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ADOPTION OF QR CODES AND AUGMENTED REALITY AND ITS EFFECT ON CONSUMER PURCHASE INTENTION IN FMCG SECTOR

Jeeva K S, Dr. P. Syamsundar
Kumaraguru School of Business, Coimbatore, Tamil Nadu, India

ABSTRACT
The rapid integration of digital technologies into packaging has transformed traditional product containers into interactive communication platforms. Among these innovations, Quick Response (QR) codes and Augmented Reality (AR) have emerged as key tools for enhancing consumer engagement and influencing purchase decisions. This study examines the adoption of QR codes and AR in packaging and analyses their effect on consumer engagement and purchase intention. A descriptive research design with a quantitative approach was employed, and primary data were collected from 220 respondents using a structured questionnaire. Statistical tools such as descriptive statistics, chi-square test, one-way ANOVA, and reliability analysis were applied to analyse the data. The findings reveal that QR and AR-enabled packaging significantly enhances consumer engagement, trust, and perceived usefulness, which in turn positively influence purchase intention. Trust was identified as the strongest predictor of engagement and behavioural intention, while AR features such as 3D visualisation and virtual demonstrations were found to increase consumer interest and confidence. However, barriers including privacy concerns, limited awareness, and technological accessibility issues negatively affect adoption. The study concludes that smart packaging supported by secure, user-friendly, and value-driven QR and AR experiences can strengthen consumer–brand relationships and serve as a strategic marketing tool to gain competitive advantage in contemporary markets.

KEYWORDS: *QR Codes; Augmented Reality; Smart Packaging; Consumer Engagement; Purchase Intention; Digital Interactivity; Trust; FMCG Marketing; Interactive Packaging; Consumer Behaviour*

1.INTRODUCTION

In the contemporary digital economy, packaging has transformed from a traditional functional element into a strategic marketing and communication platform. Earlier, packaging was primarily designed to protect products, provide basic information, and facilitate transportation and storage. However, with the rapid development of digital technologies, packaging today plays a crucial role in shaping consumer perception, building brand identity, and influencing purchase decisions. The integration of digital tools such as Quick Response (QR) codes and Augmented Reality (AR) has redefined packaging as an interactive interface that connects physical products with digital environments. QR codes enable consumers to instantly access digital content by scanning the code using smartphones. This content may include nutritional information, ingredient details, certifications, authenticity verification, usage instructions, brand stories, promotional offers, videos, and customer feedback portals. Augmented Reality (AR), on the other hand, overlays digital information such as animations, 3D models, videos, and interactive graphics onto the physical product environment, creating immersive and engaging consumer experiences. Together, QR and AR technologies transform static packaging into smart packaging, allowing two-way interaction between brands and consumers.

2.REVIEW OF LITERATURE

McGregor (2024), in *Enhancing Packaging with Augmented Reality: A Consumer Engagement Perspective* published in the *Journal of Packaging Technology and Research*, found that AR-enabled packaging significantly enhances consumer engagement, brand recall, and trust by transforming packaging into an interactive and immersive communication platform. The study highlighted that AR experiences such as product visualization and digital storytelling increase consumer attention and purchase confidence.

The study *QR Codes and Modern Shoppers: A Behavioural Study* (2024), published in the *International Journal of Consumer Studies*, reported that QR codes positively influence shopper behaviour and purchase decisions by

providing instant access to product information and digital content. Ease of use, security assurance, and strategic placement were identified as key factors driving consumer adoption and engagement.

The study *Building Consumer Trust with Digitally Interactive Packaging* (2024), published in the *Journal of Business Research*, revealed that transparent and verifiable information delivered through QR and AR technologies significantly improves consumer trust, positioning smart packaging as a strategic trust-building tool.

In *Influence of Smart Packaging on Purchase Intentions* (2023), published in the *Packaging Strategies Journal*, the authors found that smart packaging attracts consumer attention at the point of sale, enhances perceived product value, and positively influences purchase intention and impulse buying behaviour.

The study *The Role of Digital Packaging in Impulse Buying Behaviour* (2023), published in *Marketing Intelligence & Planning*, confirmed that interactive packaging stimulates impulse buying by increasing attention and emotional engagement in retail environments.

Research on *QR Codes for Product Traceability and Transparency* (2023) in the *Journal of Consumer Marketing* showed that QR codes improve transparency and consumer trust by enabling access to product origin, certifications, and authenticity information, thereby strengthening long-term brand loyalty.

3.OBJECTIVES OF THE STUDY

The main objective of this research is to analyse how QR codes and Augmented Reality (AR) features in product packaging influence consumer purchase decisions.

- To find the significance difference between the trust and engagement level of the consumer and packaging their level of recommendation of products to others.
- To find the influence of demographic variables on the barriers and concerns of the consumers for QR and AR.
- To suggest FMCG Sector marketing strategies to improvise their packaging style in packaging marketing

4.SCOPE OF THE STUDY

The scope of this study is to examine consumer perceptions and behavioural responses toward the adoption of QR codes and Augmented Reality in product packaging, with specific emphasis on their influence on consumer engagement, trust, and purchase intention. The research concentrates on interactive packaging as a marketing and communication tool rather than on the technical development of QR or AR systems. It primarily addresses how digital interactivity, information accessibility, and experiential content shape consumer decision-making. The study is limited to a quantitative analysis based on responses from consumers who have prior exposure to QR/AR-enabled packaging, providing insights relevant to branding, marketing strategy, and packaging design practices.

5.LIMITATION OF THE STUDY

This study has several limitations that should be considered when interpreting the findings. The research relies on a cross-sectional survey design and self-reported data, which may not fully capture actual purchasing behaviour or long-term effects of QR and AR-enabled packaging. The sample size and sampling method may restrict the generalizability of the results to broader populations and different geographic regions. In addition, the study focuses on consumer perceptions rather than measuring the technical performance or effectiveness of specific QR or AR implementations. Future research using larger samples, longitudinal designs, and experimental methods could provide deeper and more generalizable insights.

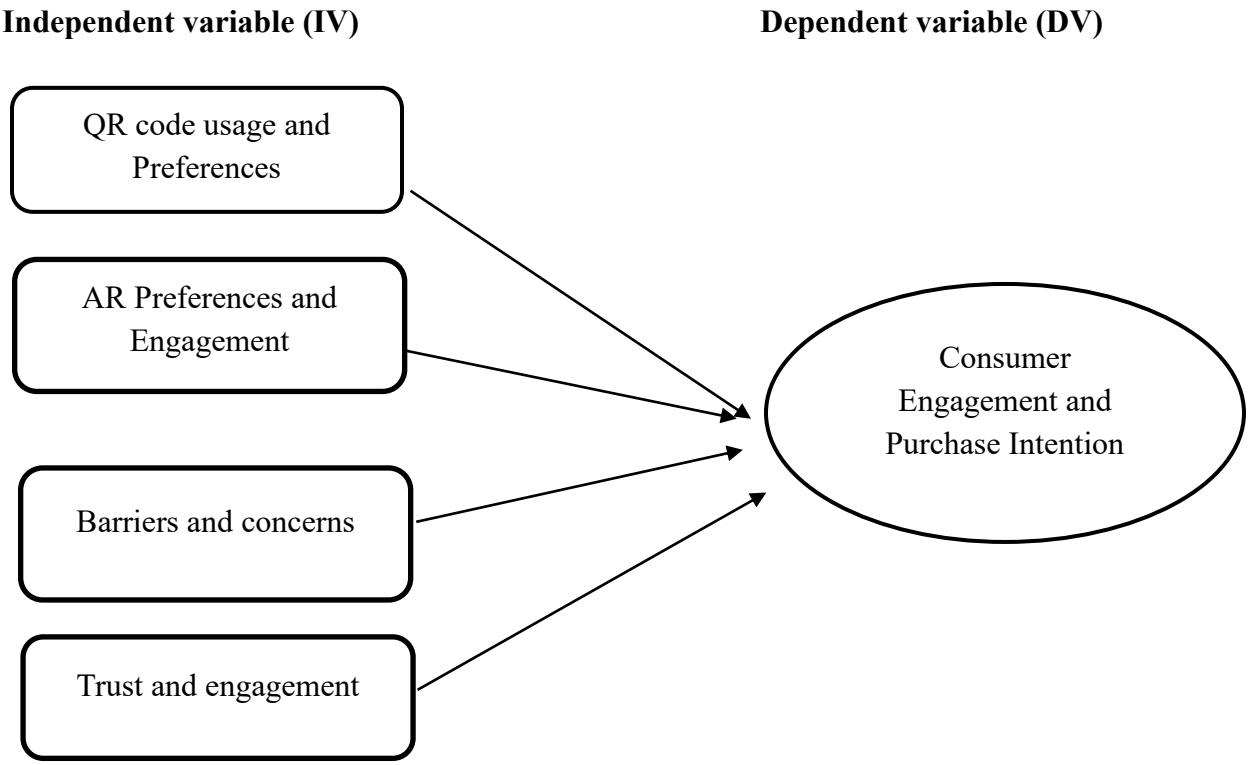
6.THEORETICAL BACKGROUND

This study is grounded in consumer behaviour and technology acceptance theories, which suggest that perceived usefulness, ease of use, and trust influence individuals' adoption of new technologies. It also draws on engagement theory, emphasizing that interactive and immersive experiences enhance emotional and cognitive involvement. Together, these perspectives explain how QR codes and Augmented Reality in packaging shape consumer engagement and purchase intention.

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7.CONCEPTUAL MODEL

The conceptual model visually represents the hypothesised relationships between the **Independent variables (IVs)** and the **Dependent variable (DV)**.



CONCEPTUAL MODEL

Dependent Variable (DV)

Consumer Engagement and Purchase Intention

Consumer engagement and purchase intention represent the behavioural and attitudinal outcomes arising from consumer interactions with QR code and augmented reality (AR)–enabled packaging. Engagement encompasses actions such as scanning QR codes, exploring AR-based content, and sharing interactive brand experiences through digital and social media platforms. Purchase intention refers to the consumer's likelihood of purchasing a product following exposure to and interaction with these digital features. Empirical evidence suggests that higher levels of interactive engagement are positively associated with increased purchase intention, particularly when the digital experience provides functional, informational, or experiential value that enhances perceived product utility and brand relevance.

Independent Variables (IVs)

QR Code Usage and Preferences

QR code usage and preferences describe the frequency, purpose, and nature of consumer interactions with QR codes on product packaging. Consumers commonly utilize QR codes to access product information, promotional offers, brand narratives, instructional content, and post-purchase support. When QR codes deliver relevant, accurate, and easily accessible information, they strengthen consumer engagement, enhance perceived transparency, and positively influence purchase intention by reducing information asymmetry and decision-making uncertainty.

AR Preferences and Engagement

AR preferences and engagement refer to consumers' attitudes toward and interactions with AR-based packaging features, including 3D visualizations, virtual product demonstrations, immersive storytelling, gamification, and virtual try-on experiences. These interactive elements transform traditional packaging into experiential digital interfaces,

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increasing cognitive involvement, emotional connection, and brand recall. Positive AR experiences enhance perceived enjoyment and perceived usefulness, which significantly contribute to favourable brand perceptions and stronger purchase intentions.

Barriers and Concerns

Barriers and concerns represent the structural, psychological, and technological constraints that limit consumer adoption of QR and AR technologies in packaging. These include low awareness, limited digital literacy, privacy and data security apprehensions, poor internet connectivity, technological accessibility issues, and skepticism regarding content credibility or utility. Such constraints negatively affect consumer engagement levels and weaken the overall influence of interactive packaging technologies on purchase intention.

Trust and Engagement

Trust and engagement reflect consumers' confidence in the authenticity, reliability, and safety of digital content accessed through QR codes and AR interfaces. Trust functions as a mediating construct that strengthens the relationship between technological interaction and behavioural outcomes. When consumers perceive the information as credible and secure, they demonstrate deeper engagement, stronger brand relationships, and more favourable brand attitudes, which collectively enhance purchase intention and long-term brand loyalty.

7.RESEARCH METHODOLOGY

This study adopts a descriptive research design using a quantitative approach. Primary data were collected through a structured questionnaire administered to 220 respondents with prior exposure to QR/AR-enabled packaging.

8.DATA ANALYSIS AND DISCUSSION

The findings indicate that young, digitally active consumers dominate QR and AR adoption. Trust, engagement, and perceived usefulness emerged as critical determinants of adoption. Consumers showed higher engagement when QR/AR content was informative, fast-loading, and easy to use. Trust emerged as the strongest predictor of engagement and purchase intention. AR features such as 3D product views and virtual demonstrations significantly enhanced consumer interest and confidence.

Statistical analysis confirms significant relationships between trust, engagement, and purchase intention. Demographic factors such as gender and occupation significantly influenced barriers and perceptions.
These findings demonstrate that QR and AR technologies influence not only information access but also emotional engagement, brand perception, and behavioural intention.

Demographic Variable	Category	Frequency	Percentage
Age	Below 20	31	31
	21–30	5	5
	31–40	31	31
	41–50	5	5
Gender	Male	83	83
	Female	137	137
Occupation	Student	70	70
	Working Professional	120	120
	Homemaker	21	21
	Business Owner	9	9

The demographic composition indicates a young, digitally literate, and economically active sample population, making it appropriate for studying the adoption of QR codes and Augmented Reality technologies in packaging and their impact on purchase intention.

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ONE WAY ANOVA
USAGE AND PREFERENCE & TRUST AND ENGAGEMENT

Trust and Engagement

Trust and Engagement	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	79.602	1	79.602	147.211	.000
Within Groups	117.880	218	.541		
Total	197.482	219			

Interpretation
The ANOVA results show that the calculated F-value is 147.211 with a p-value of 0.000 (< 0.05). This indicates a highly significant difference between groups in terms of trust and engagement with QR/AR features. In other words, consumers' level of trust in QR information is strongly associated with their engagement with AR features, confirming that these two factors are significantly related in influencing consumer perceptions.

9.MANAGERIAL IMPLICATIONS

- Position QR and AR-enabled packaging as a strategic communication channel that enhances brand visibility and differentiation.
- Provide reliable, transparent, and value-focused digital content to strengthen consumer trust and confidence.
- Design simple, fast, and mobile-optimized experiences to encourage repeated consumer interaction.
- Utilize immersive features such as 3D visualization and virtual demonstrations to improve product understanding.
- Use insights from consumer interaction data to continuously refine packaging design and digital strategies.

10.SUGGESTIONS

- Examine long-term effects of interactive packaging on brand loyalty and repeat purchase behavior.
- Employ experimental and longitudinal research designs to establish causal relationships.
- Extend studies to diverse industries and cultural contexts to improve generalizability.
- Explore integration of smart packaging with emerging digital technologies.
- Investigate consumer perceptions of privacy, security, and ethical data usage.

11.CONCLUSION

The study concludes that the adoption of QR codes and Augmented Reality in packaging significantly influences consumer trust, engagement, and purchase intention. Smart packaging transforms traditional products into interactive brand experiences, strengthening consumer–brand relationships. However, adoption depends on trust, usability, content relevance, and privacy assurance. By integrating secure, transparent, and value-driven QR/AR experiences, brands can enhance consumer confidence, increase engagement, and positively influence purchase decisions. The research confirms that smart packaging is not merely a technological innovation but a strategic marketing tool that creates competitive advantage, strengthens brand loyalty, and shapes future consumer experiences.

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