ABSTRACT

The emergence of the metaverse has attracted significant attention from industry and academia due to its transformative potential across diverse sectors of the global economy. In particular, the retail sector has been identified as a promising domain where immersive technologies can be leveraged to redefine customer engagement, reshape consumption experiences, and create new value streams. Unlike conventional online shopping, immersive virtual reality enables the creation of multisensory, interactive, and embodied shopping experiences in digital environments. These immersive capabilities not only enhance users' sense of realism and enjoyment but also provide retailers with innovative tools to drive engagement, brand loyalty, and *purchase intention*.

Despite this promise, the extant literature on immersive virtual retail remains fragmented. Some scholars have established direct links between VR system features such as *vividness* and *interactivity* and user perceptions including *immersion* and *presence*. Others have demonstrated connections between user perceptions and behavioural outcomes such as *purchase intention*. However, these findings appear scattered and uncoordinated, lacking an integrative framework that systematically connects VR features, user perceptions, and behavioural outcomes. Moreover, the moderating influence of cultural background, an important factor that shapes consumer attitudes, perceptions, and behaviours, is yet to be examined in immersive retail research. This represents a critical gap given the global and borderless nature of the metaverse, where users from diverse cultural settings interact with immersive environments.

In response to these gaps, this doctoral study was undertaken to investigate the intricate relationships among VR system features, user perceptions, cultural influences, overall user experience, and *purchase intention* in immersive retail settings. Four objectives guided the research: (1) to systematically review and synthesise VR system features from prior studies that demonstrate significant impacts on user perceptions in immersive virtual reality in a retail context, (2) to contextually co-develop a VR supermarket prototype and conduct controlled experiments to examine the relationships between VR features, user perceptions, and overall user experience in a retail context, (3) to investigate the moderating role of culture in shaping the relationship between user perceptions and overall user experience in immersive virtual retail, and (4) to evaluate the extent to which user experience in immersive VR influences the formation of *purchase intention* in virtual retail settings.

The study drew on three complementary theoretical lenses. First, cue utilisation theory provided a foundation for understanding how technological cues, such as VR system features, serve as signals that shape user perceptions and subsequent behaviours. Second, top-down processing theory from cognitive psychology explained how prior knowledge, expectations, and contextual factors guide user interpretation of immersive stimuli. Finally, validated design principles for VR experiments informed the co-development of the VR supermarket prototype, ensuring the application was both contextually relevant and technically robust. Methodologically, the research was underpinned by the pragmatist paradigm, which emphasises the practical integration of methods to address real-world problems. Accordingly, the study employed a mixed approach consisting of a systematic literature review, prototype design, and experimental testing of user responses.

The literature review confirmed *interactivity* and *vividness* as the most frequently cited VR features influencing user perceptions in immersive environments. However, empirical gaps remained regarding other system features, notably *field of view* and *spatial audio*, which warranted further exploration in retail

contexts. Building on these insights, the VR supermarket prototype was developed to simulate a realistic shopping environment, enabling experimental evaluation of how specific VR features influence user perceptions and subsequent behavioural outcomes.

The experimental results yielded several important findings. First, *field of view* emerged as the strongest predictor of *presence* and *immersion*, highlighting the importance of wide visual coverage in enhancing spatial realism and sensory engagement. This indicates that optimising the visual design of VR applications is critical for fostering deep levels of *immersion* and *presence*. Second, *interactivity* was found to be the best predictor of *perceived control* and *usability*, confirming that responsive and intuitive interaction mechanisms are central to creating user-friendly and functionally effective VR environments. This finding has particular relevance in retail settings, where product manipulation and decision-making are key aspects of the shopping experience. Third, *spatial audio* proved to be the most significant predictor of *emotional engagement*, underscoring the vital role of immersive soundscapes in stimulating affective responses within VR environments. Collectively, these findings advance knowledge of how different VR features distinctly contribute to various dimensions of user perception.

The study also revealed that cultural background significantly moderates the relationship between user perceptions and overall user experience. Users exposed to different culturally primed VR supermarkets, exhibited varying levels of *immersion*, *presence*, *flow*, and *emotional engagement*, demonstrating that cultural factors cannot be ignored in VR design and evaluation. This insight challenges the implicit assumption of universality in immersive experiences and calls for culturally adaptive approaches to VR development. Finally, the study confirmed that overall user experience directly and significantly influences *purchase intention* in immersive retail environments. This suggests that well-designed, engaging, and culturally sensitive VR retail platforms not only improve experiential outcomes but also translate into tangible commercial benefits.

The contributions of the study are threefold. Theoretically, the study develops and empirically validates an integrative research framework that connects VR system features, user perceptions, cultural influences, overall user experience, and behavioural outcomes. This framework extends scholarly discourse in consumer behaviour, virtual reality, and human-computer interaction by offering a comprehensive model for understanding immersive retail experiences. Empirically, the study provides fresh evidence of the distinct roles played by *field of view*, *interactivity, vividness*, and *spatial audio* in shaping different facets of user perception, as well as the moderating effect of culture on experiential outcomes. This empirical grounding strengthens the external validity of VR research and provides a basis for cross-cultural comparative studies. Practically, the study offers actionable guidance for designers, developers, and retailers by highlighting the design elements most critical to enhancing *usability*, *emotional engagement*, and purchase-related behaviours in immersive retail environments. Optimising *field of view*, enhancing *interactivity*, and boosting *spatial audio* are shown to be particularly effective strategies.

Beyond theory and practice, the study carries policy implications. Given the demonstrated influence of culture on immersive experiences, policy frameworks must promote inclusivity and cultural sensitivity in VR system design. Standards should also ensure accessibility and privacy awareness in commercial VR platforms, minimising cultural bias and protecting users as the digital economy becomes increasingly immersive. By addressing these policy issues, governments and regulators can facilitate responsible adoption of VR while supporting innovation in the metaverse.