# Exploring purchase intention in Virtual Reality: evidence from a comparative experimental analysis.

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# Abstract

With the advent of Virtual Reality and the impact it will have on everyday life, the way we think about and experience shopping will be different. Consumers will interact in completely virtual worlds with virtual objects. The question is whether shoppers will evaluate products and their analytical attributes in the same way as in the real world, and what consequence this will have on their purchase intentions. To understand whether consumer response in Virtual Reality differs from physical reality when it comes to assessing a product, a mixed design laboratory experiment has been conducted, comparing the two conditions, namely virtual and physical. 139 participants were involved and, for the different packaged product alternatives proposed, their purchase intention was measured and compared. The results show that consumer behaviour in Virtual Reality is comparable to and consistent with the physical world. Virtual Reality thus appears to be a promising shopping environment, as well as an effective alternative for conducting studies involving consumers.

# Keywords

Virtual Reality; Purchase intention; Product packaging; Packaging cues; Consumer attitudes.

# 1. Introduction

Virtual Reality (VR) is attracting the attention of both scholars and practitioners due to its great expected impact on everyday life (Dwivedi et al., 2022). VR already finds applications in numerous fields, including product development (Loureiro et al., 2019). It is expected to have a major impact on purchasing and shopping habits (Martínez-Navarro et al., 2019). The marketing and consumer literature on VR has been progressing only recently, and several authors call for research that delves into the behaviour of individuals in VR, also considering the mixed results that have emerged regarding VR and other shopping environments (Xi & Hamari, 2021; Wedel et al., 2020). In line with Pfeiffer et al. (2020), it would be necessary to extend the literature by investigating what differences might emerge when comparing individuals' responses to VR and physical reality (PR).

Previous research seems to focus more on the shopping experience in the store or on analysing individuals' behaviour regarding holistic aspects of the product (Hilken et al., 2022; Meißner et al., 2020; Pizzi et al., 2020; Martínez-Navarro et al., 2019). In this study, the focus is on packaging as a product attribute and a crucial element of marketing strategies. Consumers first come into contact with the packaging than with the product itself, and they use its cues – visual, haptic, structural – to evaluate the product. The packaging influences customer decision-making (Aday & Yener, 2014).

It is still unclear what attitudes consumers generate when evaluating a product's packaging and whether these are similar to the real world. Two major questions arise:

**RQ1**. What is the purchase intention of product packaging in VR?

**RQ2**. *Do consumer attitudes in VR differ from those in PR?* 

We intend to study the consumers' purchase intention (PI) towards products in VR, comparing it with the response in PR, in order to understand if the two conditions are consistent, or if differences emerge between the virtual and real worlds. To this end, a mixed design laboratory experiment was conducted, and different packaging manipulations were considered to analyse consumer responses to cues of different natures. Studying consumer attitudes in VR through PI is in line with previous studies (Harz et al., 2021; Mishra et al., 2021; Martínez-Navarro et al., 2019; Kang et al., 2020).

# 2. Literature Review

In VR, users are immersed in a fully digital world in which they can move freely and interact in real-time with digital items, isolated from the outside world. They experience a high sense

of presence, immersion, and engagement (Pala et al., 2021; Hoyer et al., 2020; Kang et al., 2020). The marketing literature calls for examining consumer behaviour in light of VR applications (Wedel et al., 2020). This technology allows studies with high ecological validity to be conducted (Meißner et al., 2020). VR could particularly be useful in prototyping and consumer evaluation analyses (Harz et al., 2021), and would be an effective approach for studying packaging (Mishra et al., 2021).

However, previous literature concerning consumer behaviour in VR presents mixed results, particularly when compared with other conditions. Siegrist et al. (2019), although they showed that the evaluation and selection of virtual packaged products are comparable with reality, call for research investigating the differences between VR and PR. Regarding shopping patterns, Schnack et al. (2020) claim that consumers behave similarly to PR. According to Harz et al. (2021), consumers behave more consistently for purchase intention in VR than in real product tests. PI of utilitarian products seems to be enhanced by VR (Mishra et al., 2021). PI is higher in VR, according to Martínez-Navarro et al. (2019), but it can vary according to VR configuration. On the other hand, Kang et al. (2020) find that viewing products in VR leads to lower purchase intentions, compared to online 3D images. According to PR, but consumers show lower PI if they have high product category knowledge. Based on the above, we intend to analyse consumer PI of different alternatives of a packaged product in VR and compare it with that in PR.

## 3. Material and methods

As an experimental stimulus for the study, a milk carton was selected, in line with previous studies (Boesen et al., 2019), as it represents a commonly accessible good, available in different packaging formats, and does not require an elaborate choice process. Based on the products commonly available in the Italian market, where the study was located, a blue cardboard packaging of a fictive brand was created, with a simple and minimal design. Starting from this baseline, a further six manipulations were realised. Keeping all other aspects fixed, one attribute was modified at a time, namely the haptic cue of the carton (rough, smooth), the packaging material (glass, plastic) and the colour (green, brown). A physical version in PR and an identical copy in VR was then realised for each of the seven packaging.

A 2 (VR vs. PR) x 7 (packaging manipulations) between-within-subjects laboratory experiment was conducted. The between-subjects design allows for a comparison between evaluations in VR and those in PR while avoiding the influence of previous experience. The within-subjects reflect realistic choice behaviour, as shoppers are usually comparing different products in succession.

The study has been conducted in a southern Italian city and involved a convenience sample of 139 consumers aged between 18 and 34 (55,4% male; 51,8% 25-34). Participants were randomly assigned to one of the two conditions: 69 completed the experiment in VR and 70 in PR.

Before the main experiment, a pilot test was conducted to verify the experimental procedure, which was found effective, and for the manipulation check, that worked as intended.

Consumers were presented with the different packaging versions, one after the other, in random order. For the experiment in VR, the participants wore an Oculus Quest 2 and interacted with the stimuli in a virtual environment created *ad-hoc* for the experiment. In both conditions, after evaluating each packaging, they were asked to express their PI, measured on a 2-items 7-points Likert scale adapted from Dodds et al. (1991). Finally, all participants filled out a questionnaire about demographic data.

# 4. Findings

A mixed ANOVA was conducted on IBM SPSS Statistic 28.0 for the analysis.

All manipulations elicit similar PI levels in both conditions: a) baseline packaging (VR<sub>baseline</sub> = 4,0580; PR<sub>baseline</sub> = 4,0357); b) rough packaging (VR<sub>rough</sub> = 4,5362; PR<sub>rough</sub> = 4,6000); c) smooth packaging (VR<sub>smooth</sub> = 4,2464; PR<sub>smooth</sub> = 3,8857); d) green packaging (VR<sub>green</sub> = 4,1159; PR<sub>green</sub> = 3,8857); e) brown packaging (VR<sub>brown</sub> = 3,8696; PR<sub>brown</sub> = 3,7143); f) plastic packaging (VR<sub>plastic</sub> = 3,3623; PR<sub>plastic</sub> = 3,1071); and, g) glass packaging (VR<sub>glass</sub> = 4,7754; PR<sub>glass</sub> = 5,2071).

Levene's test of equality of error variances shows p-values all above 0,05. Mauchly's test of sphericity shows a p-value less than 0,05 (<0,001), so the assumption of homogeneity of variance was violated. Interpreting the Greenhouse-Geisser corrected analysis (p = <0,001), however, we have evidence of a significant main effect. There is not a significant difference in between-groups means, since all the p-values are more than 0,05. A significant difference in the within-subjects groups was found in a greater number of cases in PR than in VR. Since they are less relevant to this paper, they are not addressed extensively for the sake of brevity. It is only reported that in most cases, a significant difference in within-subjects groups in VR corresponds to the same in PR.

## 5. Discussion

Three points need further discussion. First, the analysis shows that the PI generated by packaging is similar in both conditions, i.e., consumers tend to evaluate packaging in VR and PR in the same way. Considering three types of manipulations – namely altering haptic, structural and visual cues – no statistically significant differences emerged for pairwise comparisons in evaluations of packaging in VR and PR. This result is particularly interesting since, in VR, individuals cannot physically handle the product, and thus the sensory variable, particularly relevant for haptic and structural cues, is missing. Nevertheless, it has been shown that VR can deliver realistic cues for products, in line with Huang et al. (2021).

Second, the PI scores appear to be closer to each other in VR than in PR, i.e., in the first condition, the differentials between packaging evaluations are smaller. The manipulation with the highest PI – glass packaging – presents a lower score in VR than in PR. Similarly, the manipulation with the lowest score – plastic packaging – has a higher score in VR than in PR. This greater proximity of ratings in VR is also reflected in the within-subjects differences: packaging scores show statistically significant differences in fewer cases in VR.

Thirdly, consistent with the above, the order of preference of packaging, as identified based on the PI scores, is also somewhat similar in the two conditions. Glass packaging and rough packaging are the always preferred alternatives, whereas brown packaging and plastic packaging are always the least preferred.

## 6. Conclusion, limitations, and further research directions

The main results show that, overall, the PI of consumers in VR is consistent with that in PR, in line with Schnack et al. (2020) and Siegrist et al. (2019). VR can be a shopping environment in which individuals act as in the real world but immersed in a fully digital environment in which they interact with digital objects (Milgram & Kishino, 1994). The results contrast with previous literature which found differences in consumer attitudes between VR and other conditions, such as Kang et al. (2020) and Martínez-Navarro et al. (2019). VR appears to be a promising environment in which consumers will experience a new way of shopping.

Moreover, VR is also shown to be an effective research tool, as it allows for the conduct of rigorous consumer studies that overcome the limitations of PR (Meißner et al., 2020), such as ecological validity, variables and external factor control, and a general saving of time and

resources. Traditional product testing requires several physical versions to be produced before arriving at the final design: in VR, on the other hand, numerous prototype alternatives can be tested nimbly and quickly in a more sustainable process overall.

This study also has limitations, which represent insights for future research. First, the sample involved covers only consumers under 34 years of age and from one geographical origin. Cross-generational and cross-cultural studies, involving a larger sample, should be considered. Second, since laboratory experiments may present problems of external validity, and considering that consumer attitudes are analysed in this study, future research should conduct field studies to bridge the attitude-behaviour gap. Finally, it could be considered other types of products besides food and beverage ones, to extend the generalisability of the results.

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