J. of Adv. Res. in Digital Marketing Strategies and Consumer Behavior Analytics
Volume 1, Issue 2 - 2025, Pg. No. 13-19
Peer Reviewed Journal

Review Article

From Engagement to Trust: How AR and Blockchain Are Shaping Digital Marketing and Consumer Behavior Analytics

Pradeep Mehra

Student, Jai Hind College, Mumbai, India

I N F O

E-mail Id:
pradeepm@gmail.com
Orcid Id:
https://orcid.org/0009-0001-5668-0960
How to cite this article:
Mehra P. From Engagement to Trust: How AR and Blockchain Are Shaping Digital Marketing and Consumer Behavior Analytics. *J Adv Res Digit Mark Strateg Consum Behav Anal 2025; 1(2): 13-19.*

Date of Submission: 2025-10-17
Date of Acceptance: 2025-11-15

A B S T R A C T

In the dynamic landscape of digital marketing, brands must capture consumer engagement while building trust and harnessing behavioural insights. Two emerging technologies—augmented reality (AR) and blockchain—are increasingly deployed to deliver immersive experiences and secure data flows. This review explores how AR enables compelling interactions that drive engagement and how blockchain supports transparency, data integrity, and trust, which are critical for consumer behaviour analytics. Finally, it discusses the integrative potential of AR and blockchain for advanced marketing strategies, analytics, and future research directions.

Keywords: transparency, data integrity, marketing strategies, analytics, future research directions.

Introduction

Digital marketing and consumer behaviour analytics are rapidly transforming with new technologies that reshape consumer engagement and data utilisation. AR provides immersive and interactive experiences, while blockchain ensures data trust, transparency, and tokenised interactions. Integrating these technologies allows marketers to move from engagement to trust, enabling advanced predictive modelling and consumer behaviour analysis.

This review addresses three questions.

- How does AR contribute to consumer engagement and behaviour in digital marketing?
- How does blockchain support trust, data integrity, and analytics in marketing?
- What is the potential of integrating these technologies to enhance digital marketing strategy?

Augmented Reality (AR) and Consumer Engagement

Definition and Theoretical Foundations

Augmented reality (AR) is a technology that overlays digital content—such as images, animations, 3D models, and interactive elements—onto the user's view of the real world, typically through smartphones, tablets, smart glasses, or other wearable devices .[1] Unlike virtual reality (VR), which immerses users in a fully digital environment, AR enhances real-world experiences by integrating virtual elements into physical surroundings. This combination of real and digital stimuli increases sensory richness, interactivity, and user engagement, offering marketers a powerful tool for shaping consumer perception and behaviour.

Technology Acceptance Model (TAM)

- The Technology Acceptance Model (TAM) posits that adoption of any technology is primarily influenced

by perceived usefulness (the degree to which a user believes the technology enhances performance) and perceived ease of use (how effortless the technology is to operate).[2] In the context of AR marketing.

- Perceived usefulness relates to how AR helps consumers make informed purchasing decisions. For instance, AR "try-on" apps in fashion or cosmetics allow users to visualise products on themselves before buying, increasing confidence and purchase intention.
- Perceived ease of use reflects the intuitiveness of the AR interface. Simple gestures, clear instructions, and responsive performance encourage adoption, while complicated setups or lagging AR applications discourage use.

By integrating TAM into AR marketing strategy, businesses can enhance adoption rates and optimise consumer engagement.

Hedonic/Utilitarian Framework

Consumer behaviour research often distinguishes between hedonic (experiential) and utilitarian (functional) motivations. AR can satisfy both dimensions.[3]

- **Hedonic value:** AR provides enjoyment, novelty, and immersive experiences. Gamified AR campaigns, interactive brand storytelling, and AR-based social media filters create positive emotional connections and memorable experiences. For example, Pokémon Go's AR-enabled gameplay demonstrated how immersive experiences could drive engagement and brand loyalty.
- **Utilitarian value:** AR also serves practical purposes. Furniture retailers like IKEA use AR apps to help customers visualise how a sofa or table fits into their homes, reducing decision-making uncertainty and purchase risk.

Understanding this dual value helps marketers design AR campaigns that cater to both pleasure-seeking and problem-solving consumer behaviours.

Engagement Theory

Engagement theory emphasises the importance of interactive, immersive, and meaningful experiences for building strong consumer-brand relationships .[4] AR facilitates engagement by.

- Allowing active participation rather than passive observation, e.g., exploring 3D product models or interactive packaging.
- Encouraging repeated interactions, such as unlocking hidden content or rewards in AR-enabled apps.
- Stimulating multiple senses simultaneously, creating memorable and emotionally resonant experiences.

High engagement, facilitated by AR, is linked to increased brand loyalty, higher word-of-mouth referrals, and stronger purchase intentions.

Integration of Theoretical Insights

Combining TAM, hedonic/utilitarian frameworks, and engagement theory provides a comprehensive understanding of AR adoption in marketing:

- Ease of adoption ensures that consumers can access AR experiences without technical barriers (TAM).
- Value creation ensures that experiences are both enjoyable and functional (hedonic/utilitarian).
- Engagement ensures that consumers are actively involved and emotionally invested (Engagement Theory).

AR Applications in Marketing

AR is applied in retail product visualisation, interactive packaging, social media filters, location-based promotions, and immersive storytelling .[5,6] For example, virtual try-ons reduce purchase risk and increase purchase intention. AR campaigns generate higher engagement metrics, longer dwell times, and higher conversion rates .[7] AR also enables collection of richer behavioural data for segmentation and predictive analytics.

Table 1. AR Theoretical Frameworks and Marketing Relevance

Framework	Key Concept	Marketing Relevance	Example Applications
TAM	Perceived usefulness and ease of use	Explains AR adoption likelihood	Virtual try-on, furniture visualization apps
Hedonic/Utilitarian	Experiential vs functional value	AR creates enjoyment and practical benefits	AR games, AR-assisted product comparison
Engagement Theory	Immersive experiences enhance engagement	Builds consumer-brand relationships	Gamified campaigns, interactive store experiences
Experiential Marketing	Memorable multisensory consumer experiences	Enhances emotional connection and brand recall	AR storytelling, virtual showrooms
Context-Aware Personalization	Tailored content via location/behavior	Facilitates personalized marketing	Location-based promotions, customized overlays

Benefits and Limitations

Benefits: Enhanced attention, engagement, perceived value, purchase confidence, and conversion rates .[5,7]

Limitations: High development costs, hardware fragmentation, privacy concerns, and measurement challenges .[8,9]

Blockchain and Trust in Digital Marketing

Definition and Relevance

- Blockchain is a distributed ledger technology that enables secure, transparent, and decentralised record-keeping of digital transactions. Its core characteristics include.
- **Decentralisation:** Unlike traditional databases controlled by a single entity, blockchain distributes data across multiple nodes, eliminating a single point of failure and reducing the risk of manipulation.
- **Immutability:** Once recorded, transactions or data entries cannot be altered or deleted, ensuring integrity and verifiability.
- **Transparency:** All participants in the blockchain network can access and audit transaction history, fostering accountability.
- **Tokenisation:** Digital assets, rewards, or loyalty points can be represented as tokens on the blockchain, enabling innovative marketing mechanisms.
- **Cryptographic Security:** Advanced encryption and consensus protocols protect data from tampering and unauthorised access.[10]

In the context of digital marketing, blockchain is increasingly recognised for its potential to enhance trust, accountability, and efficiency across the marketing ecosystem.

Trustworthy Data Capture

Consumer data is the foundation of modern marketing analytics. Blockchain ensures that behavioural and transactional data are accurate, tamper-proof, and verifiable, which is critical for predictive analytics, segmentation, and personalised campaigns. For example, purchase histories or engagement logs stored on a blockchain are immutable, ensuring data authenticity.

Fraud Prevention

Digital advertising is vulnerable to fraud, including fake clicks, bot traffic, and ad impression manipulation. Blockchain-based ad platforms can verify each impression, click, and conversion, ensuring that marketers pay only for genuine consumer interactions. This reduces wasted ad spend and enhances ROI.[11]

Consumer-Controlled Data

Blockchain enables decentralised personal data ownership, allowing consumers to control which information is shared with marketers. Smart contracts can automate consent and reward users for voluntarily sharing their data. For example, consumers might receive tokenised rewards in exchange for sharing purchase preferences or engagement patterns. This shift fosters trust and transparency, which are increasingly important in the era of privacy regulations like GDPR and CCPA.

Tokenised Loyalty and Reward Systems

Traditional loyalty programmes often suffer from low engagement and limited interoperability. Blockchain allows tokenised loyalty points or digital assets that are secure, transferable, and usable across multiple platforms. Brands can create gamified or AR-integrated loyalty campaigns, linking blockchain-based rewards to immersive experiences. For instance, completing an AR scavenger hunt could automatically reward users with blockchain tokens that can be redeemed for discounts or exclusive experiences.

Marketing Analytics and Predictive Insights

The combination of immutable data and tokenised interactions enables advanced consumer behaviour analytics. Marketers can leverage verified behavioural data to develop predictive models, forecast trends, and optimise campaign targeting. Blockchain ensures that analytics are based on authentic, high-quality data, mitigating biases caused by inaccurate or manipulated inputs.

Marketing Relevance

Blockchain is transforming how brands approach trust, transparency, and data governance in marketing. By providing a secure and auditable foundation for consumer interactions, blockchain strengthens relationships between brands and consumers. It also facilitates innovative marketing models, including decentralised marketplaces, reward ecosystems, and tokenised engagement programmes. As digital marketing becomes increasingly data-driven, blockchain's relevance will continue to grow, particularly in areas where trust, privacy, and verification are critical.

Blockchain Applications in Marketing

- **Ad FrSupply Chain Provenance:** Consumer verification of product origin.
- **Tokenised Loyalty Systems:** Smart contracts issuing rewards.
- **Data Marketplaces:** Consumers control and monetise data.
- **Secure Behavioural Analytics:** Verified and immutable logs for modelling [12,13]

Table 1. Blockchain Features and Marketing Applications

Feature	Key Concept	Marketing Relevance	Example Applications
Decentralization	No single point of control	Reduces bias, central authority dependence	Peer-to-peer data sharing
Immutability	Records cannot be altered	Ensures trust in consumer behavior data	Verified ad impressions, transaction logs
Transparency	Open data ledger	Builds consumer trust	Supply chain verification
Tokenization	Digital assets representation	Enables rewards and engagement incentives	NFT-based loyalty programs
Cryptographic Security	Secures transactions and user data	Protects sensitive behavioral information	Encrypted consumer analytics

Benefits and Limitations

Benefits: Transparency, reduced fraud, data governance, and consumer trust [10,11]

Limitations: scalability issues, integration challenges, lack of standardisation, adoption barriers, and regulatory uncertainties.[14]

Integrating AR and Blockchain

The convergence of Augmented Reality (AR) and Blockchain offers unique opportunities for digital marketing and consumer behaviour analytics by combining immersive experiences with trusted, transparent data infrastructures. While AR enhances consumer engagement through interactive and sensory-rich experiences, blockchain provides the backbone for secure, verifiable, and tokenised interactions. Together, these technologies create a powerful ecosystem that drives both experience and trust.

Conceptual Synergy

While AR and blockchain have often been studied in isolation, their integration enables several synergistic benefits.

- **Immersive Experiences with Data Integrity:** AR delivers interactive and sensory-rich experiences, such as virtual try-ons, gamified shopping, or AR-enhanced storytelling. Blockchain ensures that all user interactions within these experiences are accurately recorded, immutable, and verifiable, allowing marketers to rely on authentic behavioural data.
- **Tokenised Rewards and Engagement:** Blockchain enables digital tokens or rewards linked to AR interactions. For example, consumers participating in an AR scavenger hunt or exploring a virtual product showcase could earn blockchain-backed loyalty points. These tokens are secure and tradable and can be redeemed across platforms, increasing engagement and brand loyalty.
- **Enhanced Consumer Trust:** Data privacy and security concerns are major barriers in digital marketing. Blockchain gives users control over their personal data, including the ability to consent to sharing AR interaction data. This transparency builds trust and encourages more active participation in AR campaigns.
- **Advanced Consumer Behaviour Analytics:** By combining AR-generated interaction data with blockchain's verifiable records, marketers can develop robust predictive models, perform granular segmentation, and analyse behavioural patterns without fear of data tampering or inaccuracy.

Marketing Applications

Some notable applications of integrating AR and blockchain include.

- **AR-Enabled Virtual Try-Ons with Blockchain Verification:** Fashion and cosmetic brands can use AR for product visualisation, while blockchain ensures the authenticity of purchases, loyalty rewards, and customer engagement data.
- **Gamified AR Campaigns:** Interactive AR games can reward participants with blockchain-based tokens, increasing engagement and incentivising repeat interactions.
- **AR Product Provenance:** AR overlays can display product origin, manufacturing, and sustainability information, with blockchain verifying the authenticity of these claims.
- **Interactive Loyalty Ecosystems:** Consumers earn tokens by completing AR-based challenges or exploring brand experiences, creating a seamless, gamified loyalty programme with verified transactions.

Benefits of Integration

The integration of AR and blockchain provides several strategic advantages for marketers.

Challenges and Considerations

- Despite their potential, integrating AR and blockchain presents several challenges.

Table 1. AR Theoretical Frameworks and Marketing Relevance

Feature	AR Contribution	Blockchain Contribution	Benefit for Marketing
Consumer Engagement	Immersive, interactive experiences	Verified participation and actions	Higher engagement, authentic metrics
Data Integrity	Tracks interactions	Immutable records	Accurate consumer behavior analytics
Trust & Privacy	Interactive experiences may collect sensitive data	Consumer-controlled data sharing	Increased trust and adoption
Loyalty & Rewards	Gamified experiences	Tokenized rewards	Enhanced loyalty and repeat engagement
Predictive Analytics	Behavioral patterns from AR usage	Reliable, verifiable data	Better targeting and campaign optimization

- **Technical Complexity:** AR and blockchain require specialised infrastructure, and their integration can be resource-intensive.
- **User Adoption:** Consumers must adopt both AR interfaces and blockchain-based wallets or tokens, which may present usability barriers.
- **Data Privacy & Compliance:** While blockchain enhances trust, ensuring compliance with privacy laws (e.g., GDPR, CCPA) when linking AR interaction data remains crucial.
- **Scalability:** High volumes of AR interactions may require significant blockchain storage and processing capacity.

Future Directions

As AR devices become more ubiquitous and blockchain scalability improves, the integration of these technologies will likely enable.

- Personalised AR Experiences: Real-time AR content customised based on verified blockchain-stored consumer preferences.
- Decentralised AR Marketplaces: Platforms where AR content, experiences, or assets can be securely exchanged using blockchain tokens.
- Immersive Social Commerce: AR shopping experiences underpinned by blockchain-verified reviews, transactions, and user behaviour analytics.

Challenges, Research Gaps, and Future Directions

While the integration of Augmented Reality (AR) and Blockchain offers transformative potential for digital marketing and consumer behaviour analytics, several challenges and research gaps must be addressed to fully realise their benefits. This section outlines key limitations, areas requiring further study, and potential future directions.

Challenges

- Technical Complexity and Integration Costs Integrating AR with blockchain technologies requires sophisticated infrastructure, including AR-capable devices, blockchain networks, and secure data storage mechanisms.[12] High development costs, system interoperability issues, and the need for continuous updates can limit adoption, especially among small and medium-sized enterprises.
- Scalability and Performance Issues AR applications generate large volumes of interactive and multimedia data, while blockchain networks, particularly those using proof-of-work consensus mechanisms, can face latency and storage limitations .[13] Ensuring smooth, real-time AR experiences while maintaining blockchain verification is technically challenging.
- User Adoption and Usability Consumers may face usability barriers in adopting AR applications and managing blockchain-based wallets or tokenised rewards.[14] Complex user interfaces, unfamiliarity with digital tokens, and perceived privacy risks can hinder engagement, reducing the overall effectiveness of integrated AR-blockchain campaigns.
- Data Privacy and Regulatory Complianc Although blockchain enhances transparency, recording consumer interactions on an immutable ledger may conflict with privacy regulations such as GDPR and CCPA, which grant individuals the right to erase or control personal data.[5] Reconciling blockchain's immutability with privacy compliance remains a key challenge.
- Standardisation and Interoperability Currently, there is a lack of standardised protocols for integrating AR experiences with blockchain systems across platforms and devices. This fragmentation can hinder adoption and limit the scalability of cross-brand or cross- platform initiatives.[16]

Research Gaps

- Limited Empirical Evidence Most studies on AR and blockchain in marketing are conceptual or exploratory, with few empirical investigations measuring the impact on consumer behaviour, engagement, or purchase intention.[17] More rigorous field experiments and longitudinal studies are needed.
- Consumer Perceptions and Behavioural Insights Research on how consumers perceive trust, privacy, and value in AR-blockchain-integrated experiences is sparse. Understanding factors influencing adoption, willingness to share data, and engagement with tokenised rewards is crucial for effective strategy design.[18]
- Effectiveness of Tokenised Marketing Models While blockchain enables innovative reward systems, empirical research on the effectiveness of tokenised loyalty points or gamified AR campaigns in increasing engagement, conversion, and long-term loyalty is limited.[19]
- Cross-Cultural and Demographic Studies Consumer responses to AR and blockchain may vary across cultures, age groups, and socioeconomic backgrounds. Research examining these differences can help marketers design inclusive and culturally sensitive strategies .[20] Integration with Emerging Technologies The interaction of AR-blockchain systems with AI, machine learning, IoT, and predictive analytics is underexplored. Integrating these technologies could enhance personalisation, automation, and predictive capabilities in marketing.[2]

Future Directions

- Scalable Blockchain SolutionsThe development of high-throughput, low-latency blockchain architectures and sidechains can support large-scale AR interactions without compromising performance. This will be essential for mass adoption in retail, tourism, and entertainment industries.
- AI-Driven AR Personalisation Artificial intelligence and machine learning can leverage blockchain-verified consumer data to deliver real-time, hyper-personalised AR experiences, increasing engagement and predictive analytics accuracy.
- Privacy-Preserving Blockchain Mechanisms Future research should explore privacy-preserving blockchain solutions, such as zero-knowledge proofs or off-chain data storage, to reconcile immutability with regulatory compliance and user trust.
- Token Economy and Gamification Marketers can explore innovative tokenomics, linking AR interactions with blockchain-based rewards to gamify engagement, incentivise loyalty, and foster community-driven brand experiences.
- Cross-Platform and Interoperable Ecosystems Developing standards and frameworks that allow ARexperiences and blockchain tokens to interoperate across multiple devices, brands, and platforms can expand reach, increase engagement, and facilitate seamless consumer journeys.
- Longitudinal and Multidisciplinary Studies Future research should employ longitudinal, multi-method approaches combining behavioural analytics, surveys, and experimental designs to measure the long-term effects of AR-blockchain integration on consumer trust, engagement, and purchase behaviour.

Conclusion

The integration of Augmented Reality (AR) and Blockchain represents a transformative evolution in digital marketing, bridging the gap between consumer engagement and data-driven trust. AR's capacity to overlay immersive, interactive, and sensory-rich content onto real-world environments enables brands to create highly engaging experiences that enhance attention, involvement, and emotional connection with products and services. These experiences, whether through virtual try-ons, AR-enabled storytelling, or gamified campaigns, significantly improve consumer-brand interaction and facilitate meaningful engagement .[1,4]

Blockchain complements AR by providing a secure, transparent, and immutable framework for recording consumer interactions and transactions. By ensuring data integrity, provenance, and tokenised ownership, blockchain enhances consumer trust, mitigates risks such as fraud and data tampering, and empowers users with greater control over personal data .[10,1] This combination of immersive experience and reliable data infrastructure enables brands to capture high-quality behavioural data, which can be leveraged for advanced consumer behaviour analytics, segmentation, and predictive modelling.

Integrating AR and blockchain also opens avenues for innovative marketing mechanisms, including tokenised loyalty programmes, gamified engagement, AR-enabled product provenance verification, and decentralised marketplaces. These strategies not only increase engagement and loyalty but also provide marketers with verified, actionable insights into consumer preferences, behaviours, and purchase intentions. Moreover, the integration encourages ethical and transparent marketing practices, aligning with growing consumer expectations around privacy and data protection.[13,15]

However, realising the full potential of AR-blockchain integration requires addressing significant challenges. These include technical complexity, scalability issues, user

adoption barriers, regulatory compliance with data privacy laws, and interoperability across devices and platforms. Addressing these operational, technological, and legal challenges is crucial for enabling seamless, trustworthy, and scalable implementation of these technologies in marketing strategies [12,16]

From a research perspective, there are notable gaps in empirical evidence regarding the effectiveness of AR-blockchain applications on consumer engagement, purchase behaviour, and loyalty. Cross-cultural studies, longitudinal analyses, and investigations into the interplay between AR, blockchain, and emerging technologies such as AI and predictive analytics will further strengthen theoretical and practical understanding in this domain.[17,21]

In conclusion, the convergence of AR and blockchain offers a strategic pathway from engagement to trust, enabling marketers to create immersive, interactive experiences underpinned by secure, verifiable data. For brands willing to invest in technological integration and navigate operational and regulatory challenges, this synergy provides an opportunity to enhance consumer engagement, foster trust, and leverage predictive insights for more effective, data-driven marketing strategies. As both technologies mature, their integration is likely to become a cornerstone of next-generation digital marketing, redefining the ways brands interact with and understand consumers in an increasingly digital and immersive marketplace.

References

1. Liu J, Du Z. Augmented Reality and Marketing: A Systematic Review. WHICEB 2021 Proceedings. 2021.
2. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly. 1989;13(3):319340.
3. Hilken T, de Ruyter K, Chylinski M, Mahr D, Keeling D. Augmenting the eye of the beholder: Exploring the strategic potential of augmented reality to enhance online service experiences. Journal of the Academy of Marketing Science. 2017;45(6):884905.
4. Wood N. Ethical Considerations of AR Applications in Smartphones; A Systematic Literature Review of Consumer Perspectives. arXiv preprint. 2023.
5. Banuba Blog. Augmented Reality in Marketing. 2024.
6. Khan OQ. The Impact of Augmented Reality (AR) on Digital Marketing. Graduate Journal of Pakistan Review. 2023;3(2).
7. PostIndustria. AR Advertising: A Ploy or the Future of Digital Marketing? 2025.
8. ArmMarketingTips. How Augmented Reality Marketing Impacts Online Reputation. 2025.
9. Reddit thread: What's the Beef with AR Adoption in Digital Marketing? 2025.
10. Islam I, Munim KM, Oishwee SJ, Najmul AKM, Islam MN. A Critical Review of Concepts, Benefits, and Pitfalls of Blockchain Technology Using Concept Map. arXiv preprint. 2020.
11. Supraveen UJ, Srivastava D, Sharma GK, Kulkarni N, Joseph C. Blockchain and Marketing: Enhancing Consumer Trust and Transparency in the Digital Era. Economic Sciences. 2025;21(03(S)):7282.
12. Liu Y. Effect of Digital Marketing Capabilities and Blockchain Technology on Organizational Performance and Psychology. Frontiers in Psychology. 2022;12:805393.Wang H, Zhang M, Ying H, Zhao X. The impact of blockchain technology on consumer behavior: a multimethod study. Journal of Management Analytics. 2021;8(3):371390.
13. Taherdoost H, Madanchian M. Blockchain-Based E-Commerce: A Review on Applications and Challenges. Electronics. 2023;12(8):1889.