified to be the most incorporated technologies in the tourism industry for promoting cultural tourism, heritage tourism, tourist destinations, etc (Quiroz-Fabra, 2023).

Virtual Reality plays a pivotal role in tourism promotions by elevating the image of a destination (Sousa et al., 2022). The impactful information and immersive environments simulated through Virtual Reality are the prime drivers of successful tourism destinations and products (Çeltek, 2021). Virtual game rides such as 5D rides at amusement parks, gaming centers, sensory activities at museums, gloves to feel the roller coaster simulator, etc., are used to bridge the gap between real and virtual experiences (Stainton, 2020). Virtual reality is considered to be more suitable for game applications as its immersiveness enables an emotional connection between the user and the virtual environment (Raut, 2018). A game player's behavior intention is dependent on the sense of realness. Technology plays a significant part in reinforcing the relationship between realness and the player's attitude towards the game. When the technology creates a realistic environment, it indirectly bolsters the player's willingness to play and stay back in the game (Wu & Hsu, 2018). In Figure 1, Virtual reality sees a positive rise from 2014 to 2024

Figure 1 | VR gaming revenue projections
Source: VR Gaming Revenue Projections from Zippia (https://www.zippia.com)

which represents the user's willingness to spend for this immersive technology (Jovanovic, 2022) and it is expected to reach a $26.9 billion market share in 2027 (Kolmar, 2022). The future of VR gaming sees positive growth in the Asia-Pacific regions such as India, Indonesia, China, and South Korea (Market Research Report, 2022).

1.1. Statement of the problem

Virtual Reality has provided many benefits to the tourism industry and continues to evolve in the areas of accessibility, education, entertainment, heritage preservation, management, and marketing (Guttentag, 2010). VR marketing is one of the major applications of VR as it bestows various sustainable outcomes (Hudson et al., 2016). VR has been used in various types of tourism promotions such as destination marketing, purchase decisions, travel intentions, etc (Sousa et al., 2022). VR games are found to be an effective marketing tool for promotions, leveraging brand image, information sharing, etc as they promote through the pleasure of the games. (Çeltek, 2021). Pleasure or satisfaction is the key term for successful promotions therefore, it is important to analyze the satisfaction achieved through VR gaming experience. The research problem lies with the effectiveness of VR in providing a satisfactory game experience to customers. Henceforth, it is important to analyze the VR experience of the games and how they influence customer satisfaction.

1.2. Theoretical Background

The cognitive theory of presence defines the human sense of realism or realistic environment when stimulated through media or technologies (Lee, 2004; Schubert, 2009). VR systems are defined by immersion and presence and the concept of presence evolved from interactive media telepresence (Minsky, 1980) to virtual presence generated by VR systems (Sheridan, 1992). The Uses and Gratification (U&G) theory states that individuals use media to satisfy their psychological needs and wants (Katz et al., 1974; Weibull, 1985) along with various gratification needs. The gratification needs like challenge, escapism, entertainment, and fantasy (Jin, 2014) are related to social network-related games while interaction, enjoyment, and achievement are associated with online games (Wu et al., 2010). The theory categorized the various social and psychological gratifications based on different types of games and different types of media used for simulation. Equity Theory on customer satisfaction needs to maintain a balance between expectation and real experience (Yüksel & Yüksel, 2008). A positive customer experience or positive customer satisfaction would be achieved based on the level of consistency enabled between the expected experience and the experience in the present (Yüksel & Yüksel, 2008). Analyzing Virtual Reality experiential dimensions to satisfy the customers is a significant problem in the VR promotions and it can be evaluated using Equity Theory on Customer satisfaction.

2. Literature Review

2.1. VR experience

The VR experience has cognitive and emotional aspects (Storgards et al., 2009; Storgards, 2011; Lin et al., 2012; Chang et al., 2014) and the best VR experience could be based on the equilibrium state of two paradoxical visions such as virtual experience reflection and freedom (Paez, 2012).

VR experiential outcomes depend on the various dimensions of VR experiences, consumption, sense of feeling, emotional attachment, technology friendliness, and sense of thinking during the VR experiences (Singh, 2018). The VR experiential outcomes can be measured based on the following

three factors such as VR experiential satisfaction, VR experiential loyalty, and VR experiential advocacy (Singh, 2018). VR experiential satisfaction is closely associated with the user's perception of VR experience and they can be positive or negative (Kao et al., 2008) based on previous VR experiences, various dimensions of VR experiences, perception, and VR content (Singh, 2018).

ReverseCAVE is a more engaging visualization method than VR content as it proves to be more effective in the aspects of content sharing and visualization. VR content could be shared only with the VR user whereas ReverseCAVE could be shared to a public audience. VR content appeals only to the active user while the ReverseCAVE appeals and engages the spectators into active participants. Precision, degree of attention, attractive features, enjoyment features, and sharing flexibility are found to be more effective and prominent in ReverseCAVE than in VR content methods (Ishii et al., 2019).

2.2. Dimensions of VR experience based on components

Dimensions of virtual reality experiences can be classified based on components such as utilitarian, hedonic, psychological, and social dimensions (Trabelsi-Zoghlami & Touzani, 2019). These dimensions can change the customer perception and consumption of the products and services offered. The projection is a significant element of the virtual experience as it helps in identifying the virtual characters, seeking excitement and facing challenges within the virtual environment (Trabelsi-Zoghlami & Touzani, 2019).

The utilitarian dimension focuses on the aspects of benefitting the consumers, acquisition, and exchange of information, knowledge sharing, and enrichment (Childers et al., 2002; Prebensen & Rosengren, 2016) while the hedonic dimension focuses on pleasure and entertainment aspects of the VR experience (Rejman et al., 2022; Wu & Holsapple, 2014). Pleasure is an important aspect of VR experiences and this could be achieved through various multi-sensory devices, a multitude of activities, and the aesthetics of VR content (Thuillier, 2011; Kinsella, 2000). The hedonic sense can be influenced by activities such as narration, inclusion of images, content, etc, and also by subjective operations experienced by consumers while interacting with such activities (Carù & Cova, 2003). The aesthetics dimension is associated with imagination during VR experiences (Pelletier, 2005).

Immersion and psychological dimensions are closely related to each other and when it becomes stronger, the user can control their actions, and time as the immersive experience makes no distinction between past, present, and future. In an immersed state an individual will not be affected by external stimuli and be aware of things happening around them leading to losing time faster than usual (Trabelsi-Zoghlami & Touzani, 2019). The psychological dimension is also associated with escapism which is a component of immersion (Fornerino et al.,2006) by indulging in games or entertainment (Calleja, 2010). Escapism helps people to detach from their painful and arduous lives and find happiness in virtual ones (Reading & Jenkins, 2015; Zarantonello & Luomala, 2011).

The social dimension is related to the examination of temporal change (Yaremych & Persky, 2019) and interactivity (Grumbach, 2007) with the virtual environment and interaction with others during the VR experience (Caroux, 2023; Zheng et al., 2017). This dimension deals with the interaction aspect as it leads to a social connection with others. The interaction is found to be more rewarding and satisfying when the experiences are shared (Filser, 2002).

The environmental presence and virtual reality experience could be enhanced by bare control movements (without gadgets) and the inclusion of another player in the virtual world. Immersion, one of the dimensions of the VR experience, is

closely associated with a stronger feel of presence and could be increased by participating in the environment and realistic gesture interaction of the player (Filser, 2022; Loyer, 2015). Virtual immersion could be facilitated by a range of technologies such as immersive viewers, augmented reality, holographic applications, and multi-projection systems (Pietroni et al, 2018) which provides customers a unique virtual experience with its own distinct immersion level and perceptive levels. Head Mounted Displays (HMD) stands ahead of other technologies as it provide a full-body experience such as 360-degree sight, speech recognition, hearing, head, hand & eye tracking and body gestures (Hertel et al., 2021).

Interaction, another dimension of VR experience is also influenced by the presence of additional players and visual representations of the player (Holopainen and Waern, 2009). These features make the interaction more likely closer to natural settings, empower their sense of presence, and more emotional connect, and instigate an engaging experience in the players (Georgiadis & Yousefi, 2017). Using hand gesture interactions to interact or contact in the virtual environment other than gadgets is proven to be the most effective feature for a realistic virtual reality experience (Park & Ko, 2022).

2.3. Dimensions of VR experience based on presence

Multiple dimensions of presence through virtual or augmented reality construct a sense of realness through spatial, content, temporal, and social presences. These four dimensions of presence tend to stimulate intense game experiences and have a strong influence on game performance, game enjoyment, and behavioral intention. They influence the intention to play similar games as it improves the game's performance and enjoyment (Park & Ko, 2022).

Presence marks the feeling associated with the virtual world (Felton & Jackson, 2022) and classifies the dimensions of VR experiences into spatial, content, temporal, and social. Spatial presence refers to the state of accepting the virtual environment, interacting with the object associated with the VR environment (Caroux, 2023), and perceiving maximum possibilities of action (Hartmann et al., 2015). Spatial presence involves two cognitive stages. The user constructs the mental image of space then tests the environment and finally accepts the virtual environment (Wirth et al., 2007). Content presence describes the level of degree to which a medium can stimulate the replica of objects, things, and people similar to the real environment (Lombard & Ditton, 1997) It is also defined as the perceived richness, vividness, clarity (Stavropoulos et al., 2013), and interactive objects in the physical environment. Temporal presence can be defined as the time spent in the virtual environment away from the real environment (Agarwal & Karahanna, 2000). It also refers to the absorption in virtual time rather than real-time (Carmigniani & Furht, 2011; Sherry, 2004). Social presence can be defined as the feeling of being connected or coexistence with others (Caroux, 2023; Venkatesh et al., 2012). It enables a sense of feeling to be surrounded by other people and removes the feeling of isolation (Kahai, 2009; Lampe et al., 2007).

2.4. Dimensions of VR experience factors

The dimensions of virtual reality experiences include factors such as immersion, interaction, usability, and illusion (Perez-Marcos, 2018). Immersion refers to the degree of involvement in the virtual environment by being completely indulged in the virtual space, forgetting the time in the real world (Jin et al, 2015). The immersion factor is most likely to be related to virtual reality experiences (Perez-Macos, 2018) and emerged as one of the prominent components of customer expe-

rience (Vynogradova,2014). Immersion is closely linked with presence and engagement (Nilsson et al., 2016). Visual exploration leads to interaction while this feature is limited in the virtual environment as the users will be completely immersed rather than exploring the virtual world (Strickland, 2019). Usability is closely associated with the efficiency, effectiveness, and user-friendliness of virtual reality (Diels et al., 2017). It defines the level of easiness in handling virtual reality gadgets and using the technology. It is the software's capability to be easily learned and used by the user in specific scenarios (Costabile, 2001). Illusion is defined as the misinterpretation of sensory experience in the virtual environment. It is perceptual and not a cognitive one (Slater, 2018). The user senses or imagines things concerning the environment, objects, space, and the self (Perez-Marcos, 2018). The objects, and characters perceived in the virtual world create a fascination that they are associated with the real world and have similarities with real life thus leading to the illusion of reality (Slater & Sanchez-Vives, 2022).

2.5. VR Experiential Dimensions-Literature Map

The literature map (Figure 2) was constructed by the author by combining the various classifications of VR experiential dimensions. These dimensions are classified into four categories namely presence, components, content, and factors (Goodwin, 2019; Park & Ko, 2022; Perez-Marcos, 2018; Trabelsi-Zoghlami & Touzani, 2019) Based on content, the VR experiential dimensions are further classified into 360 photos, 360 video emulation, 360 videos, directional movement, interactive VR, and haptic landscape, while the VR experiential dimensions are categorized into four based on presence such as content, spatial, temporal, and social. VR experiential dimensions are divided into components such as social, psychological, hedonic, and utilitarian. VR experiential dimensions factors are also categorized into immersion, illusion, interactivity, and usability.

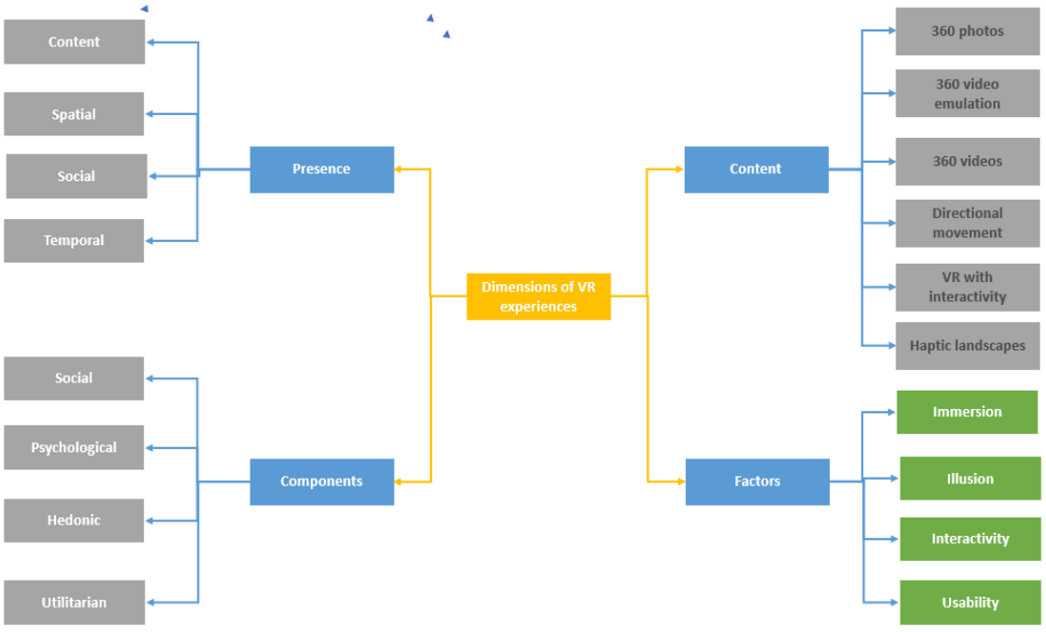

Figure 2 | Literature Map by Author

Previous literature works listed the frequency of VR dimensions (Daline & Thomas, 2024; Park & Ko, 2022; Perez-Marcos, 2018; Trabelsi-Zoghlami & Touzani, 2019; Wu et al., 2020) and based on that, (Figure 3) gives the idea that the VR experiential dimensions such as social and psychological have been discussed the most in the last 4 decades by 27 percent and 20.6 percent compared to other dimensions. Hedonic dimension has been discussed by various researchers of 11.1 percent followed by immersion, spatial, content, and temporal dimensions contributing equally to 6.3 percent in the past works of literature. Interactivity and Utilitarian have shared 4.8 percent each followed by usability and illusion at 3.2 percent respectively.

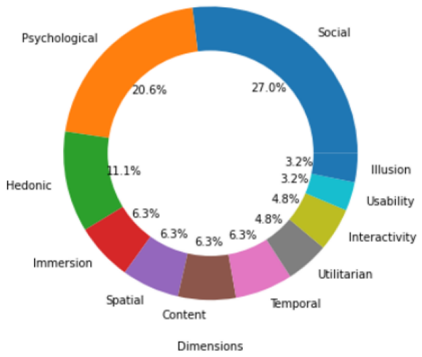

Figure 3 | Pie chart for dimensions

2.6. Research Gap

The study explored the various VR experiential dimensions outlining the dimension classifications and the volume of research covered on them over the last 4 decades. Research on dimensions of presence has been discussed many times in the last 20 years (Caroux et al., 2015) while fewer studies have been marked on the dimensions of factors (Immersion, Illusion, Interactivity, and Usability). This research gap is fulfilled by identifying an influential relationship between VR experiential dimensions and VR experiential outcomes.

A large number of researchers emerged on the metaverse (merging physical and virtual worlds through Virtual Reality, Augmented Reality, Extended Realities, etc) focused on applications, concepts, challenges, issues, innovations, opportunities, etc (Dhelim et al, 2022; Kye et al, 2021; Duan et al, 2021; Mozumder et al, 2022). Various pieces of literature, reviews, surveys, and state of art related to games were contributed in the past concerning engagement (Boyle et al., 2012), entertainment (Díaz et al., 2022), customization (Karpinskyj et al., 2014), game accessibility, interfaces (Marshall et al., 2013), game adaptation (Bontchev, 2016), emotions (De Byl, 2015), etc. However, the relationship between VR dimensions and experiential satisfaction was not explored enough in the gaming industry. Therefore, the study analyzes the experiential satisfaction at VR game centers and the other dimensions associated with it such as preference levels of VR games, experiential dimensions, and VR game centers.

A good number of studies were conducted on analyzing various applications of VR in tourism promotions such as destination marketing, decision-making, purchase decisions, motivation to visit destinations, etc (Sousa et al., 2022). However, tourism promotions through the influence of VR games emerged as a new concept and minimal studies have been done so far. Therefore this study focuses on analyzing the VR experiences provided at the VR game centers of tourism destinations and how they can influence the satisfaction of the customers. Sentiment Analysis methods and Support Vector Machine Models are implemented in this study to identify the satisfaction level of VR experiences and classify the most influential VR dimensional factors responsible for customer satisfaction.

3. Research Methodology

The information technology industry of India has its prime locations in Bangalore, Chennai, Delhi NCR, Hyderabad, Kolkata, Mumbai, and Pune

(De-Bengalurued, 2023). Therefore, it is significant to analyze the potential of immersive technologies in those IT cities. Bangalore has topped the list in terms of the highest number of active VR game companies in India compared to the other tech cities (Top Gaming Virtual Reality Companies, n.d.). This elucidates the reason for choosing VR game centers in Bangalore to study the experiential satisfaction among visitors. Bangalore City, the capital of Karnataka serves to be the center of India's high-tech industry, is listed among the top 30 smartest cities in the world (Sharma, 2024), and is one of the most preferred tourist destinations in India. Bangalore is the Silicon Valley of India and almost 80 percent of the giant IT players have their hub in Bangalore (Sharma, 2024). The city ranks fourth position in welcoming both domestic and international tourists during 2021 contributing 12 percent share (81333659 tourists) and 6.87 percent share (72487 tourists) of the total Indian tourists. (India Tourism Statistics, 2022). This city indeed provides a huge opportunity for technology advancement, innovations, and research in growing technologies. Thus the study has finalized Bangalore as the scope of the study due to its technological developments toward VR game companies and serving as one of the popular tourist destinations of India.

TripAdvisor is a travel review website that assists global travelers in planning their trips by rating hotels, attractions, and restaurants around the world and providing billions of user-generated contents. TripAdvisor is considered for the study as it is identified to be a prominent website for travel recommendations (Gretzel & Yoo 2008) and a significant information source for travel planning (Chung & Buhalis, 2008). Furthermore, previous studies have identified that TripAdvisor is reliable and unbiased in terms of inter-reviewer and intra-reviewer reliability (Chua & Banerjee 2013) and Google reviews are trusted by customers in making decisions and measuring the quality of service. (Lee & Yu, 2018). Data collection involves scraping user-generated content from the websites, cleaning the raw data and designing the AI models (Zhang et al., 2022).

Step 1: Data Scraping

The VR game websites were identified from Trip advisor by inputting keyword searches such as VR rides, VR games, VR arcades, and VR game centers. The search produced 1044 results and data were scrapped from these websites using Octoparse from 2017 to 2022 due to the availability of data during that period. Octoparse is a software and web scraping tool used to extract data from websites seamlessly (Eg: Trip Advisor). It is an automated coding software that scrapes the web content automatically in which the user does not require any coding knowledge (Ahamad et al., 2017). The scraped data will be collected, and sorted to form a proper database. Therefore, a dataset with 12967 rows was created through the Octoparse software.

Step 2: Data Cleaning

The unwanted, irrelevant data and noise were eliminated using the stemming process. Thus the processed dataset (D1) was reduced to 10569 after data cleaning and data pre-processing methods. Then sentiment analysis of reviews is manually designed with the help of domain experts and programming experts.

Step 3: AI Model Designing

With the help of programming experts, an AI model was designed to predict the sentiment of text. The preprocessed dataset (D1) is fed into this machine learning model to predict the sentiment analysis of 10569 by categorizing them into either positive or negative. The predicted output is downloaded in which 70 percent of data (7398 entries) (D2) was fed into the machine learning models to train the Artificial Intelligence and the other 30 percent (3171 entries) were saved to test the data resulting in a testing dataset (D3).

Step 4: Input Dataset Designing

The VR gaming centers in the city of Bangalore have been identified with the help of Google Search and Trip Advisor. The result produced 20 outputs which were then shortlisted to 6 based on the availability of (at least 20 reviews) an appropriate number of reviews and popularity (rating star above 4) The reviews are then scraped from VR Galaxy (150), VR Voyage (115), Gravity VR (26), VR Room (190), Freakout Gaming Zone (440) and The Grid (670). A total of 1591 user-generated content was scrapped initially through Octoparse with the following inputs of Name, Gender, Year, Month, Average Star Rating, Gaming centers, Review frequency, VR games, and Reviews and finally reduced to 1265 after data cleaning and data preprocessing processes. The experience levels such as best, better, good, bad, and worst were then label encoded to obtain a Review rating. Best was label encoded as 5, better by 4, good by 3, bad by 2 and worst by 1.

Dimensions such as immersion, illusion, interactivity, usability, and price and experience levels such as best, better, good, bad, worst were predicted manually based on a range of keywords. The keywords such as best, exciting, fantastic, marvelous, wow, super, thrilling, awesome, terrific, spectacular, brilliant, fantastic, entertaining, mind-blowing, great, and amazing are categorized as "Best" while keywords as worth, enjoy, reasonable price, happy, like, low price, lovely, cool, affordable are labeled as "Better" and some keywords like nice, okay, fun, good, helpful are considered as "Good". On the other hand, keywords such as not good, not worth, bad, poor, outdated, and need updation are grouped as "Bad" and words such as worst experience, worst place, not worthy of money, waste of time, not exciting, very disappointed, overpriced, pathetic, ridiculous, horrible, waste, sucks are classified as "Worst" (Daline & Thomas, 2024).

Concerning dimensions, terms such as overpriced, worth for money, reasonable, affordable, low price, money, ticket, amount, and cheap are classified under "Price" and terms such as best experience, different world, too good, imagination, virtual world are classified as "Illusion" and words such as "equipment, gadget, place, audio, visuals, clarity, HD, headset, usage, technology are grouped as usability whereas immersive experience, mesmerizing, alluring, enchanting, 3D are categorized as "Immersion" while interaction, VR games, sociability, interface, connection, sense, interact are considered as "Interactivity".

Keywords such as scary, uneasy, sickness, overwhelming, nauseating, lost, dragged, and confusing are related to negative words for experience in VR headset (Eg; Oculus) while incredible, impressive, excited, beautiful, appealing, amazing, realistic, fascinating, enjoyed, convincing are considered to be positive words for experience in VR headset (Raut, 2018).

The final input dataset(D4) was created with 13 columns through web scraping and machine learning models. The input dataset is then imported into the machine learning models (Anaconda software run by Python codes) to interpret the data. Various data interpretations were done to analyze the relationship among the 13 data columns and the results were depicted through line plots, violin plots pie charts, and bar graphs.

Step 5: Sentiment Analysis

Then the training dataset(D2) and input dataset (D4) are fed into the machine learning models for sentiment analysis (Fed into Anaconda Software). The logistic regression model is used to predict the emotions of the reviews either positive or negative. The artificial intelligence predicted the tone of the text based on the training dataset with an accuracy of 96%. The output of the sentiment analysis interpreted that the positive reviews lead to a satisfied VR experience and negative reviews lead to a dissatisfied VR experience.

Step 6: Classification

The test dataset (D3) is fed into the support vector machine model to classify the dimensions that lead to a VR satisfactory experience. To run this test, the dataset has to be modified. Henceforth, the reviews column was removed from the dataset, and in the programming code "Dimensions" was given in the "Y" axis (classification label) and the rest of the columns in the "X" axis (set of attributes). The predicted output by AI (Y cap) was compared with Y (Dimensions of D4) and obtained an accuracy of 97.2% with the help of built-in coding metrics. The dataset D4 also undergoes the same procedure as D3 to obtain the final classified output. This machine learning model was implemented to identify the relationship between the VR experiential dimensions (Immersion, Illusion, Interaction, Illusion), customer experiential dimension (Price), and VR experiential satisfaction. It also classified the influential experiential dimensions over satisfied VR experience.

The following flow chart (Figure 4) gives a systematic idea about the steps involved starting from data collection, data preprocessing, AI model designing, and prediction to classification.

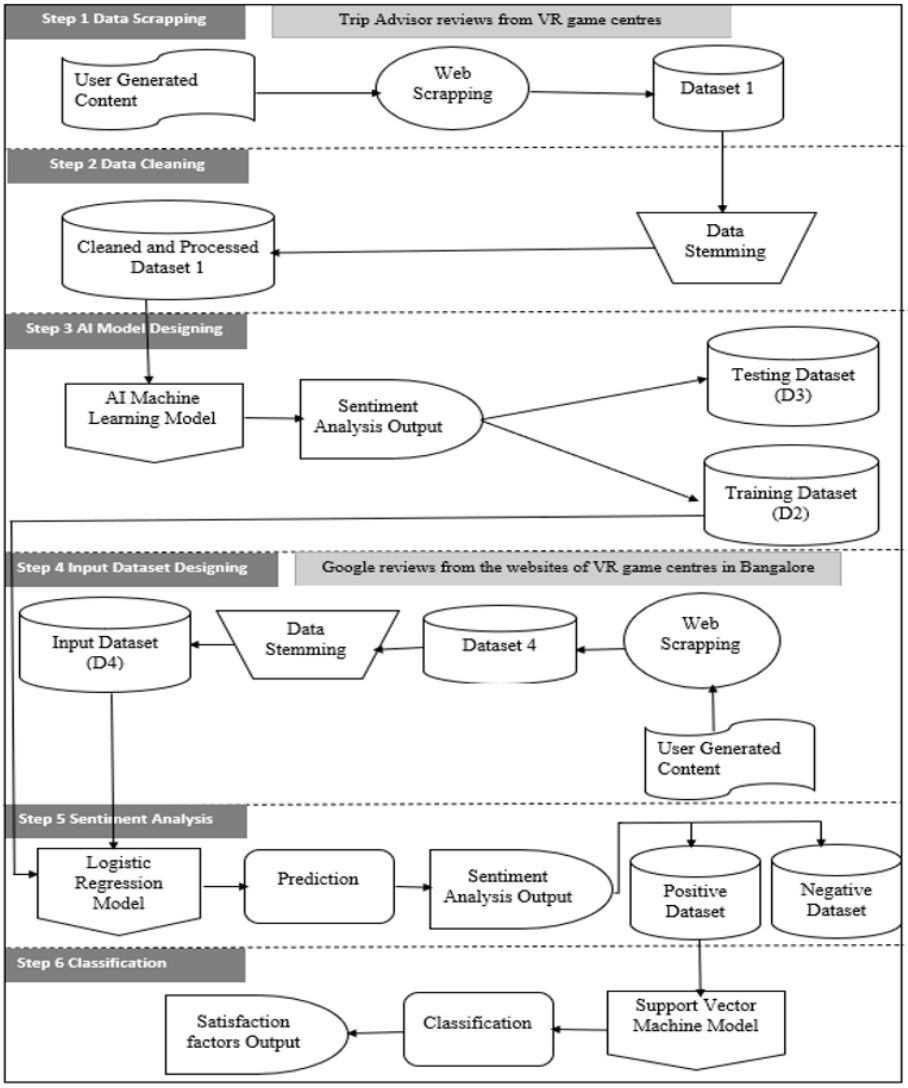

Figure 4 | Flowchart of Text Mining
Source: Own elaboration

4. Data Interpretation

Data was analyzed through Python Codes run with the help of Anaconda Software. Line plot is generated among gender, review rating, and gaming center (Figure 5). The line plot interprets that the highest mean review rating for gaming center is for VR Room for both males and females and the lowest mean review rating is for VR Voyage with respect to female and Galaxy VR for male participants. This implies that both the respondents are highly satisfied with the VR experience of VR Room and not satisfied with the VR experience of VR Voyage and Galaxy VR.

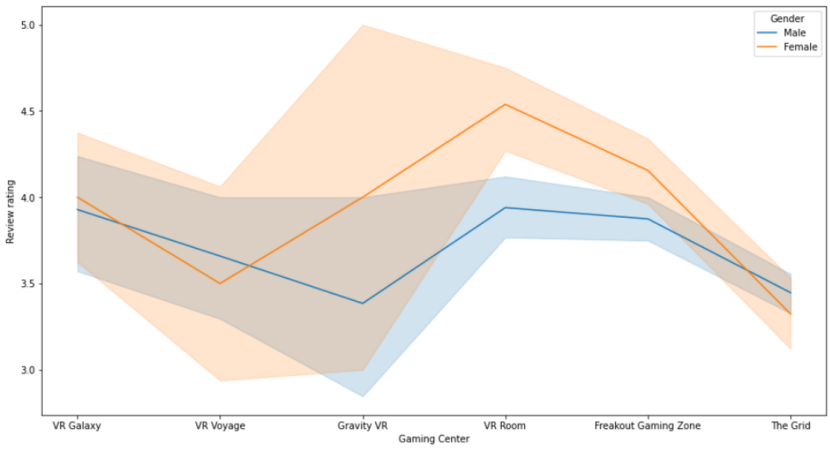

Figure 5 | Line plot between Gaming center, Gender and Review rating

The line plot (Figure 6) interprets that illusion is the most rated dimension and interactivity is the least rated dimension by female reviewers while immersion is considered to be the highly rated dimension and interactivity is the least rated dimension by male reviewers. This plot implies that reviewers are highly satisfied with the VR experiential dimensions of immersion and illusion and least satisfied with the dimension of interactivity.

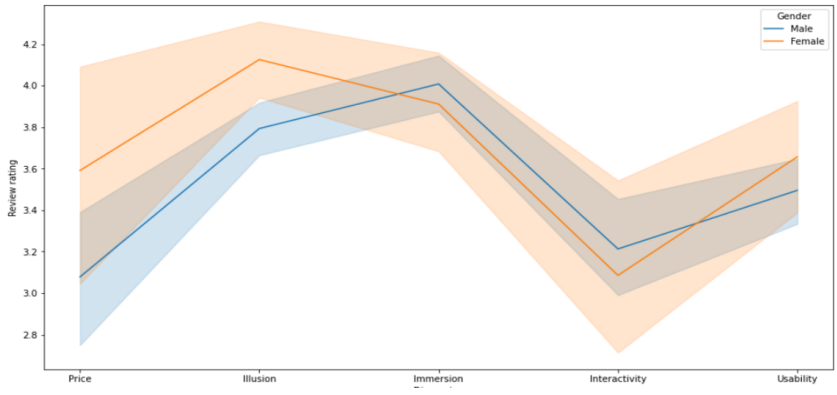

Figure 6 | Line plot between Dimensions, Gender and Review rating

This violin plot (Figure 7) shows the relationship of gaming centers and dimensions with respect to review rating. The wider section represents a higher probability of review rating consistency and the skinnier section represents a lower probability. The plot implies that the median review rating is higher for VR Voyage's immersion, VR Voyage's price, VR Voyage's illusion, VR Galaxy's interactivity, and VR Voyage's usability than others. The higher probability in review rating consistency for immersion ranges from 4 to 5, price ranges from 2 to 4, illusion ranges from 3 to 5, interactivity ranges from 1 to 3 and usability ranges from 3 to 5.

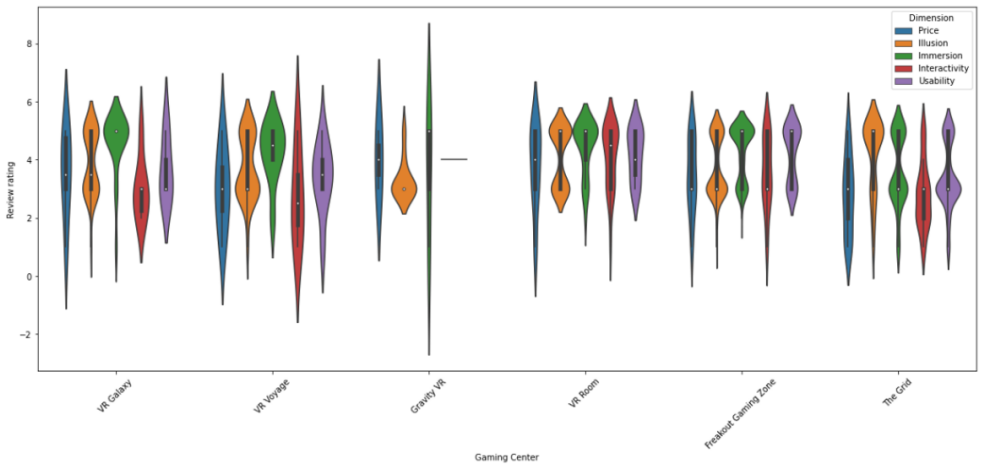

Figure 7 | Violin plot between Gaming center, Dimensions and Review rating

The line plot shows a relationship between VR game experience review rating over a period of years (Figure 8). The rating has reached its peak in 2017 and gradually drops in the consecutive years. There is a slight elevation in 2019 and 2021 compared to their preceding years.

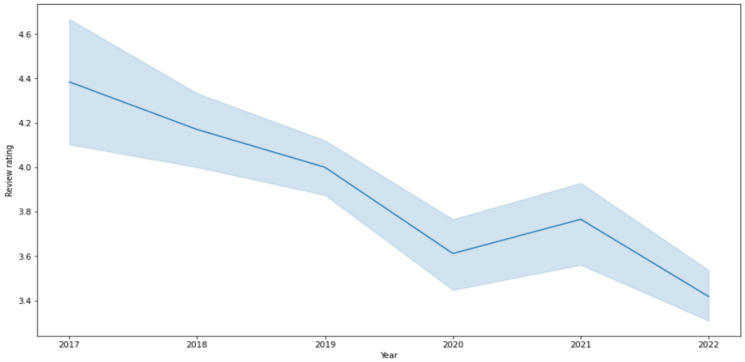

Figure 8 | Line plot between Year and Review rating

The line plot shows a relationship between VR game experience review rating over the last 70 months (Figure 9). The rating sees a lot of fluctuations with mean ranges from 2.8 to 3.5 in the last 10 months. The highest drop in the rating is the market in the 10 months with a mean value of 2.8 and the highest rise in the 70 months with a mean value of 5.

The line interprets the range of experience level across each experiential dimension with respect to each VR gaming centers (Figure 10). The experience level is best with respect to the price dimension for the Freakout gaming zone when compared to other centers. This implies that reviewers are extremely happy with the price offered for VR games at Freakout Gaming Zone.

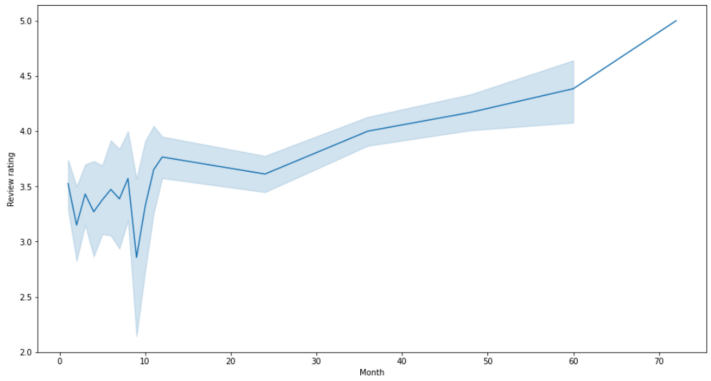

Figure 9 | Line plot between Month and Review rating

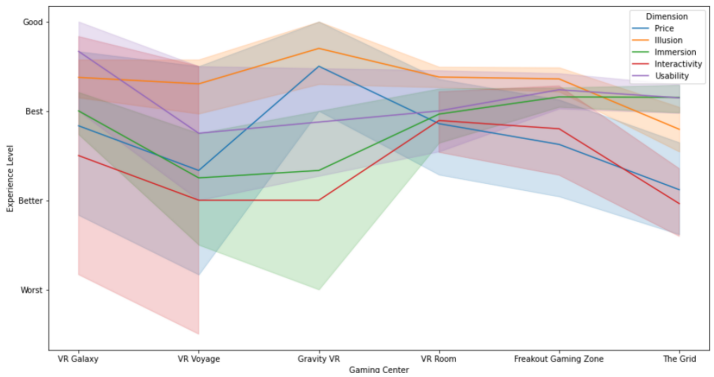

Figure 10 | Line plot between Gaming center, Dimensions and Experience level

The line interprets the range of review rating (label coded of experience level) across each experiential dimension with respect to each VR gaming center (Figure 11). The price reaches the review rating peak (mean value of 4.0) at Gravity VR and touches the bottom at the grid (mean value of 2.9). This implies that reviewers are happy with the price offered for the VR gaming experience at Gravity VR compared to others. The mean value of 4.0 states that the experience level concerning price is better at Gravity VR.

The illusion reaches the review rating peak (mean value of 4.2) at VR Room and touches the bottom at gravity VR (mean value of 3.4). This implies that reviewers found the illusion created at VR Room found to be better compared to others. The mean value of 4.2 states that the experience level for illusion is best in VR Room.

The immersion reaches the review rating peak (mean value of 4.6) at VR Galaxy and touches the bottom at the grid and gravity VR (mean value of 3.8). This implies that reviewers found VR Galaxy to provide a highly immersive VR experience compared to others. The mean value of 4.6 implies that the experience level to price is best at VR Galaxy.

The interactivity reaches the review rating peak (mean value of 4.1) at VR Room and touches the bottom at VR Voyage (mean value of 2.8). This implies that reviewers agree that the VR games offered at VR Room are more interactive compared to others. The mean value of 4.1 states that the experience level concerning interactivity is best in the VR Room.

The usability reaches the review rating peak (mean value of 4.3) at the Freakout gaming zone and touches the bottom at VR Voyage (mean value of 3.4). This implies that reviewers found that the gadgets used for VR games are easier to use at the Freaking gaming zone compared to others. In other terms, Freakout Gaming Zone's VR gadgets are more user-friendly compared to others. The mean value of 4.1 states that the experience level concerning interactivity is best in the VR Room.

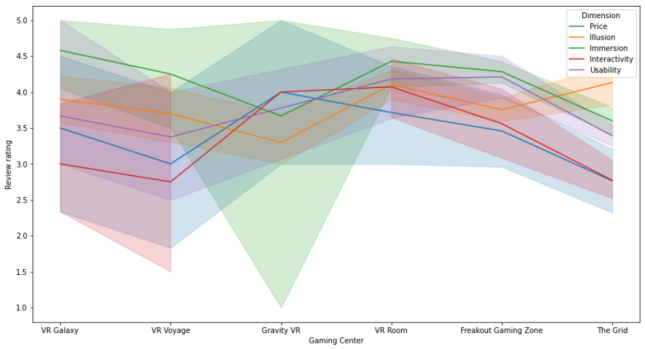

Figure 11 | Line plot between Gaming center, Dimensions and Review Rating

This chart (Figure 12) displays the list of VR games identified from the user generated content.Games such as Cricket, Roller Coaster, Boxing, Zombie Shooting, Dinosaurus Shooting, Space race, 7D, Hunting, Shooting, etc. are identified to be key games discussed from a user perspective. Cricket stands out to be the most discussed game at the VR gaming centers followed by roller coaster and zombie shooting. Car race holds the next position followed by 7D, boxing, Dinosaurus shooting, horror house, shooting, ultimate booster, space race, 3D, archery, dread eye, hunting, and cycling.

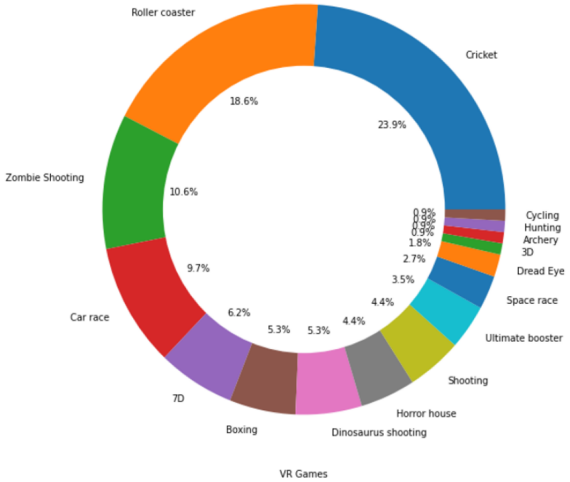

Figure 12 | Pie chart for VR games

The line plot draws a relationship between the VR games and experience rating at different gaming centers (Figure 13). The top 5 VR games such as cricket, roller coaster, zombie shooting, car race and 7D are chosen for the interpretation. The plot interprets that the VR Galaxy bestows the best roller coaster experience, VR Room offers the best zombie shooting and 7D experience and Freakout gaming zone offers the best car race and cricket respectively.

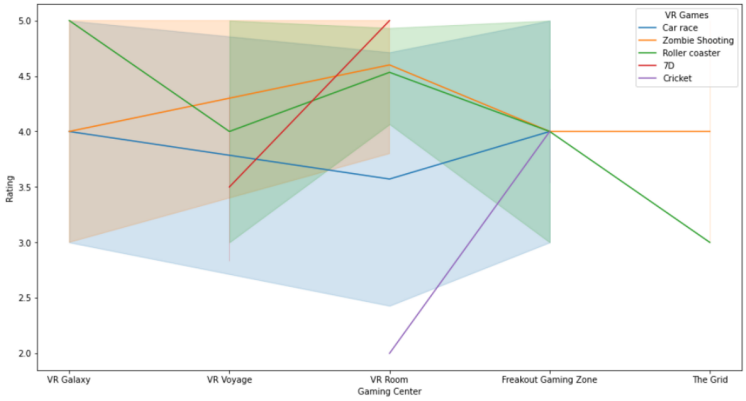

Figure 13 | Line plot between Gaming center, VR games and Rating

The logistic regression model predicted the sentiment of the reviews and the output is depicted in pie and bar charts respectively (Figure 14). The AI predicted the emotions of the reviews and categorized them as positive and negative based on the training dataset. The plot implies that the majority of the reviews are positive in nature contributing to 99.13% while there lies a minority or negligible reviews which are negative in nature contributing to 0.87%.

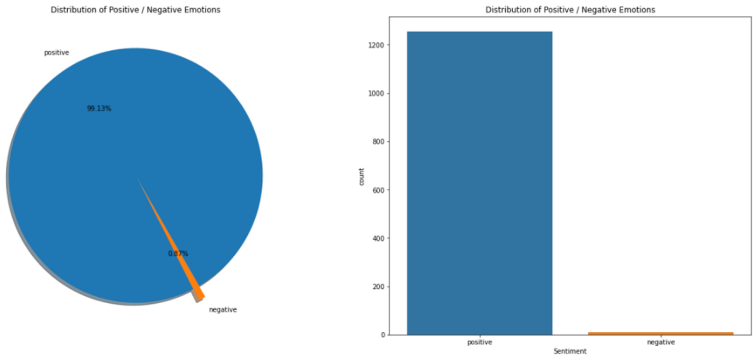

Figure 14 | Sentiment Analysis Charts

The support vector machine model classified the VR experience satisfaction into five classification labels (Figure 15). Illusion is identified to be the most influencing classification label in order to enhance the VR experience followed by immersion, usability, interactivity, and price. The influencing behavior of price and interactivity are found to be least preferred for VR experiential satisfaction. The most preferred classification labels for satisfied VR experience are found to be illusion, immersion, and usability. In simple terms, more illusion leads to a more satisfying VR experience.

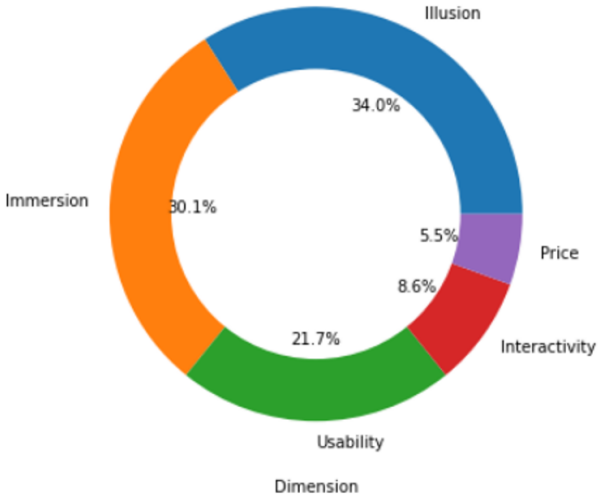

Figure 15 | Pie Chart for Dimensions

5. Discussion

The study has outlined the distinct VR experiential dimensions and mapped them against presence, content, components, and factors. The social dimension has been the most discussed VR experiential dimension in the last four decades by various researchers and practitioners. The study also identified that minimal research has been done on dimensions such as immersion, illusion, usability, and interactivity. This research gap was addressed here by studying these dimensions and their impact on experiential satisfaction. Secondly, the study has identified 16 VR games from the user-generated content whereas bowling, cricket, laser tag, roller coaster, and boxing have emerged as the most popular games at the VR game centers of Bangalore. It is also identified that the Freakout gaming zone, VR Room and VR Galaxy offers the best VR game experiences in bangalore.

Sentiment analysis which identifies the tone or opinion of the user generated content implies that the majority of the reviews are positive with negligible negative reviews. The analysis interprets that the customers are extremely satisfied with the VR experience offered at the Bangalore game outlets. This means that the services and experiences offered at these game centers met the expectation standards of the customers. The customers could immerse themselves in the virtual environment detaching themselves from the real world and be able to imagine a new delusional world around them. The gadgets such as VR headsets, motion controllers, gloves were easy to use and control. Overall, the customers are happy and satisfied with the VR experiences offered through games, thrillers and adventure rides at the VR game centers.

VR experience could be influenced by a range of other external and internal factors but the study clearly proves that immersion, illusion, and usability are the prominent factors in influencing customer satisfaction. Illusion which creates an imaginative world in the minds of the customer emerged to be the highly influential factor and responsible for a highly satisfied VR experience. A VR game with outstanding illusion features will elevate the experience to the horizon and end up in earning highly satisfied customers.

Table 1 | Summarizing the findings of the study

Experiences at VR gaming centers	Female	Best Experience	VR Room
	Male	Best Experience	VR Room
	Female	Worst Experience	VR Voyage
	Male	Worst Experience	Galaxy VR
Experiential dimensions	Female	Highly rated	Illusion
	Male	Highly rated	Immersion
	Female	Lowly rated	Interactivity
	Male	Lowly rated	Interactivity
Median of high experience level	Immersion	VR Voyage	Better, Best
	Illusion	VR Voyage	Good, Better, Best
	Interactivity	VR Galaxy	Worst, Bad, Good
	Usability	VR Voyage	Good, Better, Best
	Price	VR Voyage	Bad, Good, Better
Satisfaction level	Immersion	High	VR Galaxy
	Immersion	Low	The Grid, Galaxy VR
	Illusion	High	VR Room
	Illusion	Low	Gravity VR
	Interactivity	High	VR Room
	Interactivity	Low	VR Voyage
	Usability	High	Freakout
	Usability	Low	VR Voyage
	Price	High	Gravity VR
	Price	Low	The Grid
Sentiment Analysis	VR experience reviews	Positive	99.13%
		Negative	0.87%
VR Experiential Satisfaction	Illusion	Severe	34.0%
	Immersion	Major	30.1%
	Usability	Moderate	21.7%
	Interactivity	Minor	8.6%
	Price	Insignificant	5.5%
Top 5 VR Games	Cricket	Freakout Gaming Zone	23.9%
	Roller coaster	VR Galaxy	18.6%
	Zombie shooting	VR Room	10.6%
	Car race	Freakout Gaming Zone	9.7%
	7D	VR Room	6.2%

6. Implications of the study

Virtual Reality has been revolutionizing many sectors such as gaming, marketing, education, travel, tourism, hospitality, management, engineering, finance, medicine, etc. The crux of this technology is found to be VR experiential dimensi-

ons and the VR companies should focus on elevating these experiential dimensions for the successful running of VR applications.

Tourism is showing keen interest in VR for their marketing and promotional activities. In recent times, promoting tourism products through VR games has emerged as a novel concept and this study will provide valuable insights to tourism players like Destination Management Organizations (DMO), tour operators, and travel agents who want to strategize their promotional and marketing activities through VR games.

Games can be used as an effective marketing tool to leverage the brand image of a company. Incorporating products as an integral part of the game will create an emotional connection with the product and influence the purchase decisions of the customers. Tourism companies and hotels can incorporate their products in VR games to enhance their sales operations.

VR experiences are found to have a great influence on satisfaction and they can be used as an effective marketing tool for promotions. Promotions through VR games have become a new trend and businesses can make use of this opportunity to invent their own VR games to market their products effectively and yield high profit margins.

7. Conclusion

This study has filled the following research gaps; i) studied the VR experiential dimensions such as immersion, illusion, interaction, and usability, ii) analyzed the relationship between VR experiential dimensions and customer satisfaction at various VR game centers of tourist destinations, iii) studied the potential of VR experience in satisfying the customers. This research has identified that illusion is the most influential factor of VR experiential satisfaction which implies that the VR game centers should focus on this dimension and leverage the customer experience to the next level. VR Companies should work on the illusion dimension to stand ahead of the competition. The interactivity dimension was rated low among all other dimensions hence the VR game companies should rework this feature as it should not limit the VR experience. The VR gaming revenue has been showing positive growth since 2017 and this creates an opportunity for new VR game companies to enter the market. The study also listed the VR games on the scale of most to least preferred. This information helps the VR start-up game companies to launch highly preferred games with advanced illusion features in order to gain market advantage and customer experiential satisfaction at the earliest. Another advantage is the premium price strategy, the study has identified that price is the least influential factor in experiential satisfaction. Henceforth, VR start-ups can launch the games at a slightly higher price than their competitors. This strategy bestows high profit margins, gains brand recognition and brand value, and tough competition. The research outcome also implies that customers are highly satisfied with the VR games and are ready to pay for them if the illusion, immersion, usability, and interactivity are above the expected level.

A major challenge while conducting the research was the lack of datasets related to VR games and reviews. Training datasets for VR game reviews were not available hence the author had to create a training dataset to train the AI model. The study has included only the factors of VR experiential dimensions (immersion, illusion, usability, and interactivity) while this pays the way for future research on other dimension classifications (Content, presence, components) and their impact on customer satisfaction. The study has included only one customer experiential satisfaction (Price) along with VR dimensions while future research can be laid on studying the other customer experiential satisfaction factors such as quality, personalization, time, speed, convenience, etc.

References

Agarwal, R., & Karahanna, E. (2000). Time flies when you are having fun: cognitive absorption and beliefs about information technology usage. *MIS Quarterly, 24*(4), 665-694.

Ahamad, D., Mahmoud, D. A. M. M., & Akhtar, M. M. (2017). Strategy and implementation of web mining tools. *International Journal of Innovative Research in Advanced Engineering, 4*(12), 1-7.

Balakrishnan, J., Dwivedi, Y. K., Mishra, A., Malik, F. T., & Giannakis, M. (2024). The role of embodiment and ergonomics in immersive VR tours in creating memorable tourism experiences. *International Journal of Contemporary Hospitality Management*.

Beck, J. & Egger, R. (2018). Emotionalise Me: Self-reporting and Arousal Measurements in Virtual Tourism Environments. In Stangle, B. & Pesonen, J. (Eds.) [Electronic resource] *Information and Communication Technologies in Tourism*, 3-15.

Beck, J., Rainoldi, M., & Egger, R. (2019). Virtual reality in tourism: a state-of-the-art review. *Tourism Review, 74*(3), 586-612.

Bontchev, B. (2016). Adaptation in affective video games: A literature review. *Cybernetics and Information Technologies, 16*(3), 3-34.

Boyle, E. A., Connolly, T. M., Hainey, T., & Boyle, J. M. (2012). Engagement in digital entertainment games: A systematic review. *Computers in human behavior, 28*(3), 771-780.

Burt, M., & Louw, C. (2019). Virtual reality enhanced roller coasters and the future of entertainment–audience expectations. *World Leisure Journal, 61*(3), 183-199.

Calleja, G. (2010). Digital games and escapism. *Games and Culture, 5*(4), 335-353.

Camps-Ortueta, I., Deltell-Escolar, L., & Blasco-López, M. F. (2021). New technology in Museums: AR and VR video games are coming. *Communication & Society*, 193-210.

Carmigniani, J., & Furht, B. (2011). Augmented reality: an overview in Furht, B. (Ed.), *Handbook of Augmented Reality*, Springer, New York, 3-46.

Caroux, L. (2023). Presence in video games: A systematic review and meta-analysis of the effects of game design choices. *Applied Ergonomics, 107*, 103936, https://doi.org/10.1016/j.apergo.2022.103936

Caroux, L., Isbister, K., Le Bigot, L., & Vibert, N. (2015). Player–video game interaction: A systematic review of current concepts. *Computers in human behavior, 48*, 366-381.

Carù, A., & Cova, B. (2003). Revisiting consumption experience: a more humble but complete view of the concept. *Marketing Theory, 3*(2), 267-286.

Çeltek, E. (2021). 12 Gamification: Augmented Reality, Virtual Reality Games and Tourism Marketing Applications. *Gamification for Tourism, 92*.

Chang, I.C., Liu, C.C., & Chen, K. (2014). The effects of hedonic/utilitarian expectations and social influence on continuance intention to play online games. *Internet Research, 24*(1), 21-45.

Childers, T.L., Carr, C.L., Peck, J., & Carson, S. (2002). Hedonic and utilitarian motivations for online retail shopping behavior. *Journal of Retailing, 77*(4), 511-535.

Chua, A.Y. K., & Banerjee, S. (2013). Reliability of reviews on the Internet : The case of TripAdvisor. In: *World Congress on Engineering & Computer Science*, 23-25 Oct 2013.

Chung, J. Y., & Buhalis, D. (2008). Web 2.0: A study of online travel community. *ICT in Tourism 2008*, P. O'Connor, W. Hopken and U. Gretzel (Eds.), 70-81, Springer.

Cifuentes-Correa, L., Montoya-Hincapié, E., Valencia-Arias, A., Quiroz-Fabra, J., & Londoño-Celis, W. (2023). Research trends in geoheritage, geotourism and its relationship with new technologies. *Journal of Tourism & Development, 40*, 155-163. https://doi.org/10.34624/rtd.v40i0.31498

Costabile, M.F. (2001). Usability in the software life cycle in Chang, S.K. (Ed.), *Handbook of Software Engineering and Knowledge Engineering*: Volume I: Fundamentals, World Scientific Publishing Company, Singapore, 179-192.

Daline, R & Thomas, J. (2024, January). Evaluation of Virtual Reality Experiential Dimensions using Sentiment Analysis. In *2024 International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE)* (pp. 1-6). IEEE.

Daline, R., & Thomas, J. (2024). AI-Powered Marketing Strategies in the Tourism and Hospitality Sector. In *Utilizing Smart Technology and AI in Hybrid Tourism and Hospitality* (pp. 223-242). IGI Global

De Byl, P. (2015). A conceptual affective design framework for the use of emotions in computer game design. *Cyberpsychology, 9*(3), 4.

De-Bengalurued: Why India's tech industry is now rushing to 26 smaller cities. (2023, September 1). Economic Times. https://economictimes.indiatimes.com/news/company/corporate-trends/de-bengalurued-why-indias-tech-industry-is-now\-rushing-to-26-smaller-cities/articleshow/103245493.cms

Díaz, R. L. S., Ruiz, G. R., Bouzouita, M., & Coninx, K. (2022). Building blocks for creating enjoyable games—a systematic literature review. *International Journal of Human-Computer Studies, 159*, 102758.

Diels, C., Erol, T., Kukova, M., Wasser, J., Cieslak, M., Payre, W., Miglani, A., Mansfield, N., Hodder, S., & Bos, J. (2017). Designing for comfort in shared and automated vehicles (SAV): a conceptual framework. *1st International Comfort Congress* (ICC2017), Salerno.

Duan, H., Li, J., Fan, S., Lin, Z., Wu, X., & Cai, W. (2021, October). Metaverse for social good: A university campus prototype. In *Proceedings of the 29th ACM International Conference on Multimedia*, Virtual Event, China,161

Fan, X., Jiang, X., & Deng, N. (2022). Immersive technology: A meta-analysis of augmented/virtual reality applications and their impact on tourism experience. *Tourism Management, 91*, 104534.

Felton, W. M., & Jackson, R. E. (2021). Presence: a review. *International Journal of Human-Computer Interaction, 38*(1), 1–18. https://doi.org/10.1080/10447318.2021.1921368

Filser, M. (2002). Le marketing de la production d'expérience: Statut théorique et implications managériales. *Décisions Marketing, 28*, 13-23.

Fornerino, M. Helme-Guizon, A., & Gotteland, D. (2006). Mesurer l'immersion dans une expérience de consommation: premiers développements. *Actes du XXIIème congrès AFM*- 11&12 Mai 2006-Nantes.

Georgiadis, A., & Yousefi, S. (2017, November). Analysis of the user experience in a 3D gesture-based supported mobile VR game. In *Proceedings of the 23rd ACM Symposium on Virtual Reality Software and Technology* ,1-2.

Goodwin, T. (2019, March 15). The 6 dimensions of virtual reality. Forbes Available at: www.forbes.com/sites/workday/2019/03/15/the-future-of-the-enterprise-with-ray-wang/#a68c80768df0 (Accessed on 20 October 2022).

Gretzel, U., & Yoo, K. (2008). Use and impact of online travel reviews. *ICT in Tourism 2008*, P. O'Connor, W. Hopken and U. Gretzel (Eds.), 35-46, Springer.

Grumbach, A. (2007). Cognition virtuelle, Intellectica. *Revue de L'association Pour la Recherche Cognitive, 45*(1), 7-22.

Guttentag, D.A. (2010). Virtual reality: Applications and implications for tourism. *Tourism Management, 31*(5), 637-651

Hartmann, T., Wirth, W., Verderer, P., Klimmt, C., Schramm, H., & B€ocking, S. (2015). Spatial presence theory: state of the art and challenges ahead in Lombard, M., Biocca, F., Freeman, J., Ijsselsteijn, W. and Schaevitz, R.J. (Eds), *Immersed in Media*. Telepresence Theory, Measurement, and Technology, Springer, London, 115-135.

Hertel, J., Karaosmanoglu, S., Schmidt, S., Bräker, J., Semmann, M., & Steinicke, F. (2021, October). A taxonomy of interaction techniques for immersive augmented reality based on an iterative literature review. In *2021 IEEE international symposium on mixed and augmented reality (ISMAR)* (pp. 431-440). IEEE. .

Holopainen, J. & Waern, A. (2009). Designing pervasive games for mobile phones. In MontolaStenros, M.J. and Waern, A. (Eds), *Pervasive Games: Theory and Design*, Morgan Kaufmann Publishers, Burlington, MA, pp. 179-190.

India Tourism Statistics (2022). Incredible India. Available at: https://tourism.gov.in/sites/default/files/2022-09/India%20Tourism%20Statistics%202022-English__0.pdf (Accessed: December 15, 2022).

Ishii, A., Tsuruta, M., Suzuki, I., Nakamae, S., Suzuki, J., & Ochiai, Y. (2019, March). Let your world open: Cave-based visualization methods of public virtual reality towards a shareable vr experience. In *Proceedings of the 10th Augmented Human International Conference 2019*, 1-8.

Jovanovic, B. (2022, August 2). 37 Virtual Reality Statistics That Prove the Future is Now. DataProt. https://dataprot.net/statistics/virtual-reality-statistics/

Jin, C.H. (2014). The role of users' motivations in generating social capital building and subjective well-being: the case of social network games. *Computers in Human Behavior, 39*, 29-38.

Kahai, S. S. (2009). Anonymity and counter-normative arguments in computer-mediated discussions. *Group Organization Management, 34*(4), 449-478.

Karpinskyj, S., Zambetta, F., & Cavedon, L. (2014). Video game personalisation techniques: A comprehensive survey. *Entertainment Computing, 5*(4), 211-218.

Katz, E., Blumler, J.G., & Gurevitch, M. (1974). Utilization of mass communication by the individual in Blumler, J.G. and Katz, E. (Eds), *The Use of Mass Communications: Current Perspectives on Gratifications Research*, Sage, Beverly Hills, CA, 424-440.

Dhelim, S., Kechadi, T., Chen, L., Aung, N., Ning, H., & Atzori, L. (2022). Edge-enabled Metaverse: the convergence of metaverse and mobile edge computing. *arXiv (Cornell University)*. https://doi.org/10.48550/arxiv.2205.02764

Kinsella, S. (2000). *Adult Manga: Culture and Power in Contemporary Japanese Society*. University of HI Press.

Kolmar, C. (2022, October 9). 25 Amazing virtual reality statistics [2022]: The future of VR + AR. Zippia. https://www.zippia.com/advice/virtual-reality-statistics/

Kye, B., Han, N., Kim, E., Park, Y., Jo, S., & Huh, S. (2021) Educational applications of metaverse: Possibilities and limitations. *Journal of Educational Evaluation for Health Professions, 18*, 32. https://doi.org/10.3352/jeehp.2021.18.32

Lampe, C., Ellison, N., & Steinfeld, C. (2007). A face(book) in the crowd: social searching vs. social browsing. *Proceedings of the 2006 20th Anniversary Conference on Computer-Supported Cooperative Work*, ACM Press, New York, NY, 167-170.

Lee, K., & Yu, C. (2018). Assessment of airport service quality: A complementary approach to measure perceived service quality based on Google reviews. *Journal of Air Transport Management, 71*, 28-44.

Lee, K.M. (2004). Presence, explicated. *Communication Theory, 14*, 27-50.

Lin, H. H., Wang, Y. S. & Chou, C.H. (2012). Hedonic and utilitarian motivations for physical game systems use behavior. *International Journal of Human-Computer Interaction, 28*(7), 445-455.

Lombard, M. and Ditton, T. (1997). At the heart of it all: the concept of presence. *Journal of Computer-Mediated Communication, 3*(2), https://doi.org/10.1111/j.1083-6101.1997.tb00072.x

Loyer, E. (2015). Parasocial and social player-avatar relationships: social others in Thomas was alone. Press Start, 2(1), 21-32.

Market Research Report. (2022). Fortune Business Insights. https://www.fortunebusinessinsights.com/industry-reports/virtual-reality-gaming-market-100271

Marshall, D., Coyle, D., Wilson, S., & Callaghan, M. (2013). Games, gameplay, and BCI: the state of the art. *IEEE Transactions on Computational Intelligence and AI in Games, 5*(2), 82-99.

Minsky, M. (1980). Telepresence. *OMNI Magazine*, 44-52.

Mozumder, M.A.I.; Sheeraz, M.M.; Athar, A.; Aich, S.; Kim, H.C. (2022, February) Overview: Technology Roadmap of the Future Trend of Metaverse based on IoT, Blockchain, AI Technique, and Medical Domain Metaverse Activity. In *Proceedings of the 2022 24th International Conference on Advanced Communication Technology* (ICACT), Pyeongchang-gun, Korea, pp. 256–261.

Nilsson, N. C., Nordahl, R., & Serafin, S. (2016). Immersion revisited: A review of existing definitions of immersion and their relation to different theories of presence. *Human Technology, 12*(2), 108–134. https://doi.org/10.17011/ht/urn.201611174652

Paez, T. (2012). Le jeu vidéo; ce que y recherchons. *Mon Petit Editeur*, Novembre 2012.

Park, J., & Ko, D. (2022). Catch me if you can: effects of AR-enhanced presence on the mobile game experience. *Internet Research, 32*(4), 1235-1263. https://doi.org/10.1108/INTR-10-2020-0557

Pelletier, J. (2005). Deux conceptions de l'interprétation des récits de fiction. *Philosophiques, 32*(1), 39-54.

Perez-Marcos, D. (2018). Virtual reality experiences, embodiment, videogames and their dimensions in neurorehabilitation. *Journal of Neuroengineering and Rehabilitation, 1*, https://doi.org/10.1186/s12984-018-0461-0.

Pietroni, E., Pagano, A., & Fanini, B. (2018). UX designer and software developer at The Mirror: Assessing sensory immersion and emotional involvement in virtual museums. *Studies in Digital Heritage, 2*(1), 13–41. https://doi.org/10.14434/sdh.v2i1.24634

Prebensen, N.K., & Rosengren, S. (2016). Experience value as a function of hedonic and utilitarian dominant services. *International Journal of Contemporary Hospitality Management, 28*(1), 113-135.

Quiroz-Fabra, J., Valencia-Arias, A., Montoya-Hincapié, E. M., Cifuentes-Correa, L. M., & Londoño-Celis, W. (2023). Research trends on the incursion of immersive technologies in tourism: a bibliometric analysis. *Journal of Tourism & Development, 40*, 165-174. https://doi.org/10.34624/rtd.v40i0.31507

Raut, P. (2018). *Analysis of immersive virtual reality vs. desktop 3D games*. Boston, Massachusetts: Northeastern University.

Reading, A., & Jenkins, R. (2015). Transportation to a world of fantasy: consumer experiences of fictional brands becoming real. *Journal of Promotional Communications, 3*(1), 154-173.

Rejman Petrović, D., Nedeljković, I. & Marinković, V. (2022). The role of the hedonistic and utilitarian quality dimensions in enhancing user satisfaction in mobile banking. *International Journal of Bank Marketing, 40*(7), 1610-1631. https://doi.org/10.1108/IJBM-03-2022-0112

Schubert, T.W. (2009). A new concept of spatial presence: once again, with feeling. *Communication Theory, 19*(2), 161-187.

Sheridan, T. (1992). Musings on telepressence and virtual presence. *Presence Teleoperators and Virtual Environments, 1*(1), 120-125.

Sherry, J.L. (2004). Flow and media enjoyment. *Communication Theory, 14*(4), 328-347.

Singh, I. (2018). Interrelations, transitions, and experiential outcomes are the main domains to lay the foundation and maximum learning in architectural design studio. *International Journal of Scientific & Engineering Research, 9*(7), 1397-1403.

Slater, M. (2018). Immersion and the illusion of presence in virtual reality. *British Journal of Psychology, 109*, 431–433.

Slater, M., & Sanchez-Vives, M. V. (2022). Is Consciousness First in Virtual Reality? *Frontiers in Psychology, 13*, 787523. https://doi.org/10.3389/fpsyg.2022.787523

Sousa, N., Álen, E., Losada, N., & Melo, M. (2022). Virtual Reality in Tourism Promotion. *Journal of Tourism & Development, 39*, 279-290. https://doi.org/10.34624/rtd.v39i0.26241

Stainton, H. (2020, November 11). Virtual tourism explained: What, Why and Where. Tourism Teacher. Available at `https://tourismteacher.com/virtual-tourism/` (Accessed on 22 October 2022)

Stavropoulos, V., Alexandraki, K., & Motti-Stefanidi, F. (2013). Flow and telepresence contributing to internet abuse: differences according to gender and age. *Computers in Human Behavior, 29*(5), 1941-1948.

Storgards, J. H. (2011). The influence of the hedonic and utilitarian value of digital games on product recommendation. *The Seventeenth Americas Conference on Information Systems*, August 4-7, Detroit, MI.

Storgards, J.H., Tuunainen, V.K., & Orni, A. (2009). The hedonic and utilitarian value of digital games at product category level. *The Seventeenth European Conference on Information Systems*, 8-10, June, Verona.

Strickland, J. (2019). How virtual reality works. How Stuff works. Available at: `https://electronics.howstuffworks.com/gadgets/other-gadgets/virtual-reality3.html` (Accessed on 20 October 2022).

Thuillier, G. (2011). Entre fiction, simulacre et réalité: les avatars de l'espace virtuel. *Carnets de géographes, 2*.

Top Gaming Virtual Reality Companies. (n.d.). Clutch. `https://clutch.co/developers/virtual-reality/gaming-industry`

Trabelsi-Zoghlami, A., & Touzani, M. (2019). How real are virtual experiences? For a better understanding of virtual experiences and their impact on consumers' real life. *European Journal of Marketing, 53*(8), 1612-1636. https://doi.org/10.1108/EJM-10-2017-0776

Tussyadiah, I. P., Wang, D., Jung, T. H., & Tom Dieck, M. C. (2018). Virtual reality, presence, and attitude change: empirical evidence from tourism. *Tourism Management, 66*, 140-154.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information extending the unified theory of acceptance and use of technology. *MIS Quarterly, 36*(1), 57-178.

Vynogradova, I. (2014). Consumer experiences in virtual reality: dimensions and appropriation operations of immersion. Unpublished master's thesis, University of Nordland, Bodø.

Wang, P., Wu, P., Wang, J., Chi, H.L. & Wang, X. (2018). A critical review of the use of virtual reality in construction engineering education and training. *International Journal of Environmental Research and Public Health, 15*(6), 1-18.

Weibull, L. (1985). Structural factors in gratifications research in Rosengren, K.E., Wenner, L.A. and Palmgreen, P. (Eds), *Media Gratifications Research: Current Perspectives*, Sage, Beverly Hills,CA, 123-147.

Wirth, W., Hartmann, T., Böcking, S., Vorderer, P., Klimmt, C., Schramm, H., Saari, T., Laarni, J., Ravaja, N., Gouveia, F. R., Biocca, F., Sacau, A., Jäncke, L., Baumgartner, T., & Jäncke, P. (2007). A process model of the formation of spatial presence experience. *Media Psychology, 9*, 493-525.

Wu, H.-C., Ai, C.-H., & Cheng, C.-C. (2020). Virtual reality experiences, attachment and experiential outcomes in tourism. *Tourism Review, 75*(3), 481-495. https://doi.org/10.1108/TR-06-2019-0205

Wu, J., & Holsapple, C. (2014). Imaginal and emotional experiences in pleasure-oriented IT usage: a hedonic consumption perspective. *Information and Management, 51*(1), 80-92.

Wu, J., Wang, S. & Tsai, H. (2010). Falling in love with online games: the uses and gratifications perspective. *Computers in Human Behavior, 26*(6), 1862-1871.

Wu, S., & Hsu, C. (2018). Role of authenticity in massively multiplayer online role playing games (MMORPGs): determinants of virtual item purchase intention.*Journal of Business Research, 92*, 242-249.

Yaremych, H. E., & Persky,S. (2019).Tracing physical behavior in virtual reality: A narrative review of applications to social psychology. *Journal of Experimental Social Psychology, 85*, 103845. https://doi.org/10.1016/j.jesp.2019.103845.

Yüksel, A., & Yüksel, F. (2008). Consumer satisfaction theories: a critical review. Tourist satisfaction and complaining behavior: Measurement and management issues in the tourism and hospitality industry, 65-88.

Zarantonello, L., & Luomala, H.T. (2011). Dear Mr chocolate: constructing a typology of contextualized chocolate consumption experiences through qualitative diary research. *Qualitative Market Research: An International Journal, 14*(1), 55-82.

Zhang, T., Li, B., Milman, A. & Hua, N. (2022). Assessing technology adoption practices in Chinese theme parks: text mining and sentiment analysis. *Journal of Hospitality and Tourism Technology, 13*(1), 195-213. https://doi.org/10.1108/JHTT-05-2020-0126

Zheng, P., Yu, S., Wang, Y., Zhong, R.Y., & Xu, X. (2017). User-experience based product development for mass personalization: a case study. *Procedia CIRP, 63*, 2-7.