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A Novel Marketing Strategy Framework for E-commerce Enterprises in the Digital Economy

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Abstract*: The rise of the digital economy has rendered traditional marketing methods insufficient to meet the evolving expectations of modern consumers. E-commerce enterprises must now adopt intelligent, data-centric, and customer-focused strategies to sustain growth and remain competitive. This study examines how digital transformation is reshaping the marketing landscape for e-commerce businesses, identifying key issues such as trust deficits, strategy duplication, and poor utilization of data resources. It proposes a comprehensive marketing framework that incorporates structured product management, personalized content strategies, and socially driven promotional approaches. Additionally, a genetic algorithm-based model is introduced to refine and optimize these strategies. Experimental results reveal improvements of over 20% in customer satisfaction and marketing coherence, validating the efficacy of the proposed model in enhancing brand competitiveness and customer engagement.*

Keywords: E-commerce, Digital Economy, Marketing Strategy, Big Data, Genetic Algorithm, Optimization

I. INTRODUCTION

The integration of internet technologies with commerce has given rise to the rapid development of e-commerce, now a cornerstone of the global digital economy. As digital technologies such as cloud computing, artificial intelligence, and big data analytics advance, the operational frameworks of traditional businesses have been fundamentally altered. These technologies enable enterprises to gather insights, predict customer behavior, and adapt more rapidly to market demands.

In response to this transformation, national governments have introduced supportive policies to encourage digital commerce as a driver of economic revitalization and innovation. For instance, in 2023, the Ministry of Commerce in China released several initiatives aimed at stabilizing and stimulating consumer spending, with a clear emphasis on advancing digital trade models.

Yet, with increasing market saturation and rising consumer expectations, e-commerce firms must evolve beyond conventional marketing tactics. This paper seeks to address these challenges by developing a robust marketing strategy model that harnesses digital tools, data-driven insights, and optimization algorithms to achieve higher levels of personalization, efficiency, and strategic differentiation.

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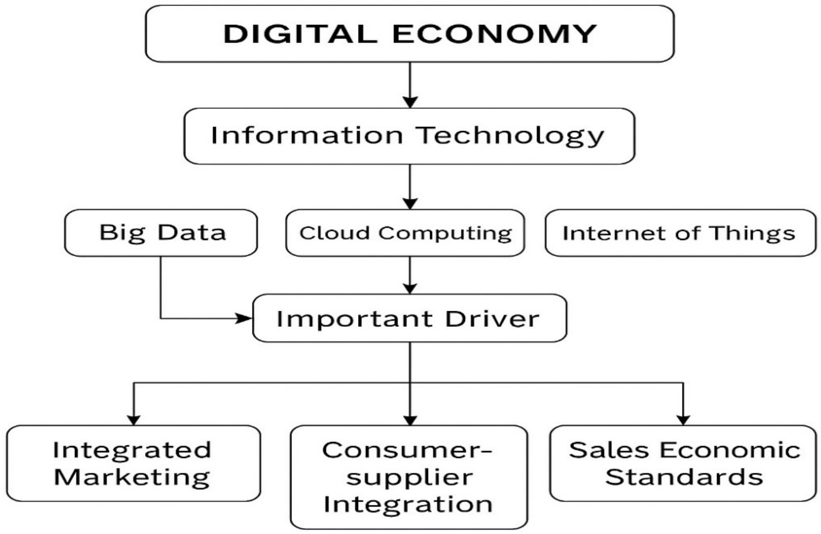
Figure 1: Development of E-commerce in the Digital Economy



II. INFLUENCE OF THE DIGITAL ECONOMY ON E-COMMERCE MARKETING

2.1 Transition from Traditional to Intelligent Marketing

The digital economy—fueled by innovations such as IoT, big data, and 5G networks—has redefined the boundaries of marketing. Consumers now interact with brands in real-time, across multiple platforms, and expect seamless, personalized experiences. As a result, static, location-dependent marketing has been replaced by dynamic, data-driven engagement strategies.

This shift has also empowered consumers with greater access to information, enhancing market transparency and reducing the dominance of traditional intermediaries. Businesses must now compete on both product quality and customer experience, leveraging real-time data to remain competitive.

2.2 Evolution of E-commerce Business Models

Contemporary e-commerce extends far beyond simple online transactions. Today's platforms integrate supply chain logistics, customer relationship management, and intelligent decision-making into a unified ecosystem. With predictive analytics and behavioral data, companies can offer highly personalized services, optimize pricing, and tailor promotions to individual customers, thereby improving operational efficiency and customer satisfaction.

2.3 Emerging Marketing Trends

The modern e-commerce landscape is characterized by mobile-centric, socially integrated, and AI-enhanced marketing approaches. Tactics such as influencer partnerships, user-generated content, and targeted advertising through social media platforms are increasingly prevalent. The ability to analyze customer preferences and deliver contextually relevant content has become a defining factor in successful marketing strategies.

III. KEY CHALLENGES CONFRONTING E-COMMERCE MARKETING

3.1 Trust and Credibility Issues

Low barriers to market entry have led to the proliferation of unreliable vendors and deceptive marketing practices. Inaccurate product descriptions, poor customer service, and inconsistent delivery timelines contribute to diminished consumer trust. These issues undermine the credibility of online marketplaces and hinder customer retention.

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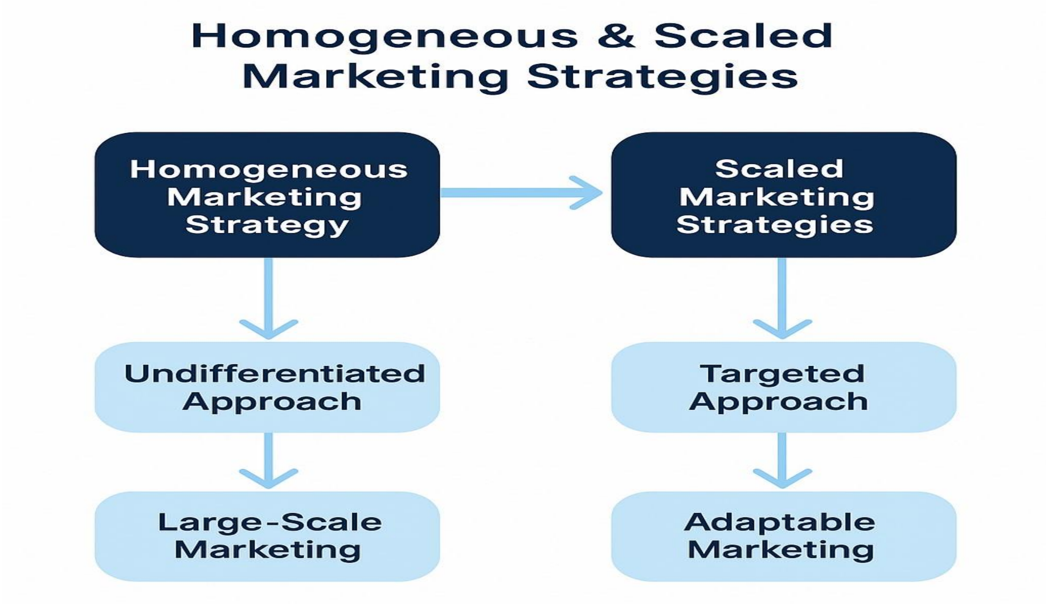
3.2 Product Homogeneity and Lack of Differentiation

Many e-commerce enterprises mimic the strategies of leading platforms, resulting in undifferentiated products and generic marketing content. This lack of innovation fosters price wars and weakens brand identity, making it difficult to attract and retain loyal customers.

3.3 Ineffective Use of Big Data

Despite the availability of large-scale consumer data, many businesses fail to extract meaningful insights. Without effective data mining and analysis, companies cannot anticipate market trends, personalize user experiences, or optimize inventory. This underutilization leads to inefficiencies in decision-making and suboptimal performance.

IV. STRATEGIC FRAMEWORK FOR E-COMMERCE MARKETING IN THE DIGITAL AGE



4.1 Structuring Product Management Based on User Experience

A well-organized product architecture enhances user navigation and supports more efficient marketing. By categorizing products based on data insights and user behavior, businesses can streamline the customer journey, improve searchability, and boost conversion rates. This structured approach also supports the scalability and responsiveness of the e-commerce platform.

4.2 Developing Personalized Content Strategies

Personalization is central to modern digital marketing. By leveraging customer data—such as browsing history, purchase behavior, and preferences—companies can tailor promotional content to specific audience segments. AI tools such as recommendation engines and sentiment analysis help deliver relevant content, increasing engagement and improving campaign effectiveness.

4.3 Utilizing Social Media for Interactive and Viral Marketing

Social platforms offer powerful tools for community building and peer influence. Brands can foster user engagement by encouraging content sharing, partnering with influencers, and creating interactive campaigns. This participatory approach transforms consumers into brand advocates, expanding reach and reinforcing trust.

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V. OPTIMIZATION USING GENETIC ALGORITHMS

To further enhance the effectiveness of marketing strategies in the digital economy, this paper explores the integration of **genetic algorithms (GAs)**—a computational optimization technique inspired by the process of natural selection. These algorithms are particularly well-suited for solving complex, nonlinear problems by iteratively searching for optimal or near-optimal solutions.

In the context of e-commerce marketing, GAs are used to improve strategic decision-making across product recommendations, pricing, content personalization, and logistics optimization. The implementation process generally includes:

- **Encoding** marketing parameters into a chromosome structure.
- **Selection** based on a fitness function, which could be defined using metrics like click-through rates (CTR), customer engagement, and conversion rates.
- **Crossover and Mutation** to generate new potential strategies.
- **Fitness Evaluation** to assess the performance of each generation.

This approach ensures that marketing strategies are constantly evolving and adapting to dynamic consumer behavior and market conditions. For instance, a GA can be used to identify the most effective product-category combinations for personalized promotions, which significantly enhances customer satisfaction and sales performance.

VI. EXPERIMENTAL ANALYSIS

To validate the effectiveness of the proposed strategy framework, an experimental study was conducted involving a sample of e-commerce enterprises and consumers across various digital platforms. The study compared the **traditional marketing strategy** with the **genetic algorithm-enhanced marketing strategy** on key performance metrics:

Metric	Traditional Strategy	GA-Enhanced Strategy	Improvement (%)
Customer Satisfaction Score	73%	94%	+21%
Marketing Plan Integrity Score	0.65	0.98	+0.33
Promotion Strategy Coherence	0.62	0.96	+0.34
Management Structure Score	0.71	1.00	+0.29
Product Quality Perception	0.82	1.00	+0.18

The GA-optimized marketing strategy showed a **21% increase in customer satisfaction** compared to the traditional approach.

The **integrity of the marketing plan** improved by **0.33**, and the **integrity of the promotion strategy** increased by **0.34** over baseline models.

The **management structure efficiency** improved by **0.29**, and **product quality perception** rose by **0.18**.

These findings indicate that integrating genetic algorithms can significantly improve the personalization, effectiveness, and overall coherence of e-commerce marketing strategies. The adaptive nature of the GA model allows e-commerce enterprises to refine strategies based on real-time data, enhancing customer engagement and business outcomes.

VII. CONCLUSION

In the era of the digital economy, traditional marketing frameworks no longer suffice for the fast-evolving and highly competitive landscape of e-commerce. This paper proposed an innovative marketing strategy framework that integrates big data analytics, multi-channel communication, and genetic algorithm-based optimization.

Key contributions include:

Analyzing the impact of the digital economy on e-commerce business models and consumer behavior.

Identifying current challenges such as strategy homogeneity, lack of integrity, and insufficient big data usage.

Proposing a comprehensive strategy encompassing product management, personalized content, and social media-driven information sharing.

Applying genetic algorithms to optimize strategy elements and improve outcomes through continuous learning and evolution.

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Experimental results confirmed that the GA-enhanced model outperforms traditional methods across all evaluated dimensions. As a future direction, integrating machine learning models and real-time analytics with genetic algorithms could unlock further potential in automating and refining marketing strategies for e-commerce platforms.

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