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Make it real with gen Z! The impact AR reality congruence on brand information sharing: Exploring a sequential mediation mechanism

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A B S T R A C T

Augmented reality (AR) has garnered considerable interest for its potential to motivate engagement and advance customer-brand interactions. This study explored the impact of reality congruence (RC) of AR-menus on brand information sharing (BIS) in fast-food restaurants, particularly among Generation Z (Gen Z), as well as the mediating effects of usefulness of AR menu (UAR) and brand positivity (BP) on this relationship. Media Richness Theory (MRT) was employed as the theoretical umbrella for developing the study model. To validate the research model, we employed structural equation modeling (PLS-SEM) with a sample of 209 respondents. The results demonstrate that reality congruence of AR menus is a relevant predictor of Gen Z members' behavior in sharing information about the brand. Furthermore, this relationship was mediated by the UAR and BP. The findings also demonstrated that UAR and BP had a sequential mediating effect on the relationship between the RC of AR-menu and BIS. This revolutionary study revealed that RC of AR-menu in restaurants fosters positive behaviors in fast food settings. By highlighting AR's potential to create engaging dining experiences for Gen Z members, this study offers valuable insights for service businesses, marketing managers, and the hospitality industry. Addressing this gap in existing research emphasizes the importance of adopting innovative technologies to enhance Gen Z's customer experience and engagement in the restaurant industry.

1. Introduction

Augmented reality has become an essential tool in the marketing discipline (Kumar et al., 2024). Leading industries are often viewed as frontrunners in the adoption of recent innovative interactive technologies such as augmented reality to navigate everyday challenges (Ameen et al., 2023; Rane et al., 2023). In particular, the hospitality and restaurant sectors have leveraged advanced service technologies, innovative menu designs, and distinctive customer experiences to adapt to and anticipate evolving customer needs and preferences (Gómez-Rico et al., 2022). AR generally refers to the overlay of digital content onto real physical objects, enabling users to explore it via smartphones or tablets (Ali, 2022; Dos Santos Simplicio et al., 2022; Flavián et al., 2019).

Forward-thinking restaurants are experimenting with AR menus. AR menus allow restaurants to display more menu options and details without physical constraints. Visuals, including 3D models, showcase dishes, and reduced inaccuracies. In addition, AR improves efficiency and provides valuable data for menu optimization (Marketer, 2024). For customers, AR menus offer interactive 3D visualizations of dishes and access to additional information, such as presentation, portion size, ingredients, nutritional

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facts, and direct ordering (Ali, 2022; Balasubramanian & Konar, 2022; Batat, 2021; Dos Santos Simplicio et al., 2022; Jagtap et al., 2021).

Large fast-food chains, such as Domino's and Subway, utilize AR in customer service. Dominos has partnered with QReal for a "shoppable AR" lens on Snapchat. Backyard Betty in Boston launched augmented reality menu (AR-menu) items for viewing dishes before ordering them (Fritz et al., 2023). Experts predict that AR menus will become mainstream within three to five years, driven by contactless ordering demands and enhanced smartphone and 5G technology sophistication (Daradkeh et al., 2023; Iiconsortium, 2023; Rastegar et al., 2021). The United States leads the AR and VR markets with an anticipated market volume of $10.9 billion by 2024 (Alsop, 2024). The primary user demographics in 2023 are individuals aged 16–34 years (Anthony, 2023). Korea et al. (2024) expect Gen Z to significantly influence various sectors by 2026, particularly the largest consumer demographics.

In the restaurant and hospitality sector, it is crucial to comprehend how AR services shape customer behaviors and attitudes toward restaurants (Batat, 2021; Wei, 2019). This is especially true for Gen Z, since born between 1997 and 2012 (Cao & Perumal, 2024), into a digital world, is more likely to embrace AR and exhibit distinct behavioral patterns with new technologies (Ameen et al., 2021). In light of today's rapidly changing market environment, customer patterns, preferences, behaviors, and attitudes are continually attracting investigation (Balasubramanian & Konar, 2022). In 2020, 26% of U.S. fast-food restaurant patrons aged 18 to 29 visited restaurants one to three times per week (Kunst, 2022). Furthermore, eating out has seen a significant increase in Gen Z and Millennial consumer markets (Balasubramanian and Konar, 2022). As this percentage rapidly increases, researchers and industries are motivated to understand and anticipate dynamic changes and customer expectations using innovative, personalized, highly visual, and responsive approaches to investigate and enhance customer value, experience, and behaviors (Batat, 2021; Saprikis et al., 2020; Shaheen et al., 2024). Accordingly, the current study focuses on exploring how Gen Z experiences, engages with, and responds to restaurants' AR menus. In a fast-food restaurant service environment, diverse media formats lead to different performance levels (Shahbaznezhad et al., 2021). Reality congruence (RC) is defined as the degree to which the presented product match the actual ones (Kowalczuk et al., 2021). In restaurants, the RC of the AR-menu could affect the dining experience. This concept is particularly relevant for enhancing the customer experience and fostering positive behaviors (Khosasih & Lisana, 2023; Kowalczuk et al., 2021).

This study focused on the effect of AR on customer experiences in the restaurant and hospitality industries. Shaheen et al. (2024) investigated how the perceived social experience of AR restaurant menus shapes customer behavior, particularly brand information sharing (BIS) and brand positivity (BP). Using a sample from the United States, the findings reveal that AR social experience significantly predicts these behaviors, mediated by AR usefulness and reality congruence. (Batat, 2021) emphasizes how AR, through experiences like Le Petit Chef, enhances the sensory experience and overall enjoyment of food, which, in turn, positively influences post-consumption attitudes and behaviors. This confirms that AR adds experiential value by enhancing the aesthetics of dining and meal presentations, which in turn influences consumers' behavioral responses to restaurant services and their decision-making processes. Ali (2022) established a scale to evaluate AR's impact in the restaurant sector by identifying its utilitarian, hedonic, and social dimensions. Balasubramanian and Konar (2022) explored AR's potential to create personalized immersive dining experiences, improve operational efficiency, and provide nutritional information. Zulkifli et al. (2020) evaluated the Nutri Label AR-menu app and found it to be feasible and acceptable for university students (Gen Z). Khosasih & Lisana (2023) investigated the features that influenced the adoption of AR apps in food presentation and delivery services during the pandemic of COVID-19. They revealed that the image of food significantly influences utilitarianism and perceived informativeness, with hedonism being the primary determinant of user intentions.

Notwithstanding the valuable findings from existing research on AR utilization in hospitality, the unresolved question that needs an answer: How do AR menus in fast-food restaurants affect Gen Z behavior? This research seeks to address the unresolved questions and fill the gaps in the literature. Shaheen et al. (2024) findings indicate the association between RC of AR-menu and BIS is not statistically significant, and the RC of AR-menu as a mediator is not significant in the relationship between the social experience of AR and sharing BIS. Therefore, we also need to answer the following question: Does the relationship between the RC of AR-menu and BIS remain the same for Gen Z? Moreover, Shaheen et al. (2024) proposed that future research should prioritize comprehending the influence of generational disparities regarding the impact of AR menus on customer attitudes and behaviors. Batat (2021) emphasized that future research should consider age differences in consumer perceptions of AR dining experiences, include representative samples of different generations, and investigate the variances between expected and actual AR practices. Fritz et al. (2023) advocated for further research on enhancing customer experiences and marketing outcomes through AR optimization, as well as investigating the influence of AR visualization of products on customer responses. Ameen et al., (2023) emphasize the importance of investigating how cutting-edge technologies can address behaviors related to younger generations, such as Gen Z and Millennials in different contexts.

Furthermore, there is a notable gap in research on how AR reality congruence in restaurant menus affects Gen Z behavior, particularly in terms of sharing detailed information or advertisements about the brand. This study addresses the growing demand for further exploration of AR technology's effects. It builds on previous research by examining how AR menus' reality congruence

influences brand information sharing in fast-food restaurants, with a particular focus on Gen Z consumers (Ali, 2022; Batat, 2021; Shaheen et al., 2024).

Building on recent research, this study explores the mechanisms driving the anticipated relationship between the reality congruence of AR menus and brand information sharing. According to a study by de Regt et al. (2021); McLean & Wilson (2019) and Shaheen et al. (2024), motivated engagement with a brand will lead to successful outcomes, which in turn encourage customers to express positive emotions, behaviors, and opinions about the brand. This sharing can be expressed through actions, such as sharing information about the brand (Abdelrazek & El-bassiouny, 2023; Kim et al., 2013). Within this context, brand positivity is defined as the favorable perception of a brand (Wilk et al., 2020). Therefore, we chose brand positivity as one of our research focuses, acting as a mediator in this research model between the RC of AR menus and BIS—a relationship Shaheen et al. (2024) did not investigate.

Furthermore, this study investigates how the RC of AR menus impacts BIS using MRT as the theoretical framework. MRT explains how and why different media forms influence a wide range of productivity outcomes (Daft & Lengel, 1986; Yoo, 2023). UAR in the fast-food service industry is significantly affected by the RC of AR menus, which, in turn, motivates customers' positive attitudes and behaviors (Kowalczuk et al., 2021; Shaheen et al., 2024). Usefulness, a key concept in TAM, is the extent to which users trust a platform to assist them in achieving their goals (Davis, 1989).Therefore, we propose usefulness as a potential mediator between the RC of AR- menu and BIS, underscoring its crucial role in customer engagement and brand promotion.

Overall, this study's research problem centers on a motivational area to investigate AR experiences in fast-food restaurant settings, with a particular focus on Gen Z. The following questions guided this study.

RQ1: To what degree does Gen Z perceive the reality congruence of AR menus, and what is its impact on brand information sharing in fast-food restaurants?

RQ2: Does AR menus' usefulness BP and mediate the relationship between the RC of AR-menus and BIS in fast-food restaurants?

The following outlines the set of goals we aimed to address in this study: First, we explored the influence of the RC of AR-menu on BIS in fast-food restaurants, with a particular focus on Gen Z consumers. Second, we examined the roles of AR-menu usefulness and brand positivity as individual mediators in the association between the reality congruence of AR-menu and brand information sharing. Third, we investigated whether AR-menu usefulness and brand positivity sequentially mediate this relationship.

This study makes a significant contribution to the current body of literature. First, it builds on previous research by addressing gaps related to the impact of AR technology, specifically by investigating how augmented reality menus affect Gen Z's behavior in fast-food restaurants. It focuses on how AR can boost customer experience and engagement (Ameen et al., 2023; Batat, 2021; Fritz et al., 2023; Puma et al., 2022; Shaheen et al., 2024). Second, it provides insights into how Gen Z interacts with and responds to AR menus, an essential demographic owing to its significant influence on the restaurant service industry. Third, this study examined how congruence between AR-menu representations and actual menu items affects brand information sharing. Fourth, we examined each of ARU and BP as mediators in the relationship between the RC of the AR-menu and BIS. Fifth, Examining the sequential mediation of ARU and BP and how these factors interact to impact the relationship between the RC of the AR-menu and BIS. Moreover, it utilizes MRT to explain how different forms of media (such as AR) influence productivity and customer behavior, contributing to the theoretical understanding of AR's impact. Furthermore, this study anticipates practical implications for the hospitality and food service industries, offering actionable insights for fast-food restaurants to implement AR technology effectively. This can enhance customer satisfaction and encourage positive behaviors such as brand information sharing. These contributions underscore the significance of this study in leveraging AR technology to enhance customer interactions and improve outcomes in the fast-food sector.

2. Literature Review and Hypothesis Development

2.1 Media Richness Theory

This study employed MRT as a conceptual framework to investigate the consequences of AR menus on BIS. Daft & Lengel (1986) developed MRT in the business field, and it gained widespread popularity with the penetration of electronic communication channels (Ishii et al., 2019). MRT emphasizes that the richness of the utilized communication medium influences the effectiveness of communication. Rich media, characterized by features such as immediate feedback, multiple sources, personalization, and language variety, are considered more effective for handling complex and ambiguous messages than learner media. Various fields, including marketing research (Shahbaznezhad et al., 2021), extensively employ this theory to explore and optimize communication processes.

Researchers use MRT to analyze how different communication channels impact consumer perceptions, decision-making processes, and engagement levels (Flavián & Casaló, 2022). In augmented reality, de Amorim et al.(2022) proposed that the richness of media, including information prompts, diversity, and instant feedback, significantly influences user decisions, emotional reactions, attitudes, and behaviors. MRT is particularly relevant in this study for explaining how various media forms affect productivity levels (Shahbaznezhad et al., 2021). In fast-food services, RC influences customer experiences, confirming that the RC of AR menus significantly influences their usefulness, thereby motivating positive customer behaviors (Kowalczuk et al., 2021; Shaheen et al., 2024). Furthermore, this discussion confirms the assumption that there is a significant association between UAR and customer brand-behaviors outcomes, such as BP and BIS. Figure 1 represents the study model based on MRT and recent studies, mainly Shaheen et al. (2024).

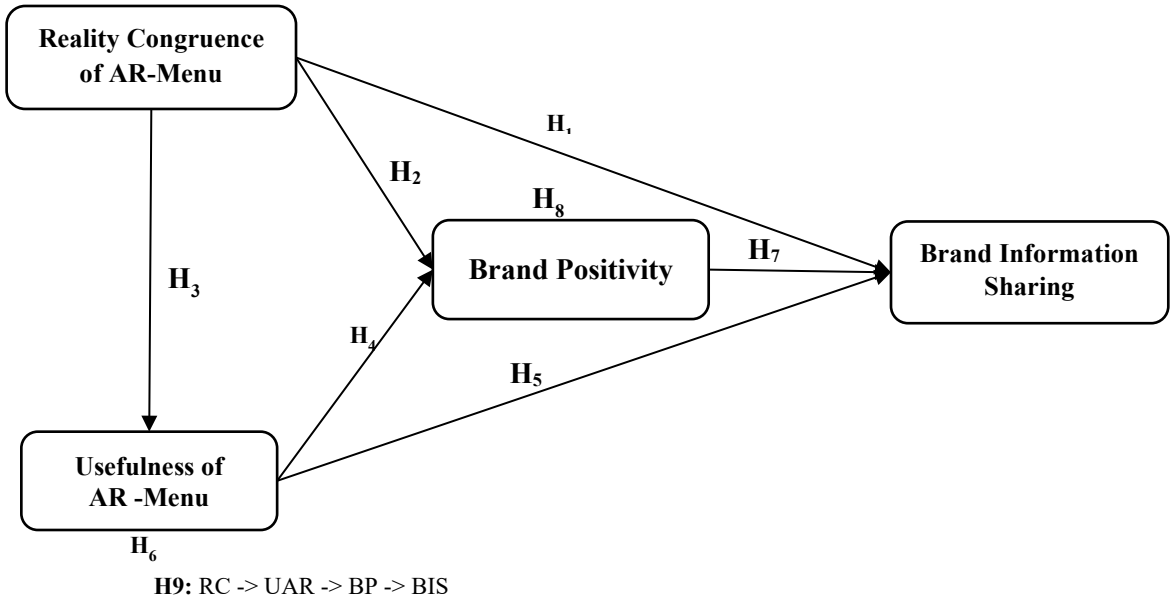

Fig. 1. Research Conceptual Model

2.2 Generation Z.

Generational theory proposes that individuals born within specific chronological ranges have unique behavioral and socio-demographic characteristics (Okros, 2020). Gen Z, typically identified as those born between the mid- to late-1990s and early 2012s, accounts for approximately 69.31 million individuals, representing about 20.69% of the U.S. population, according to the 2023 U.S. resident population data by generation (Statista, 2024).

Understanding these generational profiles is critical, especially for Gen Z, who are poised to become the primary adopters of recent interactive technologies, such as artificial intelligence (Vitezić *et al.*, 2021) and augmented reality (Sustaningrum, 2023), have lived in a digital world since birth, have been identified as technology natives, and are highly skilled in utilizing continuously updated technology and social media platforms (Dobre et al., 2021; Jayatissa, 2023). This constant exposure to technology has shaped their lives, making them adept at effortless and safe use of technology (Thach et al., 2021). Therefore, in today's competitive market, marketers focus on high personalization in order to capture consumer attention. Expected to become the most critical market segment by 2025, Gen Z is increasingly becoming the primary target for product and service consumption (Meghisan-Toma et al., 2021; Zlatanova-Pazheva, 2024). This generation is significant not only in size, but also in influence. They currently represent a substantial portion of the workforce in industries such as hospitality and tourism, and are projected to surpass millennials as the major market group globally in the coming years (Pichler et al., 2021). As such, Gen Z presents a significant challenge for businesses in terms of marketing and management as they strive to secure a competitive advantage (Zlatanova-Pazheva, 2024). Therefore, this study focuses on Gen Z members to investigate AR experiences in fast-food restaurants.

2.3 AR in restaurant industry

Digital transformation has revolutionized consumer behavior and business operations, with AR and VR becoming essential innovative technologies. AR, defined as "merging virtual content with real-time physical environments, enhances visual experiences and is particularly impactful in advertising and retail" (Paul et al., 2024). Effective AR applications such as Sephora's Virtual

Artist and Denny's AR food menu positively influence attitudes and purchase intentions by providing enjoyable and useful interactions (Qin et al., 2021; Wedel et al., 2020). In hospitality fields, AR technology reshapes the manner guests engage with hotels, restaurants, and other hospitality businesses (Lim et al., 2024). In this evolving innovative technology environment, restaurants leverage interactive technologies including AR and virtual reality to revolutionize customer experiences. These technologies enhance dining through audiovisual and sensory elements, creating memorable and distinctive experiences that establish new industry standards. Consequently, customers are encouraged to repeat visits through lasting impressions and behaviors (Bandojo et al., 2023).

To keep up with customers' ever-changing expectations, the restaurant industry continues to strive to innovate and implement cutting-edge technologies (Mar et al., 2022). The AR technology has several potential applications in this field. For instance, the "Le Petit Chef" implementation uses 3D video mapping to enhance dining experience (Batat, 2021). AR menus are another example of interactive and immersive digital menus that provide detailed information about dishes when the menu QR code is scanned using a smartphone (Çöl et al., 2023). Batat (2021) indicated that AR positively influences consumers' evaluations of restaurant experiences through various dimensions, including sensory and social aspects, thereby shaping customers' attitudes towards AR in the restaurant environment. (Ali, 2022) found that AR technology significantly boosts positive behavioral intentions among restaurant-goers in the U.S. Reviews by Çöl et al. (2023) and studies by Javornik (2016) and Qin et al. (2021) highlight AR's potential of AR for enhancing interactivity, system quality, and product informativeness, contributing to a richer customer experience and positive customer behaviors.

2.4 Brand information sharing

In the digital era, consumers seek information on product attributes, expert opinions, and vendor reputation from diverse sources (Trzebinski et al., 2022). Tools such as online reviews, blogs, social tagging, and wikis enable users to create and share product content, influencing opinions and purchase decisions (Wong & Hung, 2023). Positive perceptions impact consumer loyalty, advocacy, and brand value, driving social behaviors, such as word-of-mouth marketing and endorsements. Content generated by customers plays an essential role in the tourism and hospitality industries by shaping consumer perceptions and decisions (Aljarah & Lahuerta-otero, 2022; Zinko et al., 2020), which are critical for influencing public perception and boosting sales (Zhuang et al., 2023).

The Internet revolution has significantly boosted information sharing, especially through social media (Dwivedi et al., 2021). Social media facilitates rating, reviewing, community engagement, sharing positive brand experiences (Zhuang et al., 2023), transforming consumer-brand interactions, and making online engagement strategies vital for brand optimism (Paramita et al., 2021). Effective social presence cultivation offers competitive advantages and growth (Aljarah & Lahuerta-Otero, 2022; Wong & Hung, 2023). Peer-generated content in AR web shopping reduces uncertainty and risks and enhances brand image and loyalty through trust and community (Aljarah & Lahuerta-otero, 2022; Wong & Hung, 2023).

Cutting-edge technologies, such as AR apps with peer-generated content on AR web shopping, reduce uncertainty and risks in the customer purchase process (Barta et al., 2023). This process enhances brand image and loyalty through trust and community (Chapman & Dilmperi, 2022; Gvili & Levy, 2019; Pham et al., 2023). Furthermore, Augmented reality apps significantly enhance attitudes and customer behavior by being perceived as enjoyable, useful, and informative (Qin et al., 2021). In the restaurant industry, the utilization of AR menus notably improves brand engagement and fosters positive brand-related attitudes and behaviors. This, in turn, leads to greater brand image satisfaction (Arghashi & Yuksel, 2022; Diaa, 2022; Khalil et al., 2023). Additionally, customers' positive perceptions of AR in marketing amplify brand engagement and satisfaction, boost brand usage intentions, and enhance brand storytelling (Zanger et al., 2022). Therefore, this study emphases on the effect of the RC of AR-menu on the BIS.

2.5 Brand positivity

Brand positivity encompasses consumers' favorable perceptions and attitudes toward a particular brand, transcending mere satisfaction to include both emotional and cognitive responses (Wilk et al., 2020). This enhanced insight plays an important role in drawing the line for the consumer loyalty, advocacy, and inclusive value of the brand. Several factors contribute to shaping brand positivity, including perceived quality, brand associations, and customer loyalty (Wong & Hung, 2023).

AR technology has further transformed consumer-brand interactions by enhancing brand attitude and positively influencing brand image (Ambika et al., 2023; Rauschnabel, 2021). AR attributes, such as novelty, vividness, interactivity, pleasure, and usability, significantly boost engagement, satisfaction, and future brand purchase and usage intentions (McLean & Wilson, 2019). AR filters on social media platforms enhance the user experience by increasing entertainment value, interactivity, and compatibility, thereby

enriching consumer storytelling and driving positive behaviors (Ibáñez-Sánchez et al., 2022). Therefore, AR technology enhances BP(Shaheen et al., 2024), motivates information sharing about a brand, and elevates a brand's reputation and visibility (Zanger et al., 2022). Therefore, BP was used as a mediator in this research model.

2.6 Effect of reality congruences on BIS and BP

MRT (Daft & Lengel, 1986) claims that, the richness of the communication medium significantly predicts the effectiveness of communication activities. Rich media that provide instant feedback, multiple channels for communication, language diversity, and individual focus are more effective in information processing and communication (Suh, 1999; Yoo, 2023). Studies have shown that media richness leads to a stronger sense of presence, better product knowledge, and more positive brand attitudes (Fritz et al., 2023; Sung, 2021). These factors increase the amount of information available, provide sensory signs, and make interactive investigation easier (Batat, 2021). These immersive experiences enhance the alignment between the users' perceptions of reality and the AR environment. Furthermore, realistic presentations of menu items increase media richness (Amin et al., 2022), giving rise to a more engaging and impactful customer experience (Kowalczuk et al., 2021). In the context of AR, restaurant menus function as rich media, enhancing visitors' interactive social experiences by offering engagement and immersion in menu items through 3D virtualization. This in turn fosters customer engagement and positive attitudes and behaviors towards the brand (Batat, 2021; Shaheen et al., 2024). Furthermore, research by de Amorim et al. (2022) and Shaheen et al. (2024) provides evidence that media richness, specifically the realism of the AR menu, is a strong indicator of customer engagement and motivates positive consumer behavior. Kowalczuk et al. (2021) demonstrated that RC positively affects customer behavior and intention. They used real-world examples to illustrate that RC leads to positive customer attitudes and behaviors. Therefore, we hypothesize that:

H_1: *The reality congruence of AR-menu has a significant impact on BIS.*

H_2: *The reality congruence of AR-menu has a significant impact on BP.*

2.7 Effect of Reality Congruences of AR-menu on Usefulness

Augmented reality applications are often considered more useful than regular apps because of their ability to enhance sensory experiences, provide entertaining content, and offer informative insights, particularly in restaurant settings (Bandojo et al., 2023; Batat, 2021). In the case of AR menus in restaurants, usefulness of AR-menu is identified as the customer's perception that the AR-menu helps them achieve their dining objectives (Ali, 2022; Shaheen et al., 2024).

Researchers suggest that AR menus enhance perceived usefulness by empowering users to control their interactions and engagement, thereby fostering a sense of autonomy (Bansal et al., 2022; McLean & Wilson, 2019). Additionally, users gain new knowledge and skills through the AR menus, which prompts a sense of competence and connection (Nhan et al., 2022). Empirical studies support this concept, with McLean & Wilson (2019) and Kowalczuk et al. (2021) demonstrating that AR service competence directly impacts perceived usefulness. In the fast-food service sector, the RC of AR menus plays an important role in influencing the customer experience (Ali, 2022; Shaheen et al., 2024). Therefore, we hypothesis that:

H_3: *The reality congruence of AR-menu has a significant effect on UAR.*

2.8 The Mediating Role of the Usefulness of an AR-Menu

AR technology can revolutionize the way users interact with and share brand information. Scholars have indicated that AR enhances users' shopping experiences, fostering strong customer-brand connections and engagement, which leads to customer brand advocacy (Kumar et al., 2024). The immersive flow experience provided by AR practices generates favorable attitudes and trust towards these applications, promoting consumer engagement, and improving brand attitudes and usage intentions. When customers perceive that an AR-menu is useful, they are more inclined to engage in positive brand-related behaviors, such as BIS and BP (Arghashi & Yuksel, 2022; Shaheen et al., 2024). Moreover, the AR technology usefulness significantly enhances consumers' positive attitudes, supporting the notion that practical AR applications can foster brand advocacy (Khalil et al., 2023), including BP and information sharing. Similarly, the demonstration of the technology's usefulness is a key motivator of customer trust and brand advocacy (Van Tonder et al., 2020). Shaheen et al. (2024) confirms that AR usefulness is a strong predictor of BP and BIS. Therefore, we hypothesize that:

H_4: *The usefulness of an AR-menu has a significant effect on BIS.*

H_5: *The usefulness of an AR-menu has a significant effect on BP.*

The informative and attractive AR visualization of the products has a critical role in customers' perceptions of AR's usefulness (Barta et al., 2023; Flavián & Casaló, 2022; Kowalczuk et al., 2021). This perceived usefulness influences users' willingness to share brand information (H5). Essentially, if customers find the RC of the AR-menu relevant and useful, They are more inclined to engage with the brand and share information about it (Shaheen et al., 2024). Thus, we hypothesize that:

H6: *Usefulness of AR-menu mediates the relationship between reality congruence of AR-menu and the brand information sharing.*

2.9 Brand positivity as a mediator

Posavac et al. (2024) proposed that brand positivity, as a brand's focal presence, can lead to inflated favorability. This effect is critical to distinguish the relationship between BP and BIS. As marketing perspectives shift towards a holistic customer experience and personalized journeys, positivity becomes the basis for greater brand engagement and loyalty (Dwivedi et al., 2021). The integration of AR in marketing has further enhanced consumer-brand interactions, positive brand attitudes, and engagement (Ambika et al., 2023; Rauschnabel et al., 2019). Positive perceptions of AR attributes in mobile apps enhance brand engagement and future usage intention (McLean & Wilson, 2019). Elements such as entertainment, interactivity, and compatibility of AR filters drive user satisfaction and electron word-of-mouth (Ibáñez-Sánchez et al., 2022). Therefore, AR's ability to improve consumer-brand interactions and attitudes highlights its role in encouraging positive word-of-mouth, thus enhancing a brand's reputation and reach (Zanger et al., 2022). Based on these insights, in the restaurant environment, positive brand experiences foster engagement and prosocial behaviors, which in turn drive customers to share their favorable experiences, perceptions, and brand information with others (Shaheen et al., 2024). Therefore, we hypothesize that:

H7: *The brand positivity has significant effect on Brand information-sharing*

Restaurant AR menus serve as a rich medium, providing immersive engagement and interactive features. Scholars have proposed that media richness enhances the sense of presence, product knowledge, and positive brand attitudes (Fritz et al., 2023; Sung, 2021). RC in AR menus, where virtual elements seamlessly blend with physical reality, significantly improves user experience and gratification (Amin et al., 2022; Kowalczuk et al., 2021). These immersive experiences are critical in fostering brand positivity. The BP effect asserts that a focal brand presence can lead to increased favorability, which is critical for understanding the relationship between BP and BIS (Posavac et al., 2024). Positive brand experiences, amplified through social media, encourage engagement and prosocial behaviors, leading to the increased sharing of favorable perceptions (Fetais et al., 2022; Hossain & Quaddus, 2012). In the restaurant environment, AR menus enhance customer interactions ,attitudes and behaviors (Batat, 2021), therefore, AR boosts customers' positive word-of-mouth about the brand. (Ibáñez-Sánchez et al., 2022; Zanger et al., 2022). Thus, BP mediates the relationship between the RC of AR-menus and BIS, driving consumers to share positive experiences (Shaheen et al., 2024). Therefore, we hypothesize as follows:

H8: *BP mediates the relationship between the RC of AR-menus and BIS.*

Similarly, RC of an AR-menu has the potential to predict its usefulness (H3). Moreover, recent studies have proposed that UAR is crucial in shaping customer attitudes and behaviors. For instance, AR menus that offer detailed, interactive information about dishes can significantly enhance dining experiences, fostering positive brand perceptions and behaviors (brand positivity) (Bansal et al., 2022; McLean & Wilson, 2019). Perceived UAR applications lead to positive behavioral intentions, including BIS (Arghashi & Yuksel, 2022; Khalil et al., 2023).

Moreover, brand positivity, which encompasses favorable consumer perceptions and attitudes towards a brand, has a critical role in mediating the relationship between the RC of the AR-menu and BIS. Positive brand experiences, often amplified through social media, foster engagement and loyalty and drive consumers to share their positive perceptions and experiences with others (Fetais et al., 2022; Hossain & Quaddus, 2012). In the restaurant context, AR menus enhance customer interactions, attitudes, and positive behaviors about the brand, which in turn motivate sharing information about the brand (Amin et al., 2022; Jagtap et al., 2021; Shaheen et al., 2024; Solmaz & Pekerşen, 2022). Therefore, we hypothesize that:

H9: *The relationship between the RC of the AR-menu and BIS is sequentially mediated by the UAR and BP*

3. Methodology

3.1. Sample and Data Collection

This study focuses on Gen Z, fast food restaurant visitors in the United States. We administered an online questionnaire through Qualtrics for the data collection process, employing convenience sampling through MTurk, a commonly used method in behavioral research and hospitality (Huang et al., 2023; Moss et al., 2023). Recognizing that no data collection approach has limitations (Agley et al., 2022; Aljarah et al., 2022; Zhang & Gearhart, 2020), multiple measures were taken to reduce potential problems related to utilizing MTurk, and an attention question was incorporated to eliminate participants who may not be completely engaged or deliver correct responses, in accordance with the references of (Aguinis et al. (2021) and Hauser & Schwarz (2016). Un engaged individuals who completed the questionnaire in less than five minutes were eliminated. Only individuals with prior

experience of using AR menus were included in the study. To confirm this finding, a filtering question was posed at the beginning of the survey. The question inquired participants if they had previously used the AR menu, and only those who answered 'yes' were included. MTurk participants exhibited greater attentiveness to instructions, particularly at the beginning of the survey, compared to those using similar data collection methods (Graça & Kharé, 2023). Following Conrad et al. (2023) and Kang et al. (2023), We incorporated a video into the questionnaire to help qualified candidates recall their past experiences and memories of the restaurant's AR menu. The video showcased the extensive use of AR menus, covering activities such as navigation, visualization, item selection, and ordering. Next, they were requested to envision a scenario (T.-L. Huang, 2021; Rauschnabel, 2021), where they went to a newly opened restaurant for lunch. The participants were presented with an augmented reality menu after being seated. After watching the video, eligible participants completed an online survey.

The final analyzed data included 209 participants. The sample involved 51.2% females and 48.8% males. All respondents dined out weekly, with approximately 74.6% visiting fast-food restaurants 2-3 times per week and 14.8% visiting restaurants four or more times a week. Regarding education, 79% held a bachelor's level, 13% had a master's degree, and 8% held diplomas or lower qualifications.

3.2. Measurements

This study utilized a meticulously developed questionnaire based on previous research. The questionnaire includes Four sections. The first section describes the study's goals and instructions. The second section includes a YouTube video demonstrating the AR menu. The third section contains the measurement items for the research model. The fourth section collects demographic information. We followed a rigorous evaluation process to ensure the validity, consistency, and comprehensibility of the questionnaire. Initially, five research experts completed the questionnaire. Following this assessment, the researcher performed a pilot test on a stratified sample of 30 individuals including researchers, marketing managers, business development experts, and social media experts. This pilot testing phase aimed to identify any issues or parts requiring modification before the data collection stage (Podsakoff et al., 2012). A seven-point Likert scale, extending from 1 (strongly disagree) to 7 (strongly agree), was employed to assess the research variables. The RC of the AR menu was assessed by six items from Kowalczuk et al. (2021). The usefulness of the augmented reality menu (UAR) was evaluated using the Four items Flavián & Casaló (2021). Brand positivity (BP) was measured by Five items. Brand information sharing (BIS) was measured using Four items, both BP and BIS items were from (Shaheen et al., 2024; Wilk et al., 2020), as shown in Table 1 and Appendix A. To ensure participant engagement, attention-check questions were inserted (Hauser & Schwarz, 2016).

3.3. Assessment of the Measurement Model

We used Smart-PLS.4 to evaluate the measurement model's internal consistency, reliability, and validity. Item loading values range from 0.70 to 0.84, ensuring the reliability of the indicators.

Table 1
Reliability and convergent validity

Variables /Items Code	(λ)	VIF	α	CR	AVE
Reality congruence (RC)			0.78	0.85	0.53
RC1	0.70	1.41			
RC2*					
RC3	0.73	1.49			
RC4	0.75	1.55			
RC5	0.74	1.53			
RC6	0.73	1.49			
Brand information sharing (BIS):			0.82	0.88	0.65
BIS1	0.83	1.91			
BIS2	0.84	1.95			
BIS3	0.83	1.82			
BIS4	0.72	1.4			
Brand positivity (BP):			0.80	0.87	0.62
BP1	0.76	1.57			
BP2	0.81	1.63			
BP3*					
BP4	0.75	1.51			
BP5	0.83	1.79			
Usefulness of AR-menu (UAR):			0.79	0.86	0.61
US1	0.82	1.8			
US2	0.82	1.76			
US3	0.76	1.5			
US4	0.72	1.45			

Note: ($P < 0.05$) for all of measurements items. Items with (*) were eliminated to ensure model validity, (λ).

As shown in Table 1, the values of Cronbach's alpha (α) range from 0.78–0.82, and the values of composite reliability (CR) are above 0.7, confirming the internal consistency and reliability of the measurement model. The values of Average variance extracted (AVE) in the model construct were above 0.5, confirming the model convergent validity (Hair et al., 2019). The discriminant validity was confirmed by HTMT, values were below than 0.90 (Henseler et al., 2015), and by Fornell et al. (1981) criteria of the square root of the AVE values as shown in Table 2. As shown in Table 1, the Variance inflation factor (VIF) values of the measurement attributes were below 3.3, confirming the absence of collinearity or multicollinearity issues (Hair et al., 2021). Regarding common method bias (CMB), as shown in Table 3, the inner model VIF values were below 3.3, ensuring that there is no common method bias issues (Kock, 2015). Therefore, this comprehensive assessment of the measurement model provides a solid basis for subsequent stages of analysis.

Table 2
Discriminant validity analysis

Heterotrait-Monotrait Ratio (HTMT)				
Constructs	BIS	BP	RC	UAR
1. BIS	***0.806***	0.849	0.641	0.744
2. BP	0.758	***0.789***	0.809	0.884
3. RC	0.703	0.775	***0.731***	0.878
4. UAR	0.718	0.764	0.707	***0.781***

Note: Italic Bold numbers are the square root of (AVE). The HTMT results are shown in the upper-right corner of these italicized bold numbers.

4. Results

4.1 Structural model evaluation

We used Smart-PLS 4 with bootstrapping and 5,000 subsamples at confidence level of 95% (Hair et al., 2019). The variance explained by endogenous constructs (R^2), determination coefficient effect size (f^2), predictive relevance Q-square (Q^2), β coefficient, P-value, and t-values were all included in the overall model quality assessment, as illustrated in Table 3.

As recommended by Falk & Miller (1992), the R^2 values were above the threshold of 0.10. The model explained 63.7% of the variance in BIS, 49.9% in UAR, and 69.5% in BP. The effect sizes (f^2) were considered small (≥0.02), medium (≥0.15), or large (≥0.35) (Cohen, 1988). Therefore, the effect size (f^2) values for the RC of the AR-menu on the BIS were weak. However, the effects were strong on BP and profound on UAR, with the booth exceeding the value of 0.35, confirming a significant effect. UAR effect on BP was moderate, whereas that on BIS was weak. BP, in turn, has a moderate effect on BIS. Moreover, the predictive relevance (Q^2) values ranged between 0.482 and 0.589, therefore, confirming the predictive relevance of the model (Shmueli et al., 2019).

Table 3
Model Path Coefficient

	Hypothesis						
	Direct effect	**β Value**	**t-statistics**	**P values**	**f^2**	**VIF**	**Result**
H1:	RC of AR-menu → BIS	0.209	1.966	0.049	0.044	2.72	Supported
H2:	RC of AR-menu → BP	**0.470**	6.528	0.000	0.362	2.00	Supported
H3:	RC of AR-menu → UAR	**0.707**	15.038	0.000	0.997	1.00	Supported
H4:	UAR → BP	0.433	5.522	0.000	0.307	2.00	Supported
H5:	UAR → BIS	0.277	2.254	0.024	0.081	2.61	Supported
H7:	BP → BIS	0.384	3.466	0.001	0.124	3.28	Supported
	Indirect effect						
H6:	RC of AR-menu → UAR → BIS	0.196	2.278	0.023			Supported
H8:	RC of AR-menu → BP → BIS	0.180	3.031	0.002			Supported
H9:	RC of AR-menu → UAR → BP → BIS	0.117	2.898	0.004			Supported

Given that the p-values of the direct relationships are below 0.05 and the t-values exceed the threshold of 1.96, this research demonstrates that all direct relationships between the model variables are significant (Hair et al., 2021). The RC of the AR-menu predicted BIS ($\beta = 0.209$, $t = 1.966$, $p < 0.05$), UAR ($\beta = 0.707$, $t = 15.04$, $p < 0.05$), and BP ($\beta = 0.470$, $t = 6.528$, $p < 0.05$), therefore, H1, H2, and H3 were confirmed. The direct relationship between UAR and BP ($\beta = 0.433$, $t = 5.522$, $p < 0.05$) is significant, thus supporting H4. The direct relationship between UAR and BIS ($\beta = 0.277$, $t = 2.254$, $p < 0.05$) was significant, thus supporting H5. The relationship between BP and BIS was also significant ($\beta = 0.384$, $t = 3.466$, $p < 0.05$), supporting H7.

The model's indirect relationships demonstrated that: UAR has a significant impact on the relationship between the RC of AR-menu and BIS ($\beta = 0.196$, $t = 2.278$, $p < 0.05$), therefore, supporting H6. The indirect effect of the RC of the AR-menu on BIS through BP was significant ($\beta = 0.180$, $t = 3.031$, $p < 0.05$), thus supporting H8. Furthermore, the findings confirmed that UAR

and BP sequentially mediate the relationship between the AR-menu's RC and BIS ($\beta = 0.117$, $t = 2.898$, $p < 0.05$), thus confirming H9.

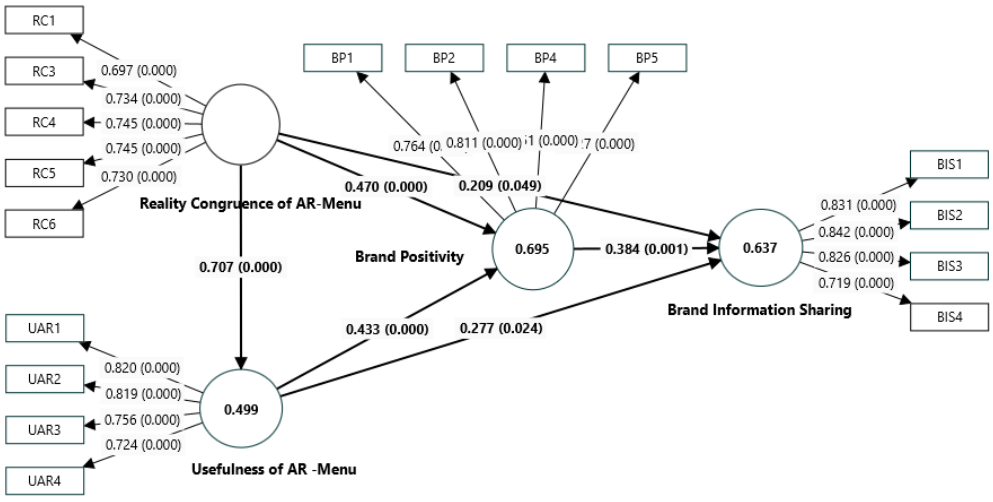

Fig. 2. The Structural Model

5. Discussion

The continuously evolving digital landscape compels researchers and marketers to explore innovative strategies for understanding and engaging with customers. Extensive research has highlighted AR's potential by examining its impact on customer attitudes and behaviors (Kumar et al., 2024). Therefore, this research considered the impact of the RC of AR menus on BIS and the psychological mechanisms involved in this process. Drawing on MRT and using PLS-SEM, the researchers assessed both the measurement and structural models. Furthermore, these results reveal an important finding for researchers and hospitality managers. First, the RC of the AR-menu experience significantly influences Gen Z customers' BIS, BP, and perceived UAR in fast food restaurants. Next, BP and the Perceived UAR significantly influenced the BIS.

Interestingly, the findings of this study demonstrate a significant influence of consumers' perceptions of virtual product presentations that "closely resemble actual items" on their positive behaviors. This alignment increases the likelihood that Gen Z members will share information about the brand and form positive impressions of it (Han et al., 2021). In this regard, the significant relationship between the RC of the AR menus and BIS contrasts with the results of Shaheen et al. (2024). Therefore, this finding confirms that there are generational differences in behaviors as a consequence of AR congruence. Moreover, the connection between the RC of the AR-menu and perceived UAR is significant (Kowalczuk et al., 2021; Shaheen et al., 2024) and very strong compared with the other relationships within the model. The link between the RC of the AR-menu and BIS was mediated by BP and remained significant when customers perceived UAR. Moreover, the findings indicated that UAR and BP sequential mediation played a substantial role in the indirect relationship between the RC of the AR-menu and BIS.

Furthermore, these findings address the research questions by demonstrating that Gen Z's perception of RC in AR menus significantly motivates prosocial behavior to share information about the brand. The study also revealed that the usefulness of AR menus and BP mediates this relationship. Specifically, a close match between AR representations and actual products enhances perceived usefulness and brand positivity, which, in turn, increases customer motivation to share information about the brand.

5.1 Theoretical Implications

This study contributes theoretically to the existing body of literature. First, it advances the theoretical understanding of the conditions under how augmented reality technology affects consumer behavior, particularly in the field of fast-food restaurants. By demonstrating that the RC of AR-menu significantly influences BIS, this study supports and extends existing theories on media richness and technology adoption. Second, the findings provide empirical support for the Media Richness Theory by illustrating how AR, as a rich media form, affects productivity and customer behavior. The significant relationships observed between the RC of AR-menu and brand information sharing reinforce the relevance of MRT in clarifying the influence of media richness on communication outcomes. Third, the findings highlight the role of UAR in mediating the relationship between the RC of the AR-menu and BIS. This finding contributes to the TAM by confirming the importance of customers' perceived usefulness in influencing engagement and behavior. Fourth, the significant role of BP as a mediator between the RC of the AR-menu and BIS provides

new insights into how positive attitudes toward a brand can amplify the effects of AR technology. This enhances the broader understanding of how consumer experience and attitudes impact brand-related behaviors. Fifth, the identification of sequential mediation effects provides a focused perspective on how UAR and BP interact to influence brand information sharing. This finding contributes to the theoretical framework by showing the complex interplay between mediators in shaping consumer responses to AR technology. Moreover, by focusing on Gen Z, this study addresses and responds to a gap in the literature regarding the interactions of younger generations with emerging technologies, thus providing valuable insights into generational differences in technology adoption. Furthermore, the findings of this study open the door for future research, emphasizing the importance of investigating additional mediators, moderators, and contexts to enrich the AR technology theoretical framework about customer brand engagement and behaviors.

5.2 Managerial Implications

The findings of this research provide worthy managerial and practical contributions to the hospitality and food service industries, particularly for fast-food restaurants. The findings offer actionable insights into how to effectively leverage augmented reality technology to improve customer experience and motivate customer engagement. By demonstrating the significant impact of RC of AR-menu on BIS, this study highlights the importance of ensuring that AR-menu representations closely match actual menu items to foster positive customer interactions. Additionally, acknowledging the crucial role that UAR and BP play in mediating these effects, suggesting that restaurant managers should prioritize the development of useful, engaging AR experiences that also cultivate positive brand attitudes. The identification of sequential mediation effects further implies that integrating AR technology with strategies that enhance both usefulness and BP can optimize customer satisfaction and promote favorable brand behaviors. For practitioners, these insights can guide the implementation of AR menus not only to meet but also to exceed customer expectations, thereby improving overall business outcomes. Furthermore, understanding Gen Z's responses to AR technology enables marketers and hospitality managers to tailor their services and offerings to this group, focusing on their preferences and enhancing their dining experience.

6. Limitations and Future Studies

While this study provides valuable insights for fast-food restaurants by focusing on Gen Z's responses to AR technology, it is not without limitations. The findings suggest that AR can effectively enhance brand information-sharing, particularly when it includes features that boost perceived usefulness and brand positivity. However, this study has some limitations that could highlight useful recommendations for future research. First, limiting the sample to a particular society could make the results less generalizable. Future research should include diverse cultural settings to enhance the applicability of the results. Moreover, the study's cross-sectional data collection method presents challenges for examining longitudinal changes in perceptions of AR. Future research could use experiments to investigate whether the effects observed are exclusive to AR, or if they could also occur in other mobile app settings. Expanding research to include comparisons between generations, primarily Gen Z and Millennials (Ameen et al., 2023), gender differences, a larger sample size, and different hospitality settings could contribute to a better understanding of AR's effects in a wider range of settings. Furthermore, these considerations highlight the need for further research to validate and expand the current findings.

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Appendix A.

Research measurement items

Code	Construct /Items
Reality congruence of AR-menu (RC):	
RC1	The AR-menu presents virtual food items impressively.
RC2	*The AR-menu presents virtual food items attractively.
RC3	The design of the virtual food items is visually pleasant.
RC4	The restaurant's AR-menu visually appealingly presents food items.
RC5	The AR-menu presents the design of virtual food items (e.g., colors, shapes) realistically.
RC6	The AR-menu presents virtual food items as if they were real
Brand information sharing (BIS):	
BIS1	I will provide details about upcoming promotions and available discounts for x brand.
BIS2	I will provide extra details about the brand (e.g., price, store locations, availability of discounts, or a link to a website).
BIS3	I will share information about available or upcoming promotions (discounts) for x brand.
BIS4	I will provide lengthy explanations as to why x brand is better than other brands.
Brand positivity (BP):	
BP1	Say positive things about x brand
BP2	Mention I am happy with its performance
BP3	*Talk about x brand favorably
BP4	Say x brand is great
BP5	Express my fondness for the brand
Usefulness of AR-menu (UAR):	
UAR1	I find the AR-menu very helpful
UAR2	I find the AR-menu very useful
UAR3	I find the AR-menu very informative
UAR4	The AR-menu gave me the information I needed