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Experiential Marketing Tourism and Hospitality Tours Generation Hybrid Model

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Abstract

The emergence of immersive technologies presents unprecedented opportunities for both users and organizations. This paper explores the future of digital marketing as a new ecosystem wherein innovative marketing strategies enable organizations to communicate with their customer base in ways previously unattainable, reshaping traditional marketing concepts into novel and unimaginable actions. This study proposes an experiential marketing tourism and hospitality tours generation hybrid model. The model focuses on generating virtual tours based on 360° VR videos, specifically designed for hotel environments, their surroundings, and tourist zones. The immersive environment proposal includes the design of user interface prototypes and incorporates the automated division of 360° videos using convolutional neural networks. Subsequently, personalized tours are composed based on user profiles, utilizing a Case-Based Reasoning (CBR). Functionality tests for the video division and labeling component, as well as the composition of tours according to user profiles recommended by the CBR, yielded satisfactory results. The application of this system has the potential to positively influence reservation intentions and enhance brand image. Immersive experiences have the capability to trigger effects in affective, attitudinal/behavioral, and cognitive dimensions.

Keywords: *Experiential Marketing, Immersive Technologies, Virtual Reality Immersion, Case-Base Reasoning, CNN Networks.*

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1 Introduction

Consumer habits are undergoing a shift towards digital consumption [32], with global trends indicating that interacting with brands through online channels has become increasingly convenient [4]. The current landscape witnesses a substantial rise in investments in platforms supporting digital environments. Concurrently, relational marketing engages and integrates business stakeholders to benefit organizational development and enhance marketing performance [29].

In contrast to transactional marketing, recent technological advancements have facilitated relational marketing in building mutual interdependence and cooperation with stakeholders in the virtual world, including the metaverse. The metaverse, empowered by technology, connects humans to the convergence of physical and digital realities [11]. Human interactions in marketing and sales play a fundamental role in fostering connections with customers, generating increased value within the business realm.

Experiential marketing focuses on creating enriching customer experiences through sensory-targeted marketing actions, influencing decisions and preferences regarding a brand, product, or service. According to [2], the core component of experiential marketing is the customer experience, encouraging active participation in the purchasing process and involving various perceptions and sensations. There is a growing interest in understanding the sensory experiences generated by sensory marketing [30], particularly those arising from direct experiences with phenomena and events with low symbolic, linguistic, or computational mediation, derived from immersion in VR environments. User experience is crucial for any application, and these applications offer a wide range of experiences based on underlying technological blocks, available interfaces, and devices used to access and interact within VR.

In this context, we propose a tourism and hospitality tours generation model in the metaverse, based on 360° VR videos. VR allows users to move freely within virtual spaces, while 360° VR provides spherical/panoramic experiences [24]. Studies indicate that it enhances perception and the sense of presence. Following the processing of the dataset consisting of 360° video, a Convolutional Neural Network (CNN) was developed with a structured input treatment to extract features, classify and output images used for the composition of virtual tours. For feature extraction, the network comprises multiple hidden layers, convolutional layers, ReLU activation function, and pooling. After training and subsequent testing, the automated labeling process for 360° videos was performed by the virtual tour visualization model. Additionally, dynamic generation of adaptive tours is explored using Case-Based Reasoning (CBR), considering past experiences, user profiles, and requirements, resulting in 360° video tours.

This article not only contributes to the research on digital marketing actions but also explores how Immersive Virtual Reality (IVR) can trigger experiences in cognitive, sensory, attitudinal, affective, and behavioral dimensions [12]. This evaluation serves to validate the model's effectiveness and understand consumer behavior and its effects on reservation intent.

The article is structured into several sections. Section 2 discusses the current state of the field, while section 3 focuses on the methods. Section 4 describe the 360° division and composition model, and section 5 provides provides data analysis and discussion of results. Finally, section 6 presents the conclusions drawn from the study.

2 Literature Review

2.1 Marketing and Experiences

A clear marketing strategy is required for organizations to achieve a competitive advantage and sustainable growth. The new paradigm of experiential marketing focuses on motivating customer purchasing decisions by generating memorable multidimensional experiences [31]. Previous studies have examined experiential marketing and branding in various environments, including the creative and cultural industries [8], luxury product consumption [33], and especially the tourism and hospitality [1]. These studies confirm the effectiveness of both previous marketing methods and strategies to encourage customer buying behavior.

Experiential marketing regards consumers as rational and sensitive human beings with a desire to explore objects, have experiences, and not just as individuals seeking to fulfill needs or gain utility from actions. The expected outcomes involve consumers responding to stimuli, demonstrating active purchasing behavior, and having entertaining experiences [2].

Consumer sensations and behavior have been the focus of various studies, particularly in the realms of sight, smell, hearing, touch, and taste, with emerging areas of research centering on sensory perceptions and marketing [19]. Marketing actions generate sensory experiences, which are linked to IVR, targeting various consumer senses. Sensory marketing aims to create memories through virtual experiences. Expectations are shaped based on previous experiences, explicit and implicit communication, and word-of-mouth recommendations. The unconscious role of the human mind in decision-making is considered relevant today, establishing that purchasing decisions involve a significant emotional component.

2.2 VR in Marketing and Advertising

According to [7], VR involves using a 3D environment generated by computational resources in which users interact and navigate, resulting in a real-time simulation that can be perceived by one or multiple users through the 'five senses.' For [14], the elements of VR include sensory immersion, implicit interaction, and simulation. Additionally, VR is associated with a 3D world where users interact with the virtual environment, constructing various types of knowledge. This process is characterized by low symbolic, linguistic, and computational mediation, offering experiences not found in the real world, with significant potential in education, marketing, and advertising, employing the concepts of "Dimension", "Transduction", and "Reification". VR can also utilize avatars that interact with each other and other elements in the virtual world.

According to [9], the potential offered by new technologies to tourists in searching for destinations can optimize the experiential process in both space and time, enhancing co-creation of value with stakeholders in the sector. Mobile technologies enable tourists to engage in real and virtual experiences simultaneously. Beck et. al [5] argue that technological solutions for VR-based applications can be fully immersive, semi-immersive, or non-immersive, with the claim that the more immersive the solution, the more complex the implementation of content and technology used by devices. Head-mounted displays used by users for VR-based tourism marketing activities are considered a good solution due to their immersive capability and cost-effectiveness.

Research in VR is focused on evaluating customer perceptions of presence and immersion [22], narrative transportation, or the establishment of story plots that can complement these elements [26]. Narrative transportation is based on cognitive processes experienced by the customer as a result of emotional immersion in a story with a plot and characters [26]. Various researchers have established that content with narrative structures influences feelings of presence due to sensory signal stimuli. Presence is an experience in the virtual world, as if it were happening in the real and authentic world, allowing for the evaluation of consumer visualization considering the environmental effect. Immersion in visual and aesthetic elements generates experiential responses [38]. The sense of reality created in VR environments through these feelings is crucial, especially since consumers cannot physically touch objects (due to the absence of haptic feedback resources).

Experiences provided by AR/VR/MR stimulate consumer imagination before, during, and after purchase [16]. These technologies enable better omnichannel experiences using different online and offline points for consumers. The 360° VR technologies are tools utilized in the adaptive model of experiential marketing proposed in this work. They provide interactions considering user profiles and interests to generate personalized virtual tours and experiences with information provided by a hotel located in a specific environment.

2.3 360° Videos in Tourism and Hospitality

360° videos allow for the integration of applications in immersive VR environments, providing viewers with autonomy in their explorations. This autonomy enhances perception and, consequently, attitude towards the visualized environment. The independence afforded by this technology contributes to better motivation and a more positive attitude towards the explored content by the user.

Oh and Cho [23] outline the benefits of autonomy in 360° videos, which improve satisfaction and acceptance levels, constituting one of the adaptive attributes of the system. The authors found a significant relationship between users' perception of autonomy, satisfaction with the use of technologies, and virtual worlds in a social context.

The use of 360° VR in tourism activities is focused on visualizing content captured in real tourist or hotel environments synthesized in 360° videos. These videos can be presented on computer or mobile screens, utilizing Head-Mounted Displays (HMDs) and serving as a means to create virtual experiences. These experiences, influenced by the visual and sensory stimuli of immersion, can contribute to the intention to make reservations. They can assist users in planning, managing, marketing, exchanging information, and engaging in various activities related to their journey, as well as in the preservation of natural and cultural heritage.

360° VR virtual tours in the field of tourism enable the immersive and audiovisual presentation of a destination. The goal is to provide potential clients and users with a virtual visit experience, allowing them to have direct experiences of the chosen destination, potentially influencing their choice and reservation intentions [37]. De Gauquier et. al [12] mentions that 360 technology represents an improvement over traditional 2D, emphasizing the crucial factor of properly guiding the user's attention during a tour, either through signals within the video itself or accompanying sounds that appropriately focus on desired actions or points.

360° videos serve as a significant motivator very close to the real experience in tourism and hospitality applications. They stand out among other immersive technologies due to their easy accessibility, as these videos can be enhanced through equipment such as VR immersion headsets but can also be viewed on mobile devices or computers.

Tourists seeking destinations or having other travel interests look for information that guarantees quality tourist or hotel destinations. Virtual experiences contribute to these objectives due to the exceptional control they provide over visualization experiences, which surpass standard videos, emphasizing the immersion attribute [2]. People have a preference for visual elements and high-significance content in virtual tourism and hotel tours. The loss of details or lack of audiovisual resources can have a negative impact on experiences and immersion [19].

2.4 Convolutional Neural Networks

A neural network involves a training phase, where the network parameters are estimated based on the adopted training dataset, and a testing phase, where the trained network is applied to predict the classes of new input data [3] [27]. In this work, a CNN is used with a supervised learning approach. Its hierarchical structure mimics the visual cortex of the human eye, learning to extract the most representative visual features from an image for specific objectives. It consists of layers specialized in processing and identifying features. The initial layers can detect lines and polygonal shapes, while subsequent layers can recognize complex features such as faces or silhouettes. This model takes image dimensions and colors as input, represented as channels.

The distinctive aspect of this model lies in convolutions, where the image is traversed based on a randomly generated kernel/filter. This process produces vector products that form an output matrix, which becomes one of the hidden layers. These matrices contain features of the original image and are useful for future detection tasks. The Rectified Linear Unit (ReLU) function is then applied in another layer to reduce negative values, followed by pooling to downsample the feature maps before activation.

To reduce the size of the next layer of neurons, a subsampling process is performed, where the size of filtered images is reduced to emphasize important features detected by each filter. Multiple iterations are performed in this stage without restrictions on the frequency.

The process concludes by taking the last hidden layer corresponding to subsampling, which becomes a layer of traditional neurons. A Softmax function is applied to connect to the final output layer, which has neurons corresponding to the classes being classified. During training, the outputs have the format known as "one-hot-encoding."

2.5 Case Base Reasoning

CBR is an AI technique used to address problems related to learning, identification, reasoning, fault treatment, decision support, and problem resolution based on experience. It reuses knowledge, considering experiences and solutions from similar previous cases to solve new problems. It includes a case base with previously stored cases. According to [6], similar cases are solutions obtained from a case base and are used for the specific solution of a new problem. The new solution can then be stored in the case base to improve the quality of solutions [6]. CBR follows a four-stage cycle: Retrieve, Reuse, Revise, and Retain. Figure 1 illustrates the architecture of a CBR system.

3 Methods

The proposal was developed in 5 phases, as shown in Fig. 2.

For the establishment of the state of the art, the PRISMA method was utilized, allowing for a systematic literature review and meta-analysis of the topics of interest. Keywords were identified for the construction of the search string, which was applied to the fol-

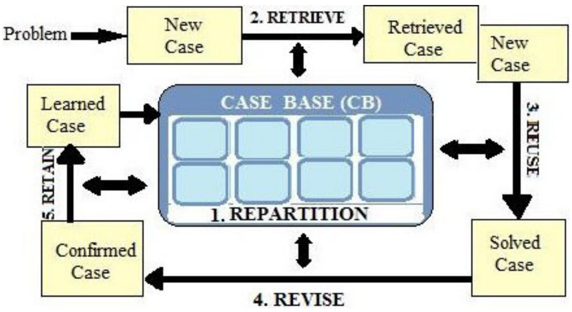

Figure 1: CBR cycle of R5 model [6].

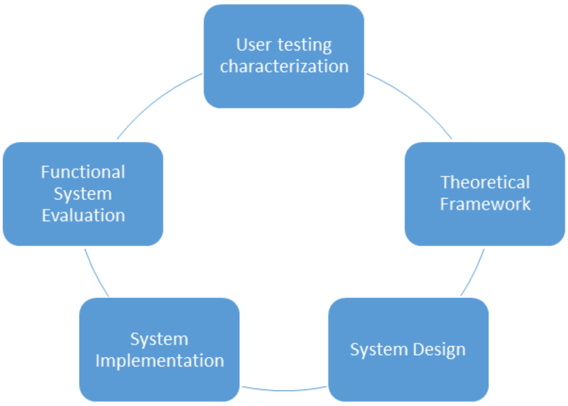

Figure 2: Development Phases Proposal.

lowing databases: Web of Science, Scopus, and IEEE Xplore. Articles from journals and conferences published in the last 20 years were considered. Duplicate documents were removed, and those not deemed relevant to the study were excluded. Applying inclusion and exclusion criteria, 36 studies were retained.

The development of the model comprises the following stages:

1. Identification of requirements and gathering user experience information through interventions with executives and hotel staff.

2. User experience analysis and mapping of experiences with management and marketing specialists.

3. Capture 360° videos of hotel, surroundings, as well as searching and selecting videos.

4. Design of user interface prototypes, including the automation of the process of splitting and composing 360° videos of environments for the creation of custom tours for tourism and hospitality in metaverse, using CNN and a Fuzzy-CBR system.

5. Implementation of an immersive display layer with Unity for VR immersive headsets.

6. Implementation of the CBR reasoning mechanism and a REST API.

7. Conduct functionality tests and model validation.

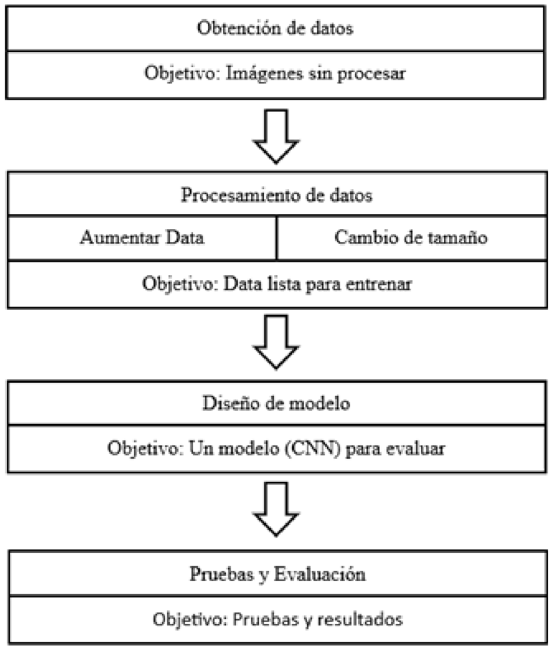

Figure 3: Diagram of proposal process.

4 360° Division and Composition Model Proposal

4.1 Research Objective

To automate the process of splitting and composing 360° videos corresponding to real environments for the generation of personalized tours for tourism and hospitality, using CNN. The proposal focuses on the labeling phase of 360° videos and aims to automate the manual labeling process, followed by the composition of virtual tours based on user profiles according to the recommendations of the Fuzzy CBR. Figure 3 shows the process diagram of the division using the CNN neural network.

4.2 Data Set

Images of various hotel environments, such as rooms, bathrooms, living rooms, patios, and pools, were obtained from various datasets on websites on the internet, totaling 2500 images. These images were divided into the proportion of 80% for training and 20% for testing. Figure 4 displays the selected images of various environments that will constitute the dataset.

4.3 Preprocessing of Data

Preprocessing involves the processes carried out on the data to prepare it for use in the input for the training stage. The processes for image preparation are as follows.

4.3.1 Data Augmentation

This stage involves the augmentation of required data because the obtained dataset is limited. In order to optimize classification accuracy, a minimum of 1000

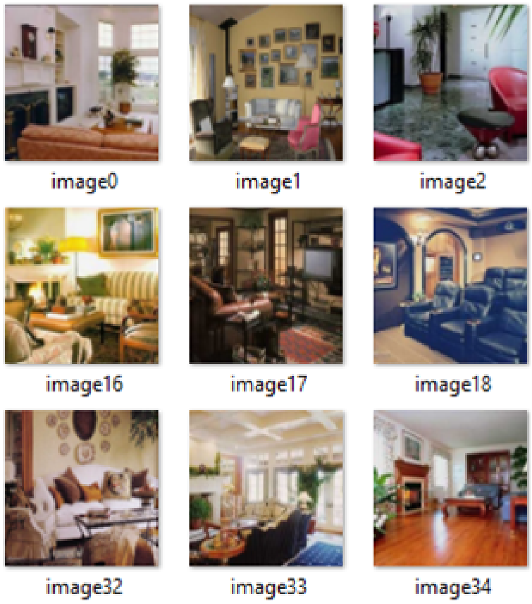

Figure 4: Data Set.

Figure 5: Augmented images.

images were set for each environment. However, obtaining the minimum amount of data manually is a complex task. To address this, each image is horizontally flipped to obtain 2 images for each original image. Figure 5 shows an example of data augmentation.

4.3.2 Resizing

The resizing is done to standardize the size of each image, as images obtained from different datasets may have different sizes and dimensions. In this proposal, they are resized to 224 x 224 pixels for each image.

4.4 Model Design

After processing the data to prepare them for use, a design and construction process for a learning-capable model is carried out. A CNN is a suitable technique for processing image inputs, because each neuron is represented by two dimensions. The CNN structure is composed of an input, the feature extraction, classification and output process. The feature extraction consists of several hidden layers, convolutional layers, the activation function (ReLU), and pooling.

The architecture created for the CNN model is detailed in Figure 6.

1. The first layer, Conv2D, defines the dimensions.
2. The second layer uses the LeakyReLU function for neuron activation.

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 224, 224, 32)      896

 leaky_re_lu (LeakyReLU)     (None, 224, 224, 32)      0

 max_pooling2d (MaxPooling2  (None, 112, 112, 32)      0
 D)

 dropout (Dropout)           (None, 112, 112, 32)      0

 flatten (Flatten)           (None, 401408)            0

 dense (Dense)               (None, 32)                12845088

 leaky_re_lu_1 (LeakyReLU)   (None, 32)                0

 dropout_1 (Dropout)         (None, 32)                0

 dense_1 (Dense)             (None, 5)                 165

=================================================================
Total params: 12846149 (49.00 MB)
Trainable params: 12846149 (49.00 MB)
Non-trainable params: 0 (0.00 Byte)
```

Figure 6: Architecture detail.

3. The third layer uses MaxPooling (2×2) to reduce images from 224×224 to half (112×112), while maintaining the detected features in each kernel.
4. To prevent overfitting, the Dropout technique is added and applied to both layers.
5. The fifth layer flattens the 32 filters to create a layer of 32 traditional Dense() neurons.
6. Finally, in the output layer, there are 5 neurons with Softmax activation.

After designing the model and defining the structure, training is performed with a parameter of 100 iterations. This allows for better accuracy in the results, which will be subsequently used in the labeling process for the implementation of the virtual tours generator for hotels and tourism.

4.5 Case Base Reasoning Engine

A subsystem focused on adaptive characteristics for the execution of the established marketing strategy, which will be implemented in part through virtual tours of hotel or tourist environments. It identifies the user profile to generate adaptive virtual navigation in the tours with an immersive visualization of facilities, services, and environments in tourist and hotel zones. It includes a component based on CBR, which establishes personalized routes based on user profiles and the availability of immersion devices. Objects within the system are dynamically presented to clients or users according to their demands through the interface shown in Figure 7.

In the proposal, 360° VR videos are used to generate these tours, which are the result obtained with the 360° VR division and composition model described. This model acquires video segments that compose the tours based on the recommendations of the CBR. The

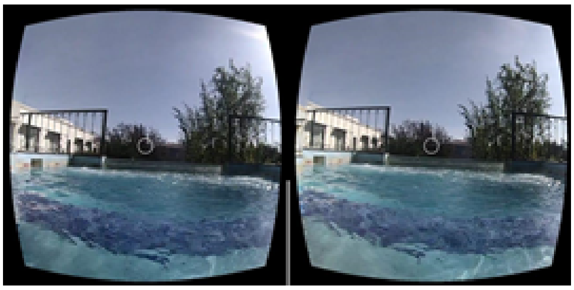

Figure 7: Virtual tour.

impact of the tours can be enhanced by including elements such as videos, images, music, etc., in accordance with experiential marketing strategies. These strategies enable users to explore through hot points, and avatars can also be developed. The result of a query is obtained using a descriptor that has a set of attributes retrieved from databases used by hotel companies, as detailed below:

- Id: Identifier for recommended routes for users.
- Zone: Tourist destination or hotel, which can be located in the city, countryside, or beach.
- Purpose: Travel can be for work, vacation, etc.
- Services: 360° videos displaying the services that may be of interest to the user during the tour.
- Company: The user may travel alone or with a partner, family, friends, etc.
- Priority: Descriptor of an important attribute or feature for the user at the time of choosing a hotel.

Six (6) parameters were established to define the functionalities of the search engine, similar to the search cases of the CBR engine.

- Attribute Name: considered for the search.
- Search Value: Value for the closest search case.
- Weights: Assigned at the time of the search and obtained through the average opinions of tourism, hotel management, and marketing specialists, as well as potential users, as shown in Table 1.
- Terms: Abstraction of the search method for each attribute, defined to search for equal values, greater than, less than, closure, etc.
- Scales: Mathematical representation that can be logarithmic, linear, etc., used to search for differences between stored cases and the new case.
- Search Options: Method for returning search results; returning the closest values was predetermined. The results of searches must be ordered or enumerated in a way that prioritizes cases closest to the base route. The visualization of cases through the immersive interface allows users to see recommendations that take into account the preferences entered earlier. If, after the search, the user chooses to follow a recommended route, a new case is created in the Case-Base, following an evaluation by the Fuzzy CBR component. This is done to increase the cases in the case base, thereby improving the quality of future searches by obtaining cases closer to the user's preferences.

Table 1: Attribute Table.

Attribute	Weight
Zone	15%
Motive	24%
Services	17%
Company	20%
Priority	24%
TOTAL	100%

Searches conducted by the CBR component use the weights and scales defined for the recommendation search [28]. After evaluating all cases, a list of cases ordered by similarity is obtained, which is then displayed and recommended to the user in the immersive application within the hotel or tourism environment.

5 Data Analysis and Discussion of Results

5.1 Results of the Automation Process of the Division, Composition, and Labeling Process

The obtained results allow affirming that the process of division and subsequent automation of the labeling phase was significantly improved in processing time with the application of the pre-trained CNN model. It was not possible to achieve 100% accuracy during the model training, reaching an accuracy exceeding 90%, which is deemed an acceptable outcome.

5.2 Results of the CBR Process

For the validation of CBR, the Case Library Subset Test (CLST) technique proposed by [13], was utilized. A subset of the case base was selected to evaluate the effectiveness of the system's adaptation and recovery functions. Result Acceptability Criteria (RAC) parameters were defined with a value of 15%, and a System Validity Criteria (SVC) with a threshold SVC value of 75%.

A total of 50 cases were used for recovery and adaptation tests with the CLST technique. After conducting the tests, a 100% acceptance rate was achieved in the recovery tests, and an 88% acceptance rate in the adaptation tests. Therefore, it is considered that the proposed CBR model is valid according to the SVC parameter (75%) of the CLST techniques.

5.3 Methodology for Validating the Effectiveness of the Model

This study is exploratory and descriptive in scope, following a non-experimental and cross-sectional design. The research type is quantitative, with some questionnaires adapted to obtain affective responses [22], for the evaluation of attitudinal responses [36] [34], and for assessing cognitive load [17], using the NASA Task Load Index (TLX) test. Sampling was random, involving 203 questionnaires applied to a young population. The SPSS statistical package was used for data processing. The study utilized a website of a boutique hotel located in Arequipa, Peru, which included images of rooms, facilities, services, and the surroundings. The 360° VR video test case used a VR Head-Mounted Display (VR HMD) device, utilizing a smartphone to generate immersive experiences. Participants in the VR group were assisted in using the devices and provided verbal consent for the use of their images in the study.

The experiment was conducted in different locations and environments, where subjects experienced individual 5-minute sessions, being asked to imagine being in a scenario of selecting a hotel, considering the study's motivations and location. Verbal consent was obtained from participants to use their images for study documentation. After the experience, participants completed a Google questionnaire, responding to questions that evaluated cognitive, behavioral, affective, and attitudinal aspects, including demographic information. The test was completed in 1 month.

Literature on consumer behavior allows establishing that cognitive, affective, and attitudinal responses are important for understanding consumer habits, decision-making, and behavior prediction.

The validation of architecture results is carried out through the following questions:

How to compare web page and photograph visualizations to adaptive 360° VR tour videos in terms of:

1. Cognitive load, relative to the efforts of technology usage and tasks linked to user experiences?
2. Behavioral/attitudinal responses?
3. Affective responses?

It is possible that VR triggers experiences in cognitive, sensory, attitudinal, affective, and behavioral dimensions [12].

5.3.1 Cognitive Response - CLT [25]

Proposes a model that establishes the limited capacity for attention [20] and provides a framework for understanding visualizations with 360° VR. Images visualized with 360° VR may imply a higher cognitive/perceptual load than traditional images, content, and other objects on websites, allowing the formulation of the following hypotheses:

Hypothesis 1a: Hotel visualizations with 360° VR will not generate a higher cognitive load compared to traditional visualizations of images, content, and other objects in similar scenes on websites.

Hypothesis 1b: Hotel visualizations with 360° VR will generate a higher cognitive load compared to traditional visualizations of images, content, and other objects in similar scenes on websites.

5.3.2 Affective Response

Several studies report that immersive experiences in VR trigger different emotional conditions, such as galvanic skin responses, increased heart rate, elevated blood pressure, and alterations in respiratory rhythm [21]. VR, by activating the senses, can lead to more intense affective responses compared to traditional images. VR can also influence the evocation of affective responses, including pleasure, excitement, and feelings of frustration [15]. 360° VR hotel videos may provoke stronger affective responses compared to photos and traditional videos on websites. Based on the above, the following hypotheses can be established:

Hypothesis 2a: 360° VR hotel environment visualizations will not generate a greater affective response compared to traditional visualizations of images, content, and other objects in similar scenes on the website.

Hypothesis 2b: 360° VR hotel environment visualizations will generate a greater affective response compared to traditional visualizations of images, content, and other objects in similar scenes on the website.

5.3.3 Attitudinal and Behavioral Responses

The visualization of 360° VR videos can influence customer behaviors and attitudes, but there is a need for further research in the field due to limited knowledge in tourism and hospitality activities. Van Kerrebroeck et al. [18] reported more positive attitudes, satisfaction, and loyalty after participating in VR experiences in the context of shopping malls. According to [10] and [35], representational richness and presence (an important attribute in VR) can influence customers' more positive attitudes toward a brand and purchase intention.

Based on the framework discussed, the following hypotheses are established:

Hypothesis 3a: The 360° VR visualization of the hotel will not generate a more positive attitude compared to the traditional visualization of images, content, and other objects in similar scenes on the website.

Hypothesis 3b: The 360° VR visualization of the hotel generates a more positive attitude compared to the traditional visualization of images, content, and other objects in similar scenes on the website.

Hypothesis 4a: The 360° VR visualization of the hotel will not result in a better behavioral attitude compared to the traditional visualization of images, content, and other objects in similar scenes on websites.

Hypothesis 4b: The 360° VR visualization of the hotel will result in a better behavioral attitude compared to the traditional visualization of images, content, and other objects in similar scenes on websites.

The affective response to the visualization was assessed using the Pleasure, Arousal, and Dominance (PAD) scale [22], validated by various studies evaluating affective responses. The scale is applicable to colors and physical environments [26]. The intervention with the scale begins with a statement: "After seeing the images of the hotel, I feel..." followed by 18 bipolar items:

1. Adjectives related to pleasure, in pairs: happy-unhappy, satisfied-unsatisfied, content-displeased, joyful-depressed, hopeful-hopeless, relaxed-bored.
2. Adjectives related to arousal, in pairs: stimulated-relaxed, excited-calm, frantic-calm, awake-drowsy, excited-not excited.
3. Adjectives related to dominance, in pairs: controlling-controlled; influential-influenced; important-insignificant; dominant-submissive; unrestricted.

To assess bipolar pairs, a semantic differential scale composed of 7 items, ranging from 1 to 7, can be used [26]. Behavioral intentions focused on hotels were evaluated with a 7-item scale adapted from Slevitch and Oh [34], which includes attitudinal themes such as:

1. What is the likelihood that you would decide to book the hotel you saw?
2. How satisfied would you be with the decision to stay at the hotel?
3. Does the visualized hotel match your price expectations?

Behavioral questions:

1. What is the likelihood of booking a hotel of this type?
2. What is the likelihood that you would say positive things to others about the hotel?

One of the methods for evaluating cognitive workload is the NASA TLX, which subjectively assesses mental workload based on the cognitive demands of the task. TLX evaluates six areas of workload: mental demand, physical demand, effort, temporal demand, performance, and frustration, assessed through the differential scale method. The reliability and validity of the method have been confirmed by various studies. The validation of question consistency was assessed using the Cronbach's alpha method, applied to the survey for both groups, with satisfactory results (Table 2).

Table 2: Reliability Statistics.

Cronbach's alpha	Cronbach's alpha based on standardized elements	Number of elements
.830	.832	10

5.4 Discussion of Model Validation Results

The analysis is as follows: A factor analysis was restricted to three components used for (1) the dimensionality proposed by the PAD scale: Pleasure, Arousal, and Dominance; (2) composite variables were developed based on the sum of values for each factor. Principal component analysis was used as the extraction method, and the varimax method with Kaiser normalization was applied for rotation. The correlation cutoff value was 0.5. The factor analysis was deemed appropriate based on the Bartlett model. The sphericity test ($p < 0.000$) and the Kaiser-Meyer-Olkin (KMO) test, which yielded a statistic of 0.838, confirmed the adequacy of the factor analysis.

5.4.1 Cognitive Load Responses

The results show low to moderately low mental demand (18.78), low to moderately low physical demand (20.78), low to moderately low pace of visualization (18.92), low to moderately low effort (19.86), low to moderately low satisfaction with performance level (15.03), and low to moderately low feelings of irritability, stress, and discomfort (14.01).

5.4.2 Affective Responses

For the affective dimension test, the related results obtained regarding how participants felt after watching the 360 VR video were as follows: pleased or somewhat pleased (57%), satisfied or somewhat satisfied (73.6%), excited or somewhat excited (59.1%), relaxed or somewhat relaxed (70%), important or somewhat important (42.5%), calm or somewhat calm (65.3%), secure or somewhat secure (60.1%), rested or somewhat rested (54.4%), and comfortable or somewhat comfortable (64.8%), were significantly higher compared to indifferent responses for all questions. The average of indifferent responses for all questions was significantly lower (28.87), as well as for somewhat unhappy and unhappy responses (3.6), bothered or somewhat bothered (22.3), dissatisfied or somewhat dissatisfied (4.7), bored or somewhat bored (18.2), tense or somewhat tense (7.7), insignificant or somewhat insignificant (20.8), uneasy or somewhat uneasy (5.2), insecure or somewhat insecure (16.6), tired or somewhat tired (9.3), and uncomfortable or somewhat uncomfortable (8.8).

5.4.3 Attitude and Behavior Responses

In the attitude and behavior dimension, the results obtained in relation to how participants felt are as follows: Satisfied or very satisfied: 14%, Indifferent: 23%, Dissatisfied: 52.1%. Regarding, the question of whether the hotel seen is in line with its price: Very much agree and agree: 15.5%, Indifferent: 38.8%, Very much disagree and disagree: 47.9%. Regarding the question of how likely they would book such a hotel: Very likely and extremely likely: 19.7%, Somewhat likely: 38.9%, Not likely at all and not very likely: 41.4%. Regarding the question of how likely they would speak positively about the hotel to other people: Very likely and extremely likely: 14%, Somewhat likely: 35.8%, Not likely at all and not very likely: 50.2%.

5.4.4 Discussion and Implications

The results obtained after viewing the 360 VR video allow for the following conclusions:

- Cognitive dimension test showed a low cognitive load, facilitating information processing (encoding, storage, and information retrieval), positively influencing customer attention and behavior.
- Affective dimension test found that stronger affective responses were triggered.
- Attitude and behavior dimension test revealed positive attitudes and booking intentions. The low response levels recorded may stem from the video quality, which may not have included the visual appeal representative of the hotel's facilities. It could also be that the selected hotel is not of interest to the target audience, considering age, lifestyle, economic status, and lack of experience as hotel users. Another important aspect could be the system response times during the experience.

6 Conclusion

The "Experiential Marketing Tourism and Hospitality Tours Generation Hybrid Model" was proposed and developed in an immersive environment based on 360° VR for the promotion of tourism, hotel environments, their surroundings, as well as tourist areas. This involved an automated division of 360° videos based on CNN, and the results were used for the composition of personalized tours based on user profiles, following the recommendations of the CBR.

The results obtained establish that in the process of division and automation of the labeling phase, there was a significant improvement in processing time with the application of the model using CNN.

For the recovery and adaptation tests of the CBR, 50 cases were used, and the CLST technique was applied. After conducting the tests, a 100% acceptance rate was achieved for recovery tests and 88% for adaptation tests, establishing the validity of the CBR, considering the SVC parameter (75%).

7 Limitations and Further Research

The response times for the composition of video sequences, as well as the quality of 360° VR videos for tour creation, could have affected the self-report responses. For future research, the use of VR hardware for different levels of immersion, along with strategies focused on the sense of hearing, should be considered.

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