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A Conceptual Model of Mobile Augmented Reality Features Driving Immersion, Choice Confidence, and Purchase Intention of Cosmetic Consumers Using S-O-R

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Abstract

Consumers are increasingly shifting from offline to online shopping platforms, with the introduction of immersive technologies enhancing this transition. This conceptual paper examines the effect of Mobile Augmented Reality (MAR) features on purchase intentions in cosmetic industry. Choice confidence is introduced as a factor positively impacting purchase intention. A deductive approach is used, with a purposive sampling technique. The study contributes to the theory by incorporating choice confidence as a mediator between immersion and purchase intention using the Stimulus-Organism-Response (SOR) model. It aims to enrich the literature on MAR apps in retail and to understand the antecedents and drivers of purchase intention within the cosmetic industry. The findings offer practical guidelines for understanding consumer behaviour in a mediated environment, given the rapid adoption of technology and e-commerce. This research provides valuable insights into how MAR features influence consumer purchase intentions, highlighting the importance of choice confidence and immersion. In practice, the understanding helps businesses to develop effective marketing strategies leveraging immersive technologies to enhance consumer engagement and drive sales. In conclusion, this conceptual paper illuminates the complex relationships between MAR features, immersion, choice confidence, and purchase intention, providing both theoretical and practical contributions to online marketing and consumer behaviour research.

Keywords: Choice Confidence, Cosmetics, Immersion, Mobile Augmented Reality, , Purchase Intention

Introduction

The advancement of technologies has significantly accelerated the shift from offline to online shopping, particularly the integration of immersive technologies such as Mobile Augmented Reality (MAR) (Barta et al., 2023). The development of MAR has blurred the boundary between the physical and virtual worlds, allowing users to feel fully immersed in the experience (Park & Yoo, 2020). As AR has evolved, the cosmetics industry has also evolved (L'Oréal, 2023). These interactive technologies are essential in improving the consumer experience, sales, and attitudes toward brands (Kumar, 2022).

Background

The consumption of beauty and personal care products is recovering quickly, recording a strong increase of 7% in 2021 compared to 2020 after the pandemic. The beauty and personal care (BaPC) market is valued at more than $503 billion globally, led by the USA, China and Japan. The BaPC market is expected to grow faster than the brick-and-mortar sales market, accounting for 25.4% of global online sales(Recalde et al., 2024). In recent years, consumers have been increasingly shifting from offline to online shopping platforms, with the introduction of immersive technologies enhancing this transition. These technologies are breaking down barriers in online shopping by addressing one of the major issues of e-commerce, the consumer's inability to test a product before purchase(Barta et al., 2023). Consequently, the Mobile Augmented Reality (MAR) effectively merges the physical and virtual worlds by integrating digital objects into the user's real environment(Qin et al., 2021). Customers can now try out products like make-up virtually, rather than simply seeing images, thus providing a perceived direct product experience(Jayaswal & Parida, 2023).

Building on the broader market trends, the cosmetic industry has emerged as an early adopter of innovative technologies to overcome challenges and deliver powerful customer experiences. In the beauty industry, the number of new brands and products launched each year has increased significantly in recent years(Recalde et al., 2024). Many cosmetic retailers such as Sephora, Mac, and L'Oréal have introduced immersive technology elements into their mobile apps and websites, allowing users to virtually try make-up products at any time without any space limitation. Consumers can try the product virtually (Wang et al., 2021). To use the MAR feature, users must give the app access to their phone's camera, take a photo of themselves, and select different beauty products and tones. The AR app then takes the user's selection and overlays it with the images. Users can even try out full make-up looks and rate how the products look on their face in natural light(Recalde et al., 2024).

When consumers shop online, this visualisation reduces uncertainty and helps them make more informed decisions(Kowalczuk et al., 2021; Nagy et al., 2022). AR helps to improve user understanding and predict product performance, and it can increase conversion rates (Whang et al., 2021). It saves time and effort when shopping, reduces the return rates of products and webrooming among individuals who prefer offline shopping (Kowalczuk et al., 2021) and reduces the rate of online cart abandonment(Jayaswal & Parida, 2023). These reductions result in a significant improvement in the organisation's economic performance by increasing its sales volumes and margins(Barta et al., 2023). AR on mobile phones is preferred over desktop PCs because their manoeuvrability unlocks the greater potential of AR technology.

AR has been integrated into the cosmetic industry to enhance consumer engagement, provide personalised experiences, and reduce online shopping uncertainty. However, despite the potential benefits of AR, its adoption has been slow. MAR apps are in their infancy stages(Kowalczuk et al., 2021; Jayaswal & Parida, 2023; Davis & Aslam, 2024). The MAR app's immersive experience and its impact on consumers' responses are neglected(Nhan et al., 2022). More research is needed on the consumer's experience of these apps (Davis & Aslam, 2024) as AR is a promising tool(Kowalczuk et al., 2021). Nikhashemi et al. (2021) state that there is limited insight into how and why consumers' interactions with an AR app can lead to positive perceptions of user usefulness, engagement, and behavioural consequences.

This study examines the direct relationship between (1) Mobile Augmented Reality features and immersion, (2) immersion and choice confidence, and (3) choice confidence and purchase intention. Along with the mediating effect of (4) immersion between Mobile Augmented Reality application features and choice confidence, and the mediating effect of (5) choice confidence between immersion and purchase intention.

Literature Review

The introduction of augmented reality in the cosmetics industry has attracted the attention of researchers, particularly its impact on behavioural intention (Dogra et al., 2023), purchase intention (Zanger et al., 2022; Barta et al., 2023; Nawres et al., 2024), word of mouth (Zanger et al., 2022; Nawres et al., 2024), and willingness to pay more (Barta et al., 2023). However, despite the growing research, there is limited understanding of how MAR features such as interactivity, vividness, augmentation, and informativeness influence consumer behaviour.

Key Theories and Concepts

The MAR app has been analysed through various theories, including the widely applied SOR model, which provides a clear conceptual model for understanding the impact of MAR features on purchase intention. It is a suitable model for examining the stimulus factors using AR characteristics (Nikhashemi et al., 2021; Wang et al., 2021; Sengupta & Cao, 2022; Gabriel et al., 2023). The SOR model shows how the physical environment influences the individual's internal state and behaviour (Prabowo et al., 2023). It is used to determine the factors that influence the attitude, opinion, and the behavioural response of the consumer under the stimulus effect. The SOR model originates from the field of environmental psychology, where environmental cues are "stimuli" which affect the individual's affective and cognitive state, which in turn influences their response, resulting in avoidance or approach behaviour (Hsu et al., 2021; Qin et al., 2021). The SOR model is particularly good for explaining the initial adoption or pre-adoption consumer behaviour rather than post-adoption. Numerous researchers have applied the SOR model in online shopping to examine consumer behaviour and experience to understand the impact of new technology on consumers' affective and behavioural responses when shopping online (Wang et al., 2021).

Many researchers have used the SOR framework to investigate the effect of AR features, such as interactivity, vividness, system quality, novelty, aesthetic appeal, product informativeness, augmentation, and personalisation, as external stimuli on consumers' organism states. These organism states include affective responses such as flow, spatial presence and hedonic value, as well as cognitive responses such as satisfaction and utilitarian value. These, in turn, lead to

consumer responses such as purchase intention, willingness to pay more, and continuance intention (Hsu et al., 2021; Wang et al., 2021; Barta et al., 2023; Gabriel et al., 2023).

Gabriel et al. (2023) explored five AR characteristics, namely interactivity, vividness, product informativeness, system quality, and novelty and their effect on purchase intention. Wang et al. (2021) investigated MAR service characteristics of interactivity, vividness, augmentation, and aesthetics on the beauty industry's purchase intention. In contrast, Whang et al. (2021) only focused on interactivity and vividness of purchase intention. The four characteristics adopted for this study, have not been tested together to investigate the effect of AR features on purchase intention in the cosmetic industry.

While many scholars have utilised the SOR model to investigate the potential benefits of AR in different aspects of consumer behaviour, there are minimal studies on choice confidence. According to Nagy et al. (2022), AR in retail is still relatively new, studies analysing the factors that motivate individuals to use technology and their influence on consumer choice confidence are limited. Furthermore, Jayaswal and Parida (2023) state that most studies on cosmetics have only considered females in their study sample and suggest that future studies should diversify the profiles of their sample by using gender-neutral products as stimuli. Answering the call of Nagy et al. (2022) and Jayaswal and Parida (2023), this study aims to fill the gap in the literature by identifying the significant influence of MAR features on purchase intention through immersion and choice confidence in the cosmetic industry by using the Shopee app “SkinCam”, considering both men and women for the sample dataset.

Model Development

Conceptual Framework

A comprehensive model is developed to examine how selected AR features (interactivity, vividness, informativeness, and augmentation) lead to immersion (affective) and choice confidence (cognitive) in consumer responses, which ultimately influence purchase intention (behavioural responses).

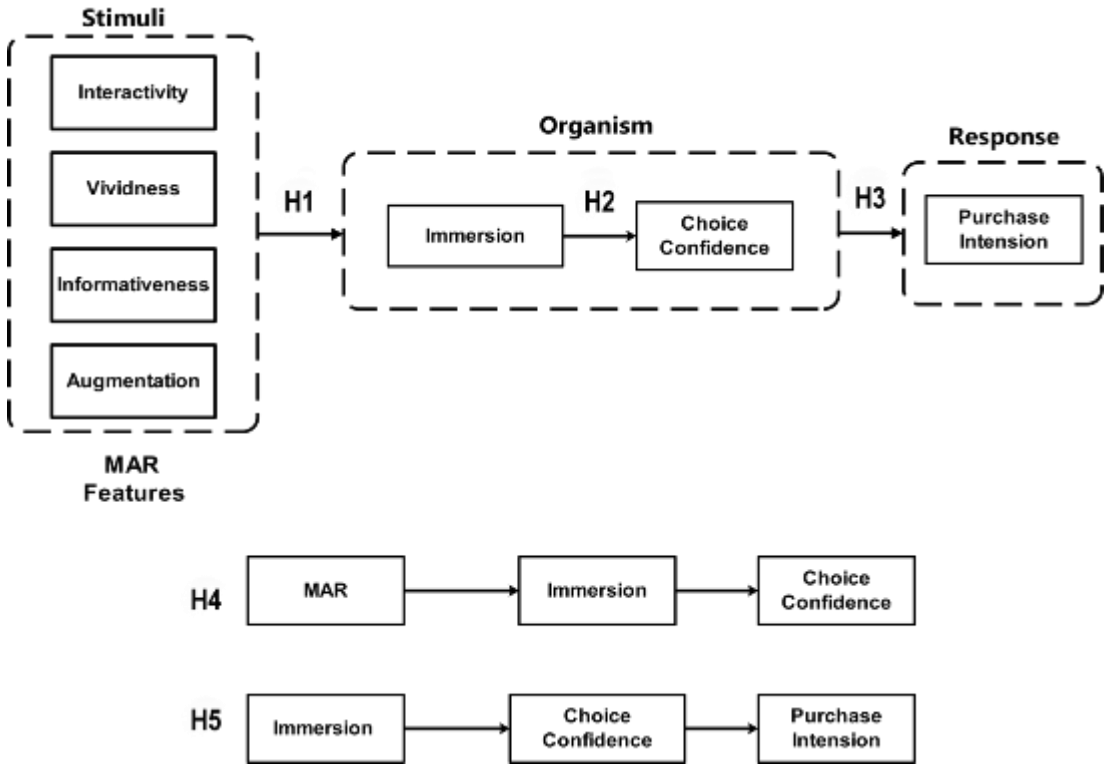

Figure 1: Author's work

Key Components and Relationships

Online consumer experience is divided into three steps by the SOR model: Stimuli (S), Organism (O), and Response (R). 'S' includes the physical and digital environment, and 'O' indicates telepresence, emotion, and engagement. 'R' represents purchase intention (Wang et al., 2021). In this study, stimuli (S) are the MAR features. AR offers an interactive experience where the surroundings are enhanced by computer-generated sensory information. The "stimulus (S)" comprises four characteristics of AR: interactivity, vividness, informativeness, and augmentation. These characteristics are summarised below.

Interactivity refers to the extent to which users can alter the form and content of a mediated environment in real-time (Sengupta & Cao, 2022) or the extent to which the individual can access different content and interact with the user interface of the AR app (Hsu et al., 2021). Vividness in the AR context represents the richness of the mediated environment as generated through the AR app in terms of the presentation quality of the product and its aesthetic appeal (Nikhashemi et al., 2021; Sengupta & Cao, 2022; Gabriel et al., 2023). Informativeness refers to the extent to which AR apps provide product information (Hsu et al., 2021). It measures how effectively the information provided through AR fulfils the consumer's needs. This ultimately impacts the consumer's intentions to purchase beauty products (Gabriel et al., 2023). The main element determining whether the consumer will be inspired to interact with the technology will be how well the customer feels the augmentation experience (Nikhashemi et al., 2021).

Organism (O) is the internal structure and process mediating between stimuli external to the person and the final response (Qin et al., 2021). In this study 'O' comprises immersion and choice confidence. It represents the internal evaluation of consumers as a reaction to

technology use. Affective responses are emotional responses that emerge from the use of technology. Cognitive responses are intellectual responses that arise from mental process feedback. Feedback provides the consumer with a way to confirm that information was acquired, processed, retained, and retrieved during a virtual reality interaction or immersion (Qin et al., 2021). Immersion is a physiological state in which consumers become fully immersed in an activity (Nhan et al., 2022). In this study, "immersion" refers to the physiological state of individuals in which they are so absorbed in the activity that they lose awareness of their surroundings. "Choice confidence" is a cognitive aspect that indicates consumers' degree of certainty about a choice (Gillison & Reynolds, 2018; Hartini et al., 2022).

Response (R): Purchase intention is the third component. It includes psychological reactions and behavioural outcomes. When results are positive, approach response behaviours follow; when results are negative, avoidance response behaviours follow (Hsu et al., 2021). AR technologies improve the shopping experience and evoke positive cognitive reactions, leading to favourable consumer behavioural intentions (Qin et al., 2021).

Flow theory has been used in the context of AR by Barhorst et al. (2021), and Arghashi and Yuksel (2022). Flow theory offers a fundamental framework for analysing user's behaviour when using technology (Arghashi & Yuksel, 2022). It is a state in which individuals are completely disconnected from the environment and become so deeply engrossed in the activity that they feel as though they are having a pleasant, natural out-of-body experience (Barhorst et al., 2021; Arghashi & Yuksel, 2022). There is no standardised way to measure the flow in the extant literature. However, the agreement shows that flow encompasses immersion in an activity (Barhorst et al., 2021). Existing literature provides evidence that AR features interactivity (Barhorst et al., 2021; Wang et al., 2021; Arghashi & Yuksel, 2022) and vividness (Barhorst et al., 2021; Wang et al., 2021) are strong stimuli in consumers' flow experience (immersion). These features lead to flow, which in turn increases consumers' affective response and behavioural intentions (Arghashi & Yuksel, 2022). This study examines how MAR features lead to immersion, a state in which individuals are disconnected from the environment. They are so engrossed in their activity that they are unaware of what is happening around them.

In the online retail context, an information gap exists between consumers and products, and online sellers can only display their products on the screen. Owing to the inability of online sellers to describe products online, consumers may have doubts about the quality of products (Sun et al., 2022). Product performance uncertainty arises when customers are unable to assess product performance due to inadequate knowledge (Barta et al., 2023). The theory of uncertainty states that there are three different approaches for individuals to decrease uncertainty. These are categorised as active, passive and interactive strategies (Sun et al., 2022). Consumers can actively search for new product information to reduce uncertainty. They can also passively find out about a product. For example, when they search for a product on a website, they can read reviews from previous buyers. With the advances in technology, shoppers can now enjoy interactive experiences that provide extensive information while shopping. For example, AR allows consumers to view a product integrated into the real environment and check whether it suits them (Barta et al., 2023). As consumers view virtual objects as real, their cognition of the product will increase, and their degree of confidence will grow correspondingly (Wang et al., 2021). Thus, the reduction of product uncertainty

follows. This study will examine how MAR features lead to immersion, which leads to choice confidence, and how choice confidence will increase purchase intention.

Theoretical Justification

Interactivity is one of the most important features of AR research (Gabriel et al., 2023), due to its implied ability to impact attitudinal and behavioural consequences (Nikhashemi et al., 2021). Interactivity has a significant impact on spatial presence (Wang et al., 2021). An AR-based product display leads to a higher level of interactivity than an image-based product display (Kim et al., 2023). Compared to the normal shopping experience, the interactivity of AR features leads to a higher flow level (Barhorst et al., 2021). This is supported by Arghashi and Yuksel (2022) findings that the AR app interactivity feature induces a higher flow level. Similarly, Kowalczuk et al. (2021) shows that interactivity leads to immersion. Existing literature shows a strong connection between interactivity and immersion (Yim et al., 2017; Kowalczuk et al., 2021; Joo & Yang, 2023).

Vividness is the ability of the technology to provide a sensory-rich mediated environment. It creates distinct mental images of the product. An AR-based product presentation creates a higher level of vividness than an image-based product display (Kim et al., 2023). Barhorst et al. (2021) state that vividness induces higher levels of flow in AR conditions. Wang et al. (2021) states that vividness positively influences spatial presence and Prabowo et al. (2023) confirms that vividness significantly impacts immersion.

The informativeness feature of AR improves the users' experience by providing additional information. When consumers use AR technology for information processing, users' attention is drawn and they become deeply engrossed in the activity (Barhorst et al., 2021). Prabowo et al. (2023) prove that the better the information quality, the more immersion it will create.

Augmentation creates realistic feelings of digital content within the actual surroundings. It allows users to have a strong sense of control over the digital product. Consumers have a sense of presence in the extended environment, and its extent depends on control over the ability to change the environment (Wang et al., 2021). Furthermore, he highlights that augmentation has a significant influence on spatial presence. Hence, it can be hypothesised that:

H1: MAR app features for skin analysis positively and significantly influence cosmetic consumers' immersion.

The main advantage of AR is that consumers do not have to imagine, instead they are engaged with digital representations of products (Barhorst et al., 2021). Choice confidence shows the level of certainty with which the consumer understands their preferences and the extent to which they are believed to be accurate (Hartini et al., 2022). AR technology significantly influences consumer knowledge and choice confidence(Nagy et al., 2022). Given that AR technology reduces information asymmetries and improves control over the purchase process, enabling consumers to decide with high confidence. Therefore, the following hypothesis was formulated:

H2: Consumers' immersion in the skin analysis app positively and significantly influences the choice confidence of the cosmetic industry.

Choice confidence is the degree to which a consumer believes they have made a correct purchase decision (Hartini et al., 2022). Purchase intention refers to consumers' desire to purchase a product (Gabriel et al., 2023). Consumers who believe their assessment is correct will respond positively to the product they choose. The higher the choice confidence, the more certain they will be about their decision; Thus, the higher the consumer's intention to purchase. Therefore, the following hypothesis is coined:

H3: Consumers' choice confidence significantly and positively impacts purchase intention in the cosmetic industry.

The literature shows that AR-product presentation induces higher levels of immersion in consumers. Previous studies provide evidence of the mediating role of immersion between AR features and consumer response. For example, Prabowo et al. (2023)suggests that immersion mediates the relationship between AR features (vividness and information quality) and purchase intention. Sengupta and Cao (2022) further adds that immersion positively mediates the association between AR shopping tools and purchase intention. Since Choice confidence has not been studied previously in the context of AR, we will test this novel relationship. This is the extension of the SOR model that was estimated to be vital to explored. Thus, the following hypothesis is formulated:

H4: Immersion mediates the relationship between MAR app features and choice confidence in the cosmetic industry.

Immersion is considered a significant factor that influences consumers' judgment in AR conditions. Previous studies show that AR induces a high level of immersion and these affective feelings have a positive effect on consumers' attitudes and behavioural intentions (Kowalczuk et al., 2021). Choice confidence is the clarity with which the individual understands his or her preferences, and the extent to which these preferences are considered correct is reflected by choice confidence. The ability to focus more intently on some products or segments than others is made possible by positive immersion. It assists in the decision-making process by providing predictive clues (Sengupta & Cao, 2022). Online shoppers can use AR to evaluate a product and make more informed decisions (Romano et al., 2022). Thus, it can be hypothesised

H5: Choice confidence positively mediates the relationship between immersion and purchase intention in the cosmetic industry.

Conclusion

This research has proposed a comprehensive framework that investigates the impact of Mobile Augmented Reality (MAR) features, namely interactivity, vividness, informativeness and augmentation, on consumer purchase intentions within the cosmetics industry. Choice confidence is introduced as a factor positively impacting purchase intention in the mediated environment.

The proposed framework offers a detailed examination of the relationships between MAR features and consumer behaviour. However, the conducted study has some limitations. The relationships and mediators that have been suggested are theoretical and have not yet been subjected to empirical testing. Furthermore, the focus on the cosmetics industry, while relevant, may limit the generalizability of the findings to other sectors.

Future research could collect information through surveys or experiments in the cosmetic field to empirically test the proposed framework. Structural Equation Modelling (SEM) could be used to assess the relationships between MAR features, immersion and choice confidence, and consumer purchase intention.

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