

# Research on Digital Marketing Strategies in the LED Plant Light Industry Empowered by New Technologies

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**Abstract**—With the continuous development of new technologies and the unique characteristics of the LED plant light industry, digital marketing has become an important means of promotion and sales in the LED plant light industry. Based on the background of relevant policies on digital marketing, this study summarizes the previous achievements and research trends of digital marketing in domestic and foreign literature, elucidates the current market status of the LED plant light industry and the importance of empowering the industry with new technologies. Furthermore, it proposes five digital marketing strategies to promote the market development of the LED plant light industry and facilitate the steady development of modern agriculture.

**Index Terms**—New technologies, LED plant light, digital marketing, digital marketing strategies

## I. INTRODUCTION

The profound development of new technologies such as artificial intelligence, mobile internet, big data, and quantum computing has greatly changed the marketing model of the LED plant light industry and also transformed consumer behavior. Business owners have embraced these new technologies to empower their marketing strategies in the LED plant light industry, shifting from a simple supply chain to a bidirectional interactive demand chain. This has prompted LED plant light enterprises to redefine their marketing strategies. In this context, digital marketing has experienced rapid growth. In October 2023, the Global Digital Marketing Summit will be held in Tokyo, Japan, where intelligent service robots and products like intelligent recognition systems will be showcased, indicating that new technologies are bringing more digital marketing innovations to domestic and international businesses. In July 2023, the Central Committee and the State Council of the Communist Party of China issued opinions on promoting the growth and development of the private economy, emphasizing the acceleration of digital transformation and technological upgrading. These policies will accelerate the enhancement of digital marketing capabilities for private enterprises.

In the digital age, the enrichment of theories and the cross-disciplinary fusion inject momentum into the development of digital marketing. There has been a continuous emergence of research on digital marketing, with different scholars proposing various concepts. For example, the concept of Digital Marketing Communication was first introduced by Deighton and Barwise (2001), the concept of Online Marketing Communications was proposed by Jensen (2006), the concept of AI marketing was introduced by Lin *et*

*al.* (2021), the concept of algorithmic marketing was proposed by Chen *et al.* (2021), the concept of digital platforms was proposed by Rietveld and Schilling (2021), and the concept of digital consumer behavior was introduced by Gungor and Cadirci (2022). These new concepts often draw upon theories related to marketing. So, what is the core concept of digital marketing? The following are definitions of digital marketing given by different scholars: “Sharing content created by consumer groups and using this level of digital media to reach consumers, increasing consumer awareness of brands and products at the right time in the global network, with interactivity and digitization features” (Corniani, 2006). The adaptive technological empowerment process where businesses cooperate with customers and partners to create, communicate, deliver, and maintain value for stakeholders” (Kannan and Li, 2017).

“Digital marketing refers to the marketing activities, mechanisms, and processes facilitated by digital technologies aiming to create, communicate, and deliver value for customers and other stakeholders (American Marketing Association)”. From these different definitions, it can be seen that digital marketing essentially involves the integration of marketing with new technologies such as artificial intelligence, mobile internet, big data, and quantum computing. It involves the reconstruction of marketing processes, communication and dissemination models, and value delivery methods for both business owners and consumers. So, what is the research dynamics of digital marketing among domestic and foreign scholars?

## II. LITERATURE REVIEW

In recent years, there has been extensive research on the topic of digital marketing by both domestic and foreign scholars. Digital marketing is not only limited to conceptual discussions but has also entered a stage where theory and practice go hand in hand. This can be evidenced by the relevant studies conducted by scholars worldwide.

From an international perspective, foreign scholars have primarily conducted research on digital marketing from three dimensions:

First, Systematic Framework: They have proposed holistic frameworks to systematically elucidate digital marketing. For example, the Antecedents, Decisions, Outcomes framework for digital marketing research (Paul and Gabriel, 2018) and the Theory, Context, Characteristic, Methodology framework for digital marketing (Paul and Rosado-Serrano, 2019).

Second, Digital Marketing Strategy: Research has been carried out from the perspective of digital marketing strategies. For instance, effective digital marketing strategies provide businesses with more online visibility and rapid growth (2023). Adoption process models have been

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established based on the pressure-response-effect path, where market pressures and organizational preparedness act as drivers and enablers in this process (Su *et al.*, 2023).

Third, Technological Empowerment: Research has explored how new technologies empower digital marketing. Examples include the facilitative role of intelligent chatbot interaction systems in digital marketing (Ma *et al.*, 2023) and how artificial intelligence enhances user experience and improves the effectiveness of digital marketing activities (Cristina *et al.*, 2023). Additionally, studies have examined the capabilities of ChatGPT and how they impact search marketing and SEO (Kelly, 2023).

Overall, foreign research on digital marketing mainly focuses on systematic frameworks, digital marketing strategies, and the empowerment provided by new technologies.

From a domestic perspective, research conducted by Chinese scholars on digital marketing can be summarized into the following three aspects:

First, Practical Application and Strategy: Studies focus on optimizing and enhancing digital marketing strategies, such as establishing digital stores, improving regulatory mechanisms, enhancing brand construction, optimizing new media marketing, and building intelligent retail management systems based on digital analysis systems (Li *et al.*, 2023). Research also explores the path to digital marketing for children's food through strategies such as opening up digital marketing channels, building digital marketing systems, and grasping digital marketing trends (Ni, 2022). Additionally, digital technologies are utilized to empower the modernization transformation of agricultural cultural heritage, achieve dynamic inheritance, and improve the comprehensive benefits of agricultural cultural heritage (He *et al.*, 2023).

Second, Top-level Logic: Research is conducted on the top-level logic of digital marketing. This includes reconstructing the meta-universe marketing ecosystem of "people," "goods," and "scenes" through core concepts and methods such as digital avatars, virtual idols, NFT digital collections, and virtual entertainment experiences (Li and Liu, 2022). Scholars also propose an integrated framework for digital marketing research to analyze the internal mechanisms of digital marketing, explore issues related to customer privacy paradox, intelligent algorithm black boxes, blockchain marketing, digital marketing capabilities, digital customization, agile marketing, theoretical construction and usage, and situational and method matching (Wang *et al.*, 2023). In-depth analysis of the deep-level logic of the evolution of the digital advertising industry is conducted, and innovative paths for the development of China's digital advertising industry are proposed (Liao and Zhang, 2022).

Third, Impact on Consumers: Research focuses on the impact of digital marketing from the perspective of consumers. Suggestions are made for merchants to focus on brand construction and image, utilize digital marketing strategies reasonably, and provide good after-sales and transportation guarantee services (Lin, 2022). It is found that digital marketing communication enhances consumer attention, and product involvement also moderates the impact of different modules of digital marketing communication on consumer attention (Liu *et al.*, 2022). In the era of digital

marketing, acquiring consumer brand value identification, triggering brand value resonance, and subsequently gathering community participation in brand value co-creation are emphasized (Cheng *et al.*, 2022). Overall, domestic research on digital marketing in China encompasses practical application and strategy, top-level logic, and the impact on consumers.

In summary, the prominent characteristics of academic research on digital marketing can be approached from different perspectives and dimensions: practical application and strategy research, top-level logic research on digital marketing, research on new technologies empowering digital marketing, and research on the impact of digital marketing from the perspective of consumers. Different research perspectives and dimensions generate different research outcomes. This indicates that digital marketing is a topic of interest for many domestic and foreign scholars. However, currently, these types of research only explore digital marketing from various perspectives and dimensions, without specifically studying the feasibility of digital marketing in the LED plant light industry or considering digital marketing strategies for the LED plant light industry. Based on the insights gained from the aforementioned research, we intend to focus on the "feasibility and practicality of digital marketing" in the LED plant light industry and address the following questions: How can new technologies such as 5G, big data, and artificial intelligence empower digital marketing in the LED plant light industry? What are the digital marketing strategies to promote the development of the LED plant light industry?

### III. NEW TECHNOLOGIES EMPOWERING THE DIGITAL MARKETING DEVELOPMENT

#### A. Overview of the LED Plant Grow Light Industry

The LED plant grow light industry has gradually emerged and developed under the influence of factors such as global climate change and carbon neutrality, presenting a vast global market. LED plant lights, which use LEDs as light sources to provide artificial lighting conditions for photosynthesis and promote vigorous plant growth, are highly popular. The main buyers of these LED plant lights are importers, agricultural engineering companies, channel distributors, and agricultural growers, primarily used in indoor farming, vertical farming, and greenhouse cultivation (Zhu, 2022). The combination of excellent products and significant market demand has driven the marketing exploration in the LED plant grow light industry. Particularly during the global COVID-19 pandemic, new technologies have facilitated the rapid development of digital marketing in the LED plant grow light industry, giving rise to long-distance, contactless marketing ecosystems and accelerating the progress of modern agriculture worldwide.

The development of new technologies such as 5G, big data, and artificial intelligence, along with government policies, matured LED chip technology, increasing demand in the North American medical sector, and the growth of LED product supply chains, have collectively propelled the global market size of the LED plant grow light industry while enriching its application scenarios and modes. In the future, more intelligent LED plant lights will be developed. The

growth of the LED plant grow light industry relies on the development of marketing models. Digital marketing offers a perfect solution in the fierce global competition within the LED plant grow light industry. However, long-distance, contactless digital marketing ecosystems require the empowerment of new technologies in order to be better presented.

#### *B. New Technologies Empowering the Digital Marketing Development*

The rapid development of new technologies has facilitated the popularization of digital marketing. The application of new technologies in the LED plant grow light industry will become a core driver for the development of digital marketing. Initially, the LED plant grow light industry mainly adopted a B2B approach for offline and online marketing, which was a one-way, irreversible process. Companies promoted products or advertisements, and buyers could only passively accept them. With the rise of mobile Internet devices and the emergence of social media platforms such as Facebook and LinkedIn, as well as cross-border e-commerce platforms like Amazon and AliExpress, online live streaming has become more frequent. B2C has gradually become an important part of marketing, where buyers pay more attention to consumer experience and visual interaction, enabling two-way interactive marketing. As a result, social media interaction will become very common (Rossmann *et al.*, 2016). With the increasing prevalence of customization enabled by the Internet, algorithms, and artificial intelligence (Park J & Han H, 2013), companies in the LED plant grow light industry will fully utilize the new business formats brought about by new technologies to promote the digital marketing model of two-way interactive communication and actively expand their presence in the global market.

Due to the inherent product and application characteristics of LED plant grow lights, companies in this industry need to use visual marketing to better showcase product features and application scenarios. The rapid advancement of new technologies such as artificial intelligence, big data, blockchain, and quantum computing will accelerate the application of LED plant grow lights in digital marketing. This application will reconstruct a multi-dimensional interactive digital marketing ecosystem among LED plant grow light material suppliers, companies, and buyers, which will further promote the development of the LED plant grow light market and the industry as a whole.

#### IV. TRANSLATION OF LED PLANT GROW LIGHT INDUSTRY DIGITAL MARKETING STRATEGIES

Currently, new technologies are becoming the driving force behind the growth of the LED plant light industry. The development of the LED plant light industry relies on digital marketing strategies to promote it. Based on the previous discussion, this study proposes several digital marketing strategies to promote the development of the LED plant light industry.

##### *A. Accelerate AI-Driven Digital Marketing*

What is AI marketing? AI marketing is a digital marketing model that incorporates big data technologies such as data

collection, analysis, data mining, and data visualization into the main marketing process of LED plant light companies. It analyzes the relevant customers of LED plant light products to provide accurate user profiles and analysis reports for LED plant light companies. AI marketing not only enables market analysis in the LED plant light industry but also focuses on the user experience and after-sales service for LED plant light buyers. Through AI marketing strategies, LED plant light companies can identify which products need optimization to improve customer conversion rates and increase sales.

##### *B. Promote Virtual Reality Experiential Marketing*

VR experiential marketing involves integrating VR technology into online and offline marketing efforts. This breaks the boundaries of traditional marketing and allows shoppers to have a seamless shopping experience. Through VR experiential marketing, LED plant light companies can engage in multi-channel advertising and promotion to maximize brand awareness and sales. Additionally, language switching and 3D scene switching in VR allow overseas customers to have a better purchasing experience. VR experiential marketing strategy, as a form of immersive shopping experience, has advantages and allure compared to traditional marketing strategies. It can greatly enhance customer trust and expectations. By dynamically showcasing LED plant light products in vertical farming, greenhouse cultivation, indoor cultivation, and other scenarios, customers can choose LED plant lights that suit their own farms based on what they see. LED plant light companies can rapidly increase sales and profit margins through VR experiential marketing strategies.

##### *C. Create an Immersive Marketing Model in the Metaverse*

To overcome development bottlenecks, LED plant light companies need to pursue innovative promotion. An immersive marketing model in the metaverse can play a significant role in advertising and promotion for the LED plant light industry. Through billboards, virtual venues, events, etc., LED plant light companies can carry out advertising and marketing campaigns in the virtual world, allowing their audience to interact with their brand and advertisements. This helps to create a positive interactive advertising model and generate favorable marketing outcomes.

##### *D. Enhance the Implementation of Intelligent Customization Marketing Strategies*

New technologies such as AI, big data, blockchain, and quantum computing make precise intelligent customization marketing strategies feasible. LED plant light products belong to application-oriented products rather than consumer goods. Therefore, LED plant light companies deal with a wide range of product customization requirements. In the past, due to technological limitations, achieving precise customization was challenging. Nowadays, mature technologies facilitate the implementation of intelligent customization marketing strategies. Through intelligent customization digital marketing strategies, LED plant light companies can provide precise intelligent customization for customers and offer targeted product solutions for different application scenarios. Enhancing intelligent customization marketing helps LED plant light companies to reposition

their markets, redefine marketing objectives, and gradually increase profits.

#### E. Restructure the Closed-Loop Marketing Ecosystem of the LED Plant Light Industry

LED plant lights have unique product characteristics, such as different spectra that affect plants differently and different lens combinations that influence light intensity, among others. Therefore, the marketing approach for LED plant lights will inevitably differ from traditional products. This requires LED plant light companies to build their own closed-loop marketing ecosystem, consisting of core components like chips, components, heat sinks, production processes, sales, transportation, and after-sales services. By restructuring this closed-loop marketing ecosystem, LED plant light companies can benefit from cost savings, expanded sales channels, increased sales volume, improved communication between buyers and sellers, and other advantages.

### V. SUMMARY

The LED plant light industry has unique characteristics that require different marketing approaches. In the current era of continuous technological innovation, the development of digital marketing in the LED plant light industry can only be achieved by leveraging new technologies to drive sales growth and industry advancement. This study begins with an overview of relevant international and domestic policies, summarizes the achievements and research trends of previous researchers at home and abroad, and emphasizes the importance of new technology in empowering the LED plant light industry. It then proposes several digital marketing strategies, including accelerating AI-driven digital marketing, promoting virtual reality experiential marketing, creating an immersive marketing model in the metaverse, enhancing the implementation of intelligent customization marketing strategies, and restructuring the closed-loop marketing ecosystem of the LED plant light industry. These strategies aim to promote market development in the LED plant light industry and foster the steady and healthy growth of modern agriculture.

### CONFLICT OF INTEREST

The author declares no conflict of interest.

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