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Innovative Approaches To Fmcg Customer Journey Mapping: The Role Of Block Chain And Artificial Intelligence In Analyzing Consumer Behavior And Decision-Making

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Abstract

The convergence of Artificial Intelligence (AI) and Blockchain has the potential to revolutionize customer journey mapping, particularly in the Fast-Moving Consumer Goods (FMCG) sector. AI offers powerful analytics and personalization, while Blockchain enhances data transparency and security. Integrating these technologies can solve long-standing marketing challenges like data privacy and consumer trust.

Purpose:

This study aims to explore how AI and Blockchain can transform customer journey mapping in the FMCG industry, providing deeper insights into consumer behavior, decision-making, and personalized marketing.

Methodology:

A structured questionnaire was administered to 505 respondents from FMCG companies in Bangalore, using a convenience random sampling approach. Factor analysis and structural equation modeling were applied to analyze the data and evaluate the technologies' impact on customer journey mapping.

Major Findings:

The study revealed that integrating AI and Blockchain improves data accuracy, supply chain transparency, and customer personalization. Familiarity with these technologies is high, with 82.4% of respondents acknowledging Blockchain's benefits in product authenticity and transparency. However, high implementation costs and data privacy concerns remain key challenges.

Key Words: Block chain, Artificial Intelligence (AI), Customer Journey Mapping, Consumer Behavior, Data Transparency

INTRODUCTION:

Consequent upon the revolution of the digital age, the marketing environment has constantly evolved into new paradigms that both challenge and present previously unheard-of prospects for old tactics. Some of the most significant of these include AI and block chain technology. Each of these on their own has transformed certain facets of the marketing environment. Therefore, Block chain has completely shaken up the concepts of security,

trust, and transparency in transactions by addressing key problems like data integrity and privacy **(Jyoti Rana, 2022)**.

Arrival of such technologies is likely to usher in a new innovative marketing era. Such may solve some of the most critical issues that the sector faces, for instance, with AI that criticism is more severe due to data privacy issues despite its superiority in processing and interpreting consumer data for predictive trends and behaviors. It actually takes care of those problems on its own because its immutable and transparent ledger gives safe and decentralized storage and access of customer data. It would make available more control of personal information for consumers.

With this convergence, new innovations in content verification, loyalty programs, and open supply chains spring up. For example, with Block chain's AI-driven data analysis, firms shall be able to ascertain the authenticity and ethical sourcing of their products **(Nazmul Hasan, 2022)**.

However, during this convergence, problems arise in terms of scalability, interoperability, and all the ethical considerations where block chain technology must be integrated with artificial intelligence by handling, taking care of all the challenges which possibly arise during the use or deployments of these emergent technologies in an optimal manner that maximizes their benefits and reduces their associated risks as they evolve.

Background:

This growing need in the Fast-Moving Consumer Goods industry has been for high-end technologies to attempt at attempting mitigating the complexity of consumer behavior **(Mohsen Attaran, 2019).** The thing about such product or service mapping is that whereas traditional customer path mapping techniques might be good enough at times, they don't quite cut the mustard when trying to provide accurate, real-time data. While AI allows for strong analytics and personalization, block chain promises to enhance security and transparency in data. The bases of this study therefore anchored on an idea that customer journey mapping may be transformed using various means of technologies to give a more accurate and useful insight into consumer behavior and decision-making.

STATEMENT OF THE PROBLEM:

Block chain and artificial intelligence seem exciting promises for marketing, though there still exists overwhelming ignorance about how to employ these technologies for more efficient service towards the marketing objectives. It appears that little work has been conducted in determining the integration of the principles of block chain with the technology behind AI for creating creative, effective, and scalable marketing solutions despite the transparency, security, and integrity of data provided by block chain, while AI delivers superior analytics and personalization. This knowledge gap prohibits marketers to leverage the full benefits of both platforms. Under such circumstances, the opportunities for enriching consumer engagement, eliminating inaccurate data, and enabling strategic decision-making remain untapped. Hence, careful analysis and development of comprehensive frameworks, practical guidelines, on block chain in association with artificial intelligence for successful integration in marketing is the need of the hour.

Research Gap:

The major gaps of the research article "**Revolutionary Marketing: The Convergence of Block chain and AI**" is that there exists no reasonable framework that combines both technologies in marketing. Much work has been done regarding the block chain and artificial intelligence, but little is known regarding the mixture of the two for real-world marketing. This gap calls for workable models that will guide the integration of AI's data-processing and personalization skills with block chain's features on transparency and security. To fill up this gap, comprehensive frameworks, in-depth case studies, and best practices on integrating block chain and AI with marketing must be established.

NEED OF THE STUDY:

The primary purpose of this research paper, "**Innovative Approaches to FMCG Customer Journey Mapping: The Role of Block chain and AI in Analyzing Consumer Behavior and Decision-Making**," is to explore the methods through which block chain and AI can revolutionize customer journey mapping in the FMCG sector. For all intents and purposes, it defines how these technologies promote transparency, security, and personalization while tracing consumer behavior and decision-making processes. The research will provide innovative methodologies, practical recommendations, and insights in integrating block chain's data integrity into the AI-based predictive capabilities to enrich customer experience and strategic decision-making of FMCG companies.

SCOPE OF THE STUDY:

Customer journey mapping is a strategic process visualizing the whole customer experience, from the first point

of touch with the brand up to the post-purchase stage. It is an in-depth diagram or map that has enumerated all touch points and interaction phases a customer would have with a company-from the awareness stage to consideration, purchase, and finally, post-purchase.

RESEARCH QUESTIONS:

- How can block chain technology help FMCG companies track and manage customer data more securely?
- What role does AI play in analyzing customer behavior and predicting future buying patterns in the FMCG sector?
- Why is AI particularly effective in analyzing consumer behavior and predicting buying patterns for FMCG brands?
- Why is it important for FMCG companies to ensure their use of block chain and AI respects customer privacy and meets regulatory standards?

LITERATURE REVIEW:

Kakatkar (April 2020) The goal of artificial intelligence (AI) is to give machines a level of intelligence that is primarily associated with humans. The body of research, in conjunction with our practical experience, indicates that although AI might not be prepared to fully replace highly creative work in the innovation process, it can be a valuable tool for innovation managers. We discuss the advantages and drawbacks of applying AI to innovation before offering some strategic recommendations and extra tools for innovation managers.

Honglu Wang (August 2021), Block chain technology is one of the revolutionary ones that revolutionize the supply chain. The aim of the current study is the empirical investigation on how block chain technology influences customer behavior. Our study was conducted in collaboration with a Chinese e-commerce company that introduced a block chain-based tracing platform. The outcome demonstrates that firms which have implemented the block chain tracing system have high sales of products and low returns on the product compared to the firms which did not implement. We based our multiple case study on four instances from each of the four industries.

Sathishkumar Chintala (November 2021), The emergence of data and communication technologies, ICT, has driven a massive transformation in the retail sector in the past two years. An aspect of this is that the thought of moving from the old brick-and-mortar retail model to the modern click-and-mortar model is being projected. Information technology lies at the heart of these retail marketing strategies and is changing the trade of retail marketing strategies. Consumer preference and behavior have changed much in the retailing business over the years.

Femi Olan (June 2021) Because of the disruption and advancement of consumer attitudes toward certain products and services brought about by online communities and cutting-edge advancements like artificial intelligence (AI), the growing usage of digital technology has fundamentally changed marketing and consumer behavior (CB). According to our findings, AI influences consumer attitudes and behavior when new information is gained, and online communities encourage curiosity and encourage users to learn by exchanging experiences about certain goods and services.

Alexander Brem (October 2021) One technical area with high revolutionary potential relates to the field of artificial intelligence (AI). In this context, we discuss the various changes that AI is bound to do for innovation. We introduce a conceptual model within which we argue that artificial intelligence (AI) is an innovator as much as an enabler of innovation. In addition, considering the traditional innovation process and the front end of innovation perspective, we enter into several applications and consequences for innovation theory and practice. Finally, we discuss potential paths to be followed in the study of these fields.

Albérico Travassos Rosário said of 2024, "artificial intelligence has so much impacted the way businesses handle customer behavior nowadays. It changed how businesses see and communicate with their clients as well as how to take care of them." In an economic sense, doing this, businesses can find their strengths and weaknesses through online data concerning social media, interactions, and customer reviews. The information can be applied to businesses for proper decision-making in pricing and marketing strategies as well as managing their inventories. Companies can gain a competitive advantage and have closer ties with their clients if AI is applied to their consumer interaction initiatives.

Khouloud, Oueslati, and Salma Ayari (2024) In the modern world, artificial intelligence (AI) is a powerful technological force that is revolutionising business operations through innovative solutions. Even though a lot of research has been done on a wide range of AI-related topics, there is still a dearth of organised compilations of recent findings. This study closes this gap by providing a comprehensive overview of AI in marketing literature through bibliometric analysis. Outside of the academic community, the study provides practical recommendations for putting effective AI methods into practice, emphasising adaptability and ethical considerations in marketing.

Research Methodology:

For the purpose of to gain further insight into how artificial intelligence (AI) and block chains influence customer journey mapping, this study concentrates on FMCG companies. The information is gathered from several FMCG companies in the industry's major cities. A suitable random selection method was used to choose a representative sample of FMCG companies, given the difficulties of integrating these technologies. Additionally, to investigate the applications of AI and block chain in customer journey mapping in the FMCG industry, as well as to determine the relationships between the application of AI and block chain technologies and advancements in customer journey mapping. This study's main objective is to evaluate how well these technologies support decision-making and customer behaviour analysis. I have applied factor analysis utilising path models or path approaches, in addition to structural equation modelling. The paper's primary goal is to investigate the applications of AI and block chain technology in customer journey mapping for the FMCG industry. Additionally, to find any connections between the application of AI and block chain technologies and enhancements to customer journey mapping, as well as to assess how well these technologies work to improve consumer behaviour analysis and decision-making. In Bangalore North, data was gathered using a structured questionnaire and the convenience random selection approach. To get the necessary data and carry out the research, this sampling technique is employed. In Bangalore North, Karnataka, structured questionnaires were designed to gather information from 505 respondents, comprising a range of generations and ages 18 to 60.

Analysis & Interpretation:

Familiarity with Customer Journey Mapping in the FMCG Sector:

- The survey results revealed that 41.7% of participants were very well acquainted with customer journey mapping regarding fast-moving consumer goods (FMCG), while 41.1% indicated medium familiarity. This implies that the majority of respondents may have some basic ideas about customer journey mapping owing to their interaction with fast-moving consumer goods industry.
- The traditional mediums through which consumer journey mapping is carried out include CRM systems (33%), conventional surveys (31.4%) and internet analytics tools (28.9%). The high level of awareness about artificial intelligence (AI) among practitioners is exemplified by machine learning with a proportion equal to 46.6%. This means that machine learning stands out among AI technologies since it plays an important role in predicting skills.
- Respondents believe that one of the greatest benefits of block chain in customer journey mapping is product authenticity according to 47.8% approval rate. Such data indicates the potential for block chain to enhance product authenticity and supply chain transparency during customers' journeys.
- Almost half (46.4%) of respondents consider machine learning algorithms as the best AI technology used to determine customer preference types. This shows a lot of trust in their ability to analyze data and identify trends.

Effectiveness of Block chain in Enhancing Transparency in aspect of Customer Journey Mapping in FMCG sector

- As per the reports, 48% of those involved stated they were "very familiar" with block chain, while 33% professed to be "somewhat familiar," which was indicative of a profound level of knowledge. Thus, it follows that block chain technology enjoys positive opinions from 82.4% of respondents.
- In total, respondents representing 82.4% of the population (46.4% experienced "very effective" and 36.4% "somewhat effective") acknowledge its favourable impact on their lives supporting the thesis that it may take more effort to convince or educate them about its transformative potential.
- 26.1% and 47.8% of respondents claim that supply chain transparency and product authenticity respectively have the greatest advantages from block chain technology employed in this study. In regard to purchase mapping, 44.1% will rely on block chain technology. This suggests a positive view about block chain being able to enhance credibility and honesty in customer-related activities.
- Most of the respondents (47.2%) were very likely to use block chains for improved customer journey mapping while 33.2% were somewhat likely. This encouraging attitude vividly reflects the rising recognition of how blockchain integrations can boost confidence, openness, and information safety between customers on one hand and service providers on the other.

Use of AI Technology for understanding Consumer Preferences and enhancing the overall customer experience

- In particular, blockchain and AI have substantially improved the customer journey through pre-purchase search (63.6%); therefore clients are offered specific information and personalized insights to stimulate educated choices. Furthermore, it also helps in the purchase decision-making stage (12.8%) which indicates more relevant recommendations.
- Many organizations are evidently commited to being flexible as seen by 36% of respondents who update their plans frequently while 40.5% do it occasionally. The gradually declining proportions of never (11.1%) and seldom (11.1%) show that continuous updates become more vital for optimizing these disruptive technologies' merits. There are difficulties in implementing AI for consumer behavior analysis; 52.2% of respondents name high cost as their top worry. Concerns about data privacy (23.7%) show that protecting customer information is important.
- Those people whose answers have been analyzed, 51.4% said that using the two technologies (blockchain and artificial intelligence) in conjunction significantly boosts data security as well as consumer privacy during the mapping of customer journeys and detecting frauds (14.4%). Furthermore, it ensures protection for both companies and clients. Besides, it reveals that real-time analytics would assist in accelerating these processes by 22.4%.

Combined Benefits of Integrating Block chain and AI in FMCG Strategy

- 50% of interviewers think that making the connection of block chain and AI in customer journey mapping is very good; thus, it indicates their collaborative power acknowledgement. On the other hand, 29.4% consider it as average to them meaning that many people appreciate this partnership.
- The majority or 51% of the respondents pointed out better precision in data as the main benefit to them. On top of that, another group consisting of 27.3% stress on trust amid customers while 4.5%; and 10.5% emphasized advanced consumer insights which equals enhanced decision-making propelling corporate success thus ensuring clients' happiness.
- According to half the respondents increase customization represents the most likely trend within personalized consumer journey mapping for fast-moving consumers goods (FMCG) industry. This thus means that there are real chances for actual usage on personal level in case mapping was done on these products only Real-time supply chain tracking, which increases transparency and dependability, is the most successful novel approach for enhancing the customer experience with block chain and AI (49.4%) and personalized customer journey mapping (27.1%) which enhance consumer satisfaction and security, they also drive overall engagement.
- Respondents who think enhanced transparency and personal touch will make customers happy account for 55.3%. 24.9% increase in conversion rates, and 9.5% increase in operational efficiency leads to enhanced productivity which eventually leads to lasting success as well as fostering faithfulness and trust.

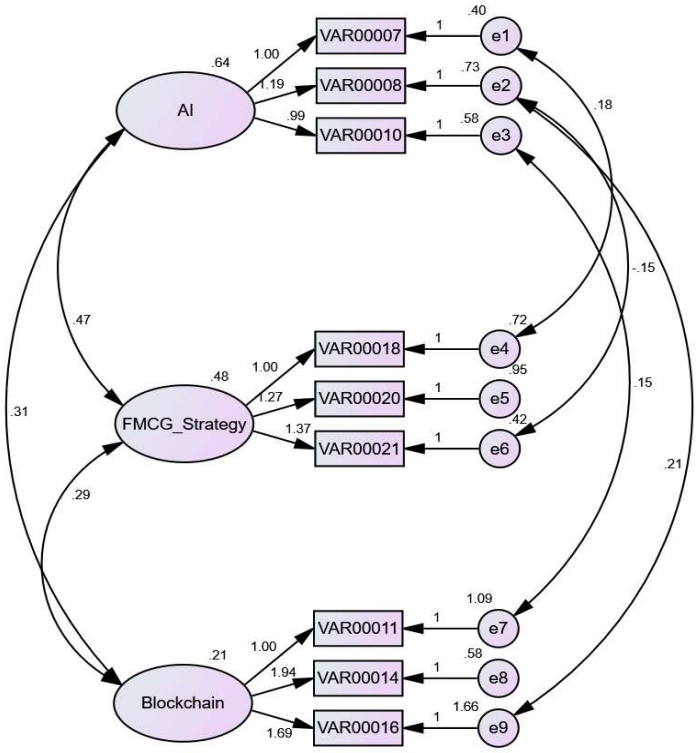

Figure 1.1 representing path diagram for showing relationships between various constructs and variables.

1. Latent Variables (Constructs):

- AI
- FMCG Strategy
- Block chain

These are represented by ovals and are unobserved variables that are inferred from measured variables.

2. Observed Variables:

- VAR00007, VAR00008, VAR00010 (associated with AI)
- VAR00018, VAR00020, VAR00021 (associated with FMCG Strategy)
- VAR00011, VAR00014, VAR00016 (associated with Blockchain)

These are represented by rectangles and are directly measured variables.

3. Error Terms:

- e1 to e9, associated with each observed variable

4. Relationships:

- Arrows from latent variables to observed variables represent factor loadings
- Curved double-headed arrows between latent variables represent correlations
- Numbers on the arrows represent path coefficients or correlation coefficients

Key observations:

- AI and FMCG Strategy have a strong positive correlation (0.47)
- AI and Block chain have a moderate positive correlation (0.31)
- FMCG Strategy and Block chain have a moderate positive correlation (0.29)
- Each latent variable has three observed variables loading onto it
- The factor loadings (path coefficients from latent to observed variables) vary in strength

- There are some correlations between error terms (e.g., 0.18 between e1 and e2)

Inferences:

- The model suggests interrelationships between AI, FMCG (Fast-Moving Consumer Goods) Strategy, and Block chain technologies.
- AI seems to have the strongest influence on its observed variables, particularly VAR00007 (1.00) and VAR00010 (0.99).
- The FMCG_Strategy construct has varied influences on its observed variables, with VAR00021 having the strongest relationship (1.37).
- Block chain shows consistent strong relationships with its observed variables.
- The correlations between the latent variables suggest that advancements or strategies in one area might influence the others, with the strongest relationship between AI and FMCG Strategy.
- The model accounts for measurement error through the inclusion of error terms.

This model could be part of a study examining how AI, FMCG strategies, and block chain technologies are interconnected in a business or technological context. It suggests that these three areas are related and may have mutual influences on each other.

Hypothesis testing:

H1*0*: There is no difference between the observed and expected co-variance structure.

The model fit shows chi-square < 5 (4.853), thus, retaining the H0. This suggest that the covariance matrix exists between the constructs.

It infers that model conceptualized by researcher is same as is observed with collected data.

H2*0*: There is no relationship between AI adoption and the development of FMCG strategies and block chain technology.

The model shows a strong positive correlation (0.47) between AI and FMCG_Strategy constructs, and block chain suggesting that as AI adoption increases, FMCG strategies are likely to evolve or improve. And also suggesting block chain adoption in FMCG strategies. Thus, the researcher rejects the null hypothesis and accept the alternative hypothesis.

H3*0*: The observed data not fit into co-variance matrix (model does not explain the relationship between the constructs and also with measured indicators.).

The model fit indicies such as GFI >0.95 (0.959); CFI (0.956); and PNFI (0.526) signifies the of the model, thus, rejecting the null hypothesis.

Appendix: Model Fit Summary

Table 1.1 representing CMIN:

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	25	97.054	20	.000	4.853
Saturated model	45	.000	0		
Independence model	9	1798.205	36	.000	49.950

Table 1.2 representing RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.063	.959	.908	.426
Saturated model	.000	1.000		
Independence model	.544	.401	.251	.321

Table 1.3 representing Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.946	.903	.957	.921	.956
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 1.4 representing Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.556	.526	.531
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

FINDINGS:

Schema derived from this report shows that companies in the Fast-Moving Consumer Goods (FMCG) sector are leaning towards using block chain and artificial intelligence (AI) for customer journey mapping instead of more conventional methods. Better data accuracy, personalisation for consumers and more informed decisions form the core forces behind this change. To this end, consumer tastes, advancements in technology especially those relating to AI as well as money issues play a big role. The main aims of increasing customer satisfaction, streamlining processes and making optimal use of resources are there. Enhanced confidence is further promoted because block chain provides security and transparency. Also, technological advances have made it easier for businesses to use these innovative techniques.

FUTURE IMPLICATIONS AND DIRECTIONS:

As per the recent report on the clothing and fashion manufacturing sector, it is interesting to note that just three out of ten firms in northern Bangalore still favor old-fashioned ways of mapping the client's journey. Consequently, they find it hard to withstand today's fast-moving trends in customer behavior across the food industry. Moreover, the survey suggested that companies looking forward to improving their operations and competing effectively should adopt blockchain technology and artificial intelligence (AI) for customer journey mapping. These novel techniques enhance customer satisfaction through more personalized interactions with clients based on detailed data about them.

Most businesses that integrate block chain and artificial intelligence benefit in terms of quickness to market, better security for data and more effective operations. Block chain makes sure that records will be safe while on-the-other-side, AI has the power to analyze huge datasets at high speed allowing organizations make faster decisions which are also more educated plus customer information is kept intact. However, there are downsides associated with adoption of digital tools and automated systems like their expensive initial costs together with need for skilled personnel to operate them. However, government-sponsored initiatives aimed at encouraging use of advanced technologies such as in case of textiles where manufacturers are encouraged to shift from manual production into automated production processes help mitigate these issues.

CONCLUSION:

Thus the FMCG industry employs blockchain and AI in customer journey mapping, which makes both customer behavior research and decision-making significantly better as indicated by the study. These technologies enable real-time data sharing, increased transparency and trust-building that create more efficient and personalized customer interactions. This paper reveals that there is a causal relationship between customer journey mapping sage and these tools motivating marketeers' strategies. To conclude, blockchain and AI applications notably transform transaction between consumers and businesses thereby empowering them to promptly respond to their customers' needs in extremely competitive environments.

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