The Digital Third Place: Analyzing the Impact of VR-Based Ambience on Customer Experience and Dwell Time in Modern Cafés

Aanchal Mishra , Dr Amol Kumar
National Council for Hotel Management and Catering Technology

Abstract - A paradigm change from a service-based economy to an experience-based economy is taking place in the contemporary hotel sector. Stakeholders are increasingly using immersive technologies to differentiate their offers as the conventional "Third Place"-the café-faces market saturation and aesthetic standardization.

This research proposal outlines a study to investigate the impact of Virtual Reality (VR)- based ambience (specifically projection mapping and "cave" environments, rather than headset-based isolation) on two critical variables: Customer Experience (CX) and Dwell Time.

While existing literature extensively covers VR in tourism (pre-experience) and gaming (active immersion), there is a significant paucity of research regarding "passive immersion" in social settings. This study aims to bridge that gap. Utilizing a quantitative, descriptive- correlational research design, the study will survey n=300 café patrons in metropolitan hubs who frequent establishments employing digital atmospherics. The study posits that dynamic digital environments create a "Time Compression" effect, leading to longer actual dwell times despite lower perceived dwell times, mediated by emotional engagement. The findings of this research will offer critical managerial implications for café owners regarding Return on Investment (ROI) for immersive tech, and contribute to the academic fields of environmental psychology and digital servicescapes.

1.0 INTRODUCTION

1.1 Context of the Study

In contrast to the house (First Place) and the office (Second Place), the café has long served as the "Third Place," a phrase used by sociologist Ray Oldenburg to characterize the social anchor of community life. Social interaction and caffeine consumption were the café's value proposition for centuries, from the coffee shops of the Enlightenment to the espresso bars of the 20th century.

But the café of the twenty-first century is in trouble. The emergence of "Industrial Chic" design, which uses reclaimed wood, exposed brick, and Edison lamps, has resulted in a uniformity of café aesthetics that architect Rem Koolhaas may call "Junkspace." The "Starbucks Effect" has normalized coffee consumption in the meantime. Novelty is no longer present. In a time when good coffee is readily available at home, a real café needs to provide something that the house cannot: a transformational atmosphere.

1.2 The Technological Pivot

We are witnessing the entrance of "Immersive Hospitality." Ambient virtual reality technology, which projects dynamic, high-resolution digital environments onto a room's actual surfaces, is used in this. This makes it possible for a café to change from an evening bioluminescent forest to a morning Parisian streetscape. In contrast to the solitary experience of virtual reality headsets (HMDs), this technology promotes "shared presence," preserving the café's social structure while changing its sensory reality.

3.0 PROBLEM STATEMENT

The core business problem driving this research is the "Investment-Value Disconnect" in the hospitality sector.

There is a lot of pressure on restaurateurs and café proprietors to modernize. Sales pitches for pricey immersive technologies, such as projectors, LED walls, and sensory augmentation systems, which can cost more than $50,000 for a basic installation, are constantly being made to them.

Nevertheless, there is insufficient empirical support for this capital investment.

* **The Psychological Blind Spot**: We do not know if customers actually enjoy these environments for prolonged periods. Does a moving digital wall cause motion sickness or cognitive fatigue (cybersickness) during a 45-minute coffee break?

* **The Operational Uncertainty**: Does the novelty of the environment translate to Dwell Time? Do patrons who remain longer to watch the visuals buy more (the "second cup" hypothesis) or do they just spend hours at a table making one purchase, which lowers table turnover and profitability?

The industry is relying on enthusiasm rather than data since there is no scientific understanding of how VR-based ambiance affects consumer behavior.

4.0 RESEARCH GAP

A preliminary review of the literature reveals a distinct gap that this study intends to fill. The current body of knowledge can be categorized into three "silos" that rarely intersect:

* **Silo A:** VR in Tourism (Pre-Experience): A lot of study has been done on the use of VR to promote travel destinations (e.g., taking a virtual tour of a hotel before booking). This emphasizes anticipation rather than the actual experience.

* **Silo B:** Headset VR (Isolation): Research primarily focuses on employing Head-Mounted Displays (HMDs) for training or gaming. These studies support great immersion, but they also call for total seclusion from the outside world, which runs counter to a café's social mission.

* **Silo C:** Traditional Atmospherics: Classic marketing literature (Bitner, 1992) studies static cues like lighting, color, and music. It does not account for dynamic, moving walls or interactive digital surfaces.

The Gap: There is virtually no research on "Ambient, Social VR" in a retail/hospitality context. Specifically, the link between digital environmental dynamism and perceived time duration in a café setting remains unexplored. This study sits squarely in this unexplored intersection.

5.0   REVIEW OF LITERATURE

This section synthesizes key theoretical frameworks that underpin the proposed study.

5.1   Theoretical Foundation: The Servicescape Model

The primary lens for this study is the Servicescape Model developed by Booms and Bitner (1981). This framework argues that the physical environment is not a neutral container but an active participant in the service delivery.

* **Dimensions:** It categorizes environment into Ambient Conditions (temperature, noise), Spatial Layout, and Signs/Symbols.

* **The Update:** This study proposes a "Digital Extension" to the Servicescape model. We argue that VR projection creates a "Fluid Servicescape," where the ambient conditions are not static. Literature on "flow states" suggests that dynamic visual stimuli can capture attention more effectively than static art, potentially increasing the customer's "stay" intention.

5.2   The Experience Economy

Pine and Gilmore (1998) revolutionized marketing by defining the Experience Economy. They argued that services are now commodities, and the new competitive battleground is the "staging of experiences."

* **Relevance:** In a café, the coffee is the commodity; the service is the barista; the experience is the feeling of being transported.

* **Critical View:** Recent critics argue that the Experience Economy has led to "Instagram ability" over substance. This study investigates if VR ambience provides genuine emotional value or merely "social currency" (a backdrop for selfies).

5.3   Dwell Time and Time Perception Theory

Dwell time is the duration a customer stays in a specific area. In psychology, Time Perception Theory (specifically the Attentional Gate Model) posits that time perception is subjective.

* Cognitive Load: When a person is bored, they focus on the passage of time (time drags). When they are cognitively absorbed, they allocate fewer resources to tracking time (time flies).

* The VR Connection: Research in gaming shows that VR induces strong "Time Compression." If this holds true for ambient VR in cafés, customers may stay for 90 minutes while feeling like only 60 minutes have passed. This has profound implications for "table turnover" strategies.

5.4   Sensory Marketing and Gastrophysics

According to recent research in gastrophysics (Spence, 2017), visual settings can affect how people perceive flavor.

* Sonic Seasoning & Visual Flavor: Research indicates that while angular shapes and blue lighting enhance bitterness, rounder curves and red lighting can make drinks taste sweeter.

* Hypothesis Link: If VR ambiance can change the room's color scheme, it may slightly improve the beverage's perceived quality, raising customer satisfaction ratings regardless of the product's real quality.

5.5   Online experience sustainability and design

finally digital ambiance has a sustainability rationale a physical space creates waste changing a digital projection does notaccording to buhalis and leung 2018 smart hospitality ecosystems can increase productivity vr-based dcor enables a venue to totally transform its appearance and feel without the need for construction or material waste bringing the company into line with contemporary sustainable innovation goals

5.6   The Concept of "Place Attachment" and the Digital Third Place

Oldenburg's "Third Place" theory suggests that cafes provide a vital social anchor outside of home and work. Modern research explores how digital layering affects this sense of belonging.

Virtual Anchoring: We're investigating if a VR-enhanced setting makes a client feel more "at home" or creates a sense of separation.

The Paradox: While technology is commonly criticized for social isolation, research suggests that "shared immersion"—in which everyone in the cafe experiences the same digital world—can actually provide a distinct, communal sense of location.

5.7   Narrative Transport Theory

This theory, often used in media studies, explains how people get "lost" in a story. In a VR cafe, the ambience isn't just a background; it's a spatial narrative.

Escapism: According to research, when a physical environment conveys a coherent tale (for example, a "cyberpunk" cafe or a "underwater" lounge), clients experience higher levels of "narrative transport."

Impact: This mental journey improves brand recall. A client remembers not only the coffee, but also the "story" they experienced while drinking it.

5.8   Biophilic Architecture and Digital Repair

"Restorative Environments"—spaces that aid in people's recovery from mental exhaustion— are a common subject of environmental psychology.

Virtual Nature: According to literature on biophilia, people have a natural need to interact with the natural world.

The Research Gap: Research indicates that cortisol levels can be lowered just by viewing a digital forest. Cafes can provide "stress-recovery" as a service by using virtual reality (VR) to present natural features (moving trees, flowing water), transforming the space from a snack stop to a health destination.

5.9   The "Awe" Factor and Consumer Pro-Sociality

Psychological research into the emotion of "Awe"—that feeling of being in the presence of something vast—shows that it changes how we treat others.

The VR Effect: Immersive tech is uniquely good at inducing awe.

Behavioral Outcome: Studies suggest that customers who experience awe in a commercial space are more likely to be patient with staff and report higher overall life satisfaction, which creates a "halo effect" for the cafe's brand.

5.10   Cognitive Fit and Task-Ambience Alignment

Not all VR is good for all tasks. This point examines the theory of Cognitive Fit, which argues that an environment must match the user's activity.

Focus vs. Relaxation: A customer working on a laptop might need a "minimalist, blue-toned" VR ambience to focus, while a group of friends might prefer a "vibrant, warm" setting.

Personalized Environments: The literature suggests that the future of hospitality lies in "zoning"—using digital projections to create different psychological zones within the same physical room.

5.11   Presence and "Telepresence" in Commercial Settings

Telepresence—the experience of "being there" although being physically elsewhere—is a critical component of virtual reality.

Physical-Digital Blending: In a cafe, the customer exists in two places at once. This "dual presence" can be tricky; if the VR is too intense, the customer might forget to eat or drink.

The Balance: Successful hospitality design requires a "semi-immersive" approach where the digital world enhances the physical coffee, rather than completely replacing it.

6.0   RESEARCH METHODOLOGY

To address the research objectives and test the hypotheses, this study will adopt a rigorous Positivist Research Philosophy, relying on quantifiable data to deduce observable laws of behaviour.

6.1 Research Design

A Descriptive-Correlational Research Design will be employed.

*Descriptive phase: To describe the demographics and habits of customers in VR-enhanced cafés.

   * Correlational phase: To statistically assess how strongly and in which direction the Independent Variable (IV) and Dependent Variables (DV) relate to one another.

6.2 Operationalization of Variables

Variable Type	Variable Name	Measurement Instrument
Independent	VR Ambience Intensity	Perceived Presence Scale (PPS): Measures depth of immersion, visual fidelity, and dynamic characteristics of the virtual environment
Dependent	Customer Experience (CX)	Schmitt's Strategic Experiential Modules (SEM): Measures Sense, Feel, Think, Act, and Relate dimensions using a 7- point Likert scale

Dependent	Dwell Time	Self-Reported Time Log: Comparison of "Time Entered" and "Time Exited"; Perceived Duration assessed through the question: "How long did it feel like you stayed?"
Mediating	Emotional Engagement	PAD Model (Pleasure–Arousal–Dominance) scale

6.3   Sampling Strategy

* Population: The study targets "Digital Natives" (Millennials and Gen Z) and "Digital Immigrants" (Gen X) frequenting metropolitan cafés.

* Sample Size: A minimum of n=300 respondents. This is calculated based on Green's formula (N > 50 + 8m) for regression analysis, ensuring sufficient power (0.80) to detect medium effect sizes at \alpha = 0.05.

* Sampling Technique: Purposive Sampling. We will select 4 specific cafés in [City Name] known for their digital art installations/projection mapping. This ensures all respondents have been exposed to the Independent Variable.

6.4   Data Collection Procedure

A structured, self-administered questionnaire will be distributed via QR codes placed on tables within these These particular cafés will use QR codes on tables to transmit a structured, self-administered questionnaire. Customers will be invited to fill either out the survey during or right after their visit in order to reduce recollection bias.

6.5   Plan for Data Analysis (Statistical Approach)

SPSS (Statistical Package for the Social Sciences) will be used to process and clean the data.

* Cronbach's Alpha: To evaluate the Likert scale questions' dependability (Target \alpha > 0.7).

* Pearson Correlation Coefficient (r): To examine the initial correlation between Dwell Time and VR Ambience.

To build a prediction model, use multiple regression analysis. The equation will be: Where Y is Customer Experience and

X are the predictors.

* Paired T-Test: To compare "Actual Dwell Time" vs. "Perceived Dwell Time" to test the time compression hypothesis.

7.0 RESEARCH HYPOTHESES

Drawing from the theoretical frameworks of the Experience Economy, Time Perception Theory, and the Servicescape Model, this study proposes the following hypotheses for empirical testing:

* H1: There is a significant positive correlation between the intensity of VR-based ambience and Customer Experience (CX) in modern cafés.

* H2: The intensity of VR-based ambience has a significant positive impact on the actual duration (dwell time) customers stay in the café.

* H3: In cafés enhanced with VR, there is a significant difference between actual dwell time and perceived dwell time, indicating a "time compression" effect.

* H4: Emotional engagement acts as a significant mediator in the relationship between VR- based ambience intensity and Customer Experience.

* H5: The association between VR-based ambiance intensity and stay length is significantly mediated by emotional engagement.

8.0   SIGNIFICANCE OF THE STUDY

Academic Contributions

This research addresses a specific gap in hospitality literature regarding "ambient" social VR—technologies that surround the user rather than isolate them in a headset. It expands upon Bitner's Servicescape Model by proposing the idea of a "fluid digital services cape," offering new perspectives for environmental psychology and consumer behaviour studies.

Managerial Implications

The findings provide café owners and hospitality managers with useful information from a commercial standpoint. The study clarifies whether the high expense of immersive technology results in observable advantages like enhanced table turnover or customer pleasure. It provides a basis for calculating Return on Investment (ROI) regarding interior design upgrades.

Industry Relevance

These findings will assist industry participants in integrating VR features responsibly as immersive technology becomes more affordable and widespread, ensuring that they improve the environment without interfering with operations or overwhelming visitors.

9.0   LIMITATIONS OF THE STUDY

This study has several limitations despite the valuable information it provides:

- **Geographic Scope:** The study's findings may not fully apply to cafés in rural or semi- urban areas where customer expectations are different because it was restricted to metropolitan areas.

- **Self-Reporting Bias**: Despite efforts to cross-verify time, some of the data depends on consumers' subjective recollections of how long they felt they remained.

- **Cross-Sectional Nature:** The data represents a snapshot in time. It does not track how customer behaviour might change after the "novelty factor" of the VR wears off.

- **Narrow Sample Reach:** Since the data comes from a fairly small and specific group, we can't be certain the results would stay the same if we tested them in a different type of café or with a totally different demographic.

- **The "Novelty" vs. Frustration Factor:** A person's existing comfort with technology plays a huge role here. Some people might have given high scores just because the VR felt "cool" and new, while others might have been annoyed by the tech, which naturally tweaks the satisfaction data.

- **Short-Term Observations:** We simply saw a snippet of the experience. It's difficult to predict if the favorable "vibe" would last through an hour-long visit, or if "digital fatigue" would eventually diminish the pleasure.

- **Uncontrollable Cafe Variables:** Real-world settings are messy. Things we couldn't control—like how crowded the shop was that day, the background noise, or a slow barista—likely bled into how people felt about the VR ambience.

- **Ignoring "Back-of-House" Reality:** The study focuses on the customer's point of view while ignoring operational difficulties for the owner, such as the high cost of hardware, technological faults, and the time required to train personnel.

- **Subjective Cultural "Vibes":** A high-end digital environment in one region may feel cold or disturbing in another. These findings are peculiar to a cultural setting and may not apply universally.

- **The Sensory Gap**: A café is a multi-sensory experience, but VR is wonderful for visuals. We only see a portion of the picture because we didn't include details like the fragrance of the coffee or the texture of the furnishings.

- **Rigid Survey Metrics**: We employed standard rating scales to keep things uniform, but statistics frequently fail to convey the delicate, "gut-feeling" emotional reactions that people experience while immersed in a digital world.

- **Intentions vs. Actual Spending**: There's always a gap between what people say they'll do on a survey and how they actually act. Just because someone says they "intend" to come back doesn't mean they'll actually become a repeat customer.

- **The Tech Expiration Date:** VR gear becomes "old news" incredibly fast. The headsets and software we used are current today, but in a year or two, they might feel clunky, which could change how future customers react to the same setup.

10.0 FUTURE SCOPE OF THE STUDY

Future scholars can build on this study in a number of ways:

 * **Longitudinal Research**: Future studies may track users over several months to ascertain whether the appeal of VR ambiance persists over time.

 * **Comparative Analysis:** Directly comparing sales figures and stay times between a standard café with a comparable menu and price and a VR-enhanced café would be advantageous.

 * **Experimental Controls:** To isolate particular factors, such as altering the digital projections' colour or speed to observe how each affects mood, researchers might set up controlled studies.

 * **Spending Behaviour:** To determine whether immersive settings genuinely result in increased average spending per ticket, future research could explore beyond dwell time.

 * **Biometric Integration:** Future research could incorporate heart rate monitors or facial expression analysis tools to obtain a more objective estimate of excitement or relaxation.

11.0   CONCLUSION

The body of research examined in this study makes one thing clear: VR-based ambience is no longer a futuristic concept; it is a fundamental shift in how we define hospitality spaces. By looking at the intersection of servicescape theory, the experience economy, and environmental psychology, it becomes evident that these digital environments act as "active agents." They don't just sit in the background; they actively influence a customer's emotional state, distort their perception of time, and redefine the very purpose of a physical café.

The Shift from Product to Presence

What stands out most from the literature is the radical shift in value. Instead of just selling coffee as a commodity, we are now selling a carefully chosen, immersive "state of mind." According to the research, concrete outcomes occur when a café strikes the "sweet spot"— balancing state-of-the-art technology with genuine design and customer expectations. We see deeper emotional engagement and a natural increase in "dwell time," which are the primary drivers of brand loyalty in a saturated market.

Strategic Implementation over Novelty

But the hardware by itself does not ensure that this integration will be successful. The most effective implementations are those in which virtual reality doesn't seem like a high-tech afterthought. It has to be integrated into the brand's identity. The feeling of "immersion" is broken and technology turns into a distraction rather than an asset if the digital world seems detached from the physical brand. This implies that "hybrid curation"—the capacity to concurrently handle digital and physical sensory inputs—is the key to the future of hospitality management.

Future Implications for the Industry

Ultimately, this study contributes to the field by repositioning VR ambience as a serious strategic asset. It is no longer just a "novelty" used to grab attention; it is a sophisticated method for crafting memory and emotional resonance. As we move forward, the "physicality" of a café will only be one layer of the guest experience.

For educators and industry leaders, the message is clear: the physical walls of a building are no longer the limit of what a hospitality brand can offer. We are entering an era where the atmosphere is as programmable as a computer, and the businesses that thrive will be those that learn to master both the digital and the physical "Third Place."

12.0   REFERENCES

[1]   M. J. Bitner (1992). Services capes: How the physical environment affects clients and staff. Journal of Marketing, 56(2), 57-71.

[2]   Bitner, M. J., and Booms, B. H. (1981). Organizational structures and marketing tactics for service companies. in service marketing. The American Marketing Association.

[3]   S. Kaplan (1995). Nature's healing properties: Toward an integrative framework. Environmental Psychology Journal, 15, 169-182.

[4]   R. Oldenburg (1989). The Great Good Place. The Paragon House.

[5]   Gilmore, J. H., and B. J. Pine (1998). Greetings from the experience economy. 76, 97– 105, Harvard Business Review.

[6]   C. Spence (2017). The New Science of Eating: Gastrophysics. * Tussyadiah, I. P., et al. (2018) Viking. Tourism provides empirical information on virtual reality, presence, and attitude transformation. Management of Tourism, 66, 140-154.

[7]   Booms, B. H., and M. J. Bitner (1981). Marketing strategies and organizational structures for service firms. 47(3), 51–67; Marketing of Services.

[8]   Buhalis, D., and R. Leung (2018). Smart hospitality: Connectivity and interoperability within an ecosystem. International Journal of Hospitality Management, 71, 41–50.

[9]   Davis, F. D. Information technology acceptance, perceived utility and perceived ease of use (1989). MIS Quarterly, 13(3), 319–340.

[10] Guttentag, D. A. Tourism Management, 31(5), 637–651 (2010). Applications and effects of virtual reality in tourism.

[11] E. C. Hirschman and M. B. Holbrook (1982). Hedonic consumption: Novel concepts, methods, and assertions. Journal of Marketing, 46(3), 92–101.

[12] Backman, K. F., Huang, Y. C., Moore, D., and Backman, S. J. (2016). Examining user

[13] acceptance of 3D virtual worlds in tourism and travel marketing. 36, 490–501; Travel Management