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# The Impact of AI on the Advertising Process: The Chinese Experience

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**Knowing that the demand for advertising in a growing e-commerce market cannot be sufficiently addressed in a traditional advertising operation model, advertisers and e-commerce platforms apply artificial intelligence (AI) technologies in advertising to improve efficiency and meet the market demand. From observations in the Chinese advertising market over the past five years, the authors gain insight into how AI technologies are applied in the advertising process and propose that the advertising process powered by AI technologies is composed of four steps: consumer insight discovery, ad creation, media planning and buying, and ad impact evaluation. This new advertising process, which is supported by a data-based platform with algorithms at its core, is tool based, synchronized, and highly efficient. AI has reorganized and upgraded the traditional advertising process and improved advertising efficiency; however, the new process is still born out of the traditional process and is not yet a reengineered one.**

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Technological innovation has been a key factor in driving how advertising and marketing campaigns are conducted. It follows the law of accelerating returns, enabling exponential growth on many fronts. The rise of artificial intelligence (AI), a set of disruptive technologies which simulate human intelligence and realize machine intelligence, has come under the limelight in many countries and industries. With the application of AI

technologies in the field of advertising in China, programmatic buying has become the most important mode of media buying, and a large number of companies have started their programmatic buying business: Alibaba, Qihoo 360, and Kuaizi Tech have developed and deployed ad creation systems; JD and Leo Group have developed smart copywriting systems; and Dentsu Aegis Network has made its foray into AI-driven consumer insight discovery, copywriting, and media planning and buying. Indeed, big data and AI technologies have transformed the ways in which Chinese ad agencies operate. Quantitative thinking and algorithms have been fully integrated into China's advertising industry, significantly changing its operating patterns and business process (Yang 2018).

The *Oxford English Dictionary* defines the term “process” as one or a series of regular actions that occur or are performed in a certain manner and then lead to a particular result (Liu 2003). In other words, a process is about both actions and their consequences. The advertising process transforms relevant input into informational output that creates value for the advertiser. Traditionally, the advertising process comprises advertising research, market analysis, strategic planning, ad creation, media mix, media planning and buying, performance evaluation, and feedback. In 1990, Michael Hammer proposed the concept of process reengineering. In 1993, Hammer and James Champy defined process reengineering as a fundamental rethinking and redesigning of a company's business process so as to dramatically improve its cost structure, quality, service, and responsiveness (Hammer and Champy 1993). How does the advertising process operate when AI technologies are applied? Has AI reengineered the traditional process? What characteristics does the advertising process powered by AI have? This article tries to answer these questions by examining the latest developments in China's advertising industry over the past five years.

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## LITERATURE REVIEW OF PREVIOUS STUDIES DONE BY CHINESE SCHOLARS

According to the author's interviews with Digital-S and Leo Group, China's application of AI technologies in advertising started as early as 2011, when programmatic buying first appeared in the advertising market. The system of programmatic buying was initially formed in 2013, when some Internet companies, such as Alibaba, Youku, and Baidu, launched their own ad exchange platforms. After 2014, companies with sell-side platforms (SSPs), data management platforms (DMPs), demand-side platforms (DSPs), and ad exchange platforms emerged in large numbers, which helped the programmatic buying system grow into a relatively complete business system. Programmatic buying is the result of applying AI technologies to traditional media planning and buying, where, among all the steps in the traditional advertising process, AI application is first witnessed. It was not until after 2016 that AI application was also found in other steps of the advertising process, such as ad design and copywriting. AI application in advertising has been expanding in both its depth and breadth since then. Correspondingly, research on the application of AI technologies in programmatic buying is relatively abundant and has generated mature results, while research on AI application in other steps of the advertising process has just started and is still in its infancy with a limited amount of literature. The following literature review covers research on AI application in both programmatic buying and other steps of the advertising process.

### Research on AI Application in Programmatic Buying

As programmatic buying just emerged in recent years, research on it mainly introduces and describes its status quo, ecological structure, and development trends in mainland China, while there is a paucity of literature on explanatory and exploratory research.

S. Huang (2015) believes that programmatic buying, which is expected to account for 40% to 50% of the advertising market in the next three to five years, is reshaping the entire advertising industry. J. Huang (2015) points out that programmatic buying is characterized by data, precision, and humanization. Cui (2016), by comparing advertising services from Alimama, Tencent Social Ads, and Baidu Union, observed that Alimama has achieved effective marketing by leveraging holographic data; Tencent Social Ads has promoted its mobile marketing through in-depth analysis of social data; and Baidu Union has gained huge success in search advertising by adopting a critical-moment strategy. Differences among the three are found in data sources, data composition, degrees of openness, billing rules, and transaction

patterns. Wang and Cao (2018) concluded that the technical thinking behind programmatic buying is composed of three different ways of thinking: management thinking based on big data technologies, intensive thinking featuring targeted technology execution, and process thinking supported by programmatic trading technology.

Neither the concept of smart programmatic buying nor AI technologies is mentioned in any of this literature. Studies done by these scholars mainly focus on the description and analysis of the new phenomena brought about by programmatic buying but fall short in the discussion on technologies driving these phenomena or the study of internal mechanisms in the advertising process.

### Research on AI Application in Other Steps of the Advertising Process

As the application of AI technologies in other steps of the advertising process is still emerging, there is a paucity of literature on it. Chen (2017) believed that the year 2017 witnessed a rapid development of technologies in smart advertising. We have entered the era of smart advertising, in which the development of technologies and their application in smart ad design, content production, and management analysis are highlights in the transformation of the advertising industry. Liao (2017) pointed out that applying AI technologies to advertising will restructure steps in the advertising process, including advertising research, advertising planning, ad creation, copywriting, media planning and buying, performance evaluation, and so forth. Nie (2017) suggested that AI technologies can be applied to the copywriting found in direct mail advertising, precise push-notification advertising, accurate target positioning, and the prediction of future trends.

Yang, Liu, and Zhang (2017) explored the application of AI technologies in advertising from the perspective of ad design. They compared design methods used in smart advertising with those used in traditional advertising and concluded that the former are highly efficient, of low cost, and user-friendly, and when they are adopted will deliver benefits such as shorter design cycles, simplified customer communication, lower labor and economic costs, and improved management.

At present, research on AI application in other steps of the advertising process is still in the stage where the majority focus on the introduction and explanation of related concepts. Possible areas in which AI technologies can be applied are either abstractly deduced and predicted on the basis of existing application or discussed at the conceptual level. The current literature fails to cover in-depth research on the internal mechanism and generation mechanism of the advertising process. In particular, it neither examines AI's impact on the traditional

advertising process nor explores how the process is reorganized and upgraded when AI technologies are applied.

To sum up, the profound changes in China's advertising market have encouraged a group of scholars to make inferences and predictions, but they have failed to take a closer look at the technologies driving these changes and how the technologies have affected the advertising process. Though some scholars have focused on a certain step of the advertising process, they have not adopted a systematic approach in their research to examine how the traditional process has been reorganized and upgraded. Some scholars have studied the economic impact of AI on the advertising process, such as lower costs and shorter design cycles, which will serve as an important reference for future research.

#### **AI APPLICATION IN THE ADVERTISING INDUSTRY: OBSERVATIONS IN THE CHINESE MARKET**

From 2012 to 2016, the transaction scale of China's e-commerce and its various segments continued to expand. According to the monitoring data from the same period collected by the China E-Commerce Research Center, the transaction scale reached 7.85 trillion yuan in 2012, 10.2 trillion yuan in 2013, 13.4 trillion yuan in 2014, 18.3 trillion yuan in 2015, and 22.97 trillion yuan in 2016. In the past five years, China's e-commerce transaction volume has grown by 15.12 trillion yuan, nearly a threefold increase. New business infrastructures have been formed through cloud computing, big data, logistics systems, mobile payments, credit systems, e-commerce transactions, and so forth, unleashing social vitality and public creativity, as well as stimulating the huge demand for online advertising. However, the demand for advertising in the growing e-commerce market cannot be sufficiently addressed in the traditional advertising operation model. For one thing, the e-commerce market is in need of a substantial number of ads to match its growing size; for another, both the market and consumers demand more personalized, high-quality ads that target consumers with great precision. Therefore, in recent years, new technologies, especially AI technologies, have been continuously applied in the field of advertising to address these concerns. Programmatic buying, which has been widely implemented in China since 2013, realized personalized media planning and buying in online advertising. Since 2016, AI technologies have been applied in several other areas, such as consumer behavior analysis, ad design, and copywriting, in an effort to deepen the level of personalization and precision. The need for the development and application of AI technologies in China's advertising market is urgent and real.

#### **AI Application in Advertising Research and Market Analysis**

When it comes to advertising research and market analysis, AI technologies are used for real-time data gathering and processing. Data gathering might involve using Internet monitoring technologies to capture online data or utilizing cameras to acquire real-time consumer data. Regarding data processing, in addition to text data, there has been significant progress in processing unstructured data over the past two years, which means that unstructured data such as pictures, videos, and audio can be converted into analyzable content with the help of natural language processing (NLP) and preprocessing technologies. For example, the researchers learned through interviews that Dentsu Aegis Network uses AI technologies to identify and analyze pictures posted on social networking sites, such as Weibo.com (China's Twitter) and Dianping.com (China's Yelp), to gain insights into dietary preferences in Guangdong Province in different time periods, and in turn to offer explanations on why sales at the restaurants a client owns in Southern China are lower than sales in other regions. In this regard, the application of AI technologies combines advertising research and market analysis into one integral step.

#### **AI Application in Ad Design and Copywriting**

In 2016, China's largest e-commerce platform, Alibaba, launched the Luban System through its AI Lab, in which AI technologies are applied in ad design. It is used primarily to design posters for Taobao.com and T-Mall Marketplace, both of which belong to the same conglomerate as Alibaba. It also began to provide service to third parties in 2018. The Luban System designed and posted 170 million posters for Alibaba's November 11 discount campaign in 2016, boosting the click-through rate (CTR) of the Taobao online marketplace by 100%. It designed 400 million posters for the same annual campaign in 2017, roughly 8,000 posters per second. In 2018, Alibaba opened the platform to other players, helping design 6 million posters for 200,000 Taobao vendors during the November 11 discount campaign. The Leonardo Da Vinci Canvas System—a smart ad design system launched in 2017 offering ad design services to approximately 20,000 online vendors—developed by Qihoo 360, and the Smart Creation System developed by Kuaizi Tech, are also cases in point.

In 2018, JD, a Chinese e-commerce platform, designed and launched Shakespeare, a smart copywriting system, to provide automatic writing services (e.g., product descriptions and copywriting) to vendors on the JD e-commerce marketplace. The system analyzes search keywords typed in by users, rapidly generates matching

merchandising descriptions, and in turn creates ad content. It automatically stores the chosen descriptions and prioritizes them high on the recommendation list the next time a similar search takes place. In addition, it allows self-adaptive learning based on user feedback and adjusts the content accordingly, and now it is capable of generating paragraphs. Also, major ad agencies such as Leo Digital Network and Dentsu Aegis Network have seen initial progress in developing smart copywriting systems that are self-adaptive.

### AI Application in Media Planning and Buying

Application of AI technologies in media planning and buying mainly takes place in programmatic buying. Programmatic buying takes two forms in China. One form is open real-time bidding (RTB). With open RTB, advertising buyers evaluate and bid on ad impressions available on millions of websites or mobile devices, where prices and quantities are determined in real time via programmatic instantaneous auctions. There are many independent open RTB vendors in China. Open RTB makes up 30% of China's programmatic buying market. The other form of programmatic buying is programmatic direct buy (PDB) or private marketplace (PMP). These approaches focus on the top 20% premium advertising resources. Resources targeted by PDB are not accessible through open platforms. Advertising spaces are more fixed and of better quality, while the prices and quantities of advertising are determined up front. With PMP, publishers put premium sites with preset prices up for auction where a number of invited advertisers bid for them. Usually, they can sell the spaces for high prices. Large, listed ad agencies, such as Leo Digital Network, often employ both PDB and PMP approaches.

### AI Application in Performance Evaluation and Feedback

AI technologies are applied to generate real-time feedback and responding action plans on advertising impact in two different ways. One is the simulation of advertising impact and optimization of the simulation model based on user behavior data. The other is the optimization, in a matter of seconds, of the system of media planning and buying based on user behavior data (e.g., picking the best CTR prediction model, adjusting tags/bids, or replacing ad content that has unsatisfactory user feedback). Digital signal processing (DSP) systems, such as Tencent Social Ads, Toutiao's Pangolin system, and similar ones developed by ad agencies, have made remarkable achievements in this field.

Through all of these observations on the application of AI technologies in China's advertising industry over the

past five years, it has been found that, as Chen (2017) and Liao (2017) also pointed out in their research, the AI technologies applied in advertising have made rapid progress in recent years, which has paved the way for the transformation of the advertising industry and has had a profound impact on research, planning, creation, copywriting, media planning and buying, and performance evaluation in the traditional advertising process. But how exactly has AI affected these steps in traditional advertising? The new process powered by AI, as well as its operating mechanisms, are worth further study.

## ADVERTISING PROCESS POWERED BY AI TECHNOLOGIES

The authors, in observing China's advertising market, found that the impact of AI on the advertising process is a disruptive upgrade that happens in the form of systematic restructuring. A new set of process steps—consumer insight discovery, ad creation, media planning and buying, and ad impact evaluation—has emerged (Jiang and Ma 2019), which has led to a new series of advertising activities, such as large-scale personalized advertising production based on consumer profiling, omnichannel precision media planning and buying, and proactive strategy-based algorithms that evaluate and optimize advertising impact.

### Consumer Insight Discovery

Consumer insight discovery refers to the use of social network analysis technologies to analyze massive amounts of data from multiple sources and of different structures in the advertising market; to construct a measurement system for consumers' digital lifestyles; and to acquire insight into what consumers really want.

To start with, consumers' online lifestyle and behavioral trajectories are thoroughly explored and mined to obtain individualized information. A spatial and temporal app usage pattern mine (STAUP-Mine) algorithm is used to mine consumers' spatial and temporal app usage patterns (STAUPs) (Lu and Yang 2018). Relevant behavior characteristics are adjusted according to the "carefulness" of users, and a game theory model is adopted to optimize the carefulness and identify consumers' communication modes and information communicated in social media (Fu, Xie, and Rui 2015; Zhang et al. 2016). With GPS and GIS site information, the prefix-scan algorithm is used to extract frequent sequential activity patterns in daily life, and with travel patterns, consumers' daily behavioral trajectories are mined (Feng and Zhu 2016; Shou and Di 2018). Through all of this analysis, a comprehensive insight into users' individualized information



from both online and offline sources is gained (Dougnon et al. 2016; Vourvopoulos, Bermudez i Badia, and Liarokapis 2017).

Then, consumers' digital profiles are inferred and created on the basis of the individualized information obtained from enormous amounts of data from multiple sources. These consumer profiles are often composed of information such as gender, age, origin, hobbies, purchasing power, and recent consumption. An architecture based on a weighted fuzzy Dempster–Shafer framework (WFDSF), which can adjust weights associated with inconsistent evidence obtained by different classification approaches, is used to realize consumer behavior data analysis from multisource and mass information (Liu et al. 2018). The partial graph profile inference + (PGPI+) algorithm is used, under the constraints of partial social network analysis, to profile consumers without mistakes.

Last, the label values of consumers at various digital touchpoints are in turn analyzed to construct a model that matches ads to consumers. With social network in-depth analysis technologies and consumer profiles, this kind of model is built and utilized to clearly analyze individual target consumers who fit into the advertising objectives and goals.

Here, social network analysis technologies are applied to convert traditional advertising research and market analysis into one outcome: consumer insight discovery.

### Ad Creation

Ad creation refers to the use of NLP and deep learning technologies to generate individually tailored advertising designs or materials comprising text, images, or other creative elements. Although Nie (2017) and Yang, Liu, and Zhang (2017) suggested that AI technologies can be applied to the copywriting in direct mail advertising and the design in print advertising, they fail to provide in-depth analysis of the technical logic and explain the technological process.

First, with the help of the results derived from consumer insight discovery, consumers' preferences for creative advertising are inferred. On the basis of in-depth semantic analysis and real-time consumer interactions, consumers' preferences for creative advertising are studied to predict the probability for consumers' acceptance of a certain advertising idea in the foreseeable future. For example, the cascade method based on the independent cascade model (Kleinberg 2007) is adopted to calculate the probability that one social entity will take social influence into consideration (Chen et al. 2009).

Then, the algorithmic logic of ad creation is extracted. Certain AI technologies, such as target semantic

extraction, correlation analysis, cross-media information retrieval based on content, sentiment analysis, and topic analysis (Abbasi et al. 2018; Deng et al. 2019), are used to extract the algorithmic logic of advertising content creation.

Last, targeted ad creation is carried out on the basis of the model that matches advertising ideas to user touch points. With the help of algorithms for ad creation, categorized and individually tailored ad content is created automatically on a large scale. Here, the analysis of users' needs, strategic advertising planning, advertising creative performance, and ad creation are combined into one step: targeted ad creation.

### Media Planning and Buying

The step for media planning and buying involves identifying and checking scenes in consumers' real lives against the measurement system of consumers' digital lifestyles and using programmatic tools to optimize the media composition for media planning and buying. This enables personalized advertising content to be delivered directly to users.

First, a model of consumer touch points in advertising is built on the basis of the results derived from consumer insight discovery. Consumer touch points are classified, and relevant algorithm simulation is run on the basis of consumer behavioral trajectories in information-acquisition media (e.g., news apps, short-video apps), daily-use media (e.g., social networking apps, sports apps), and online shopping media (e.g., Taobao, JD).

Second, with touch points, a hybrid approach that combines logical and distributional semantics using probabilistic logic, specifically Markov logic networks (Beltagy et al. 2016), is adopted to run intelligent simulation on the model of consumer behavior and estimate ad campaign impact. Then a performance indicator system for media planning and buying is constructed.

Third, with the performance indicator system and targeted ad content, the step of individually tailored media planning and buying is carried out through programmatic buying. Here, media planning and buying combines the planning and choosing of the right combination of advertising channels with media buying.

### Ad Impact Evaluation

Ad impact evaluation refers to the acquisition of accurate and timely feedback from the ad impact data collected in real-time monitoring of media planning and buying. With the help of machine learning, corresponding real-time responses are made according to different

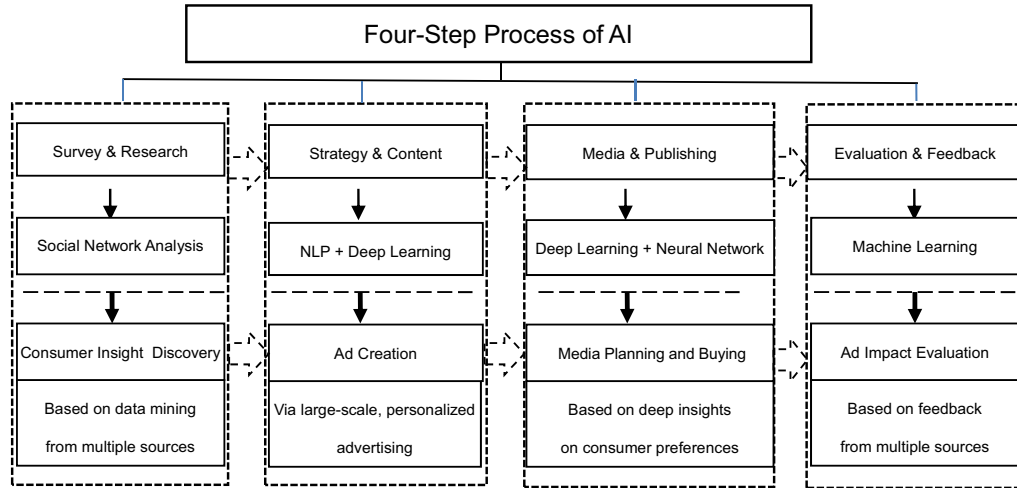


FIG. 1. Four-step process of artificial intelligence (AI) advertising. NLP = natural language processing.

feedback so as to achieve consistency between the brand impact and the advertising impact.

First, ad impact is analyzed and evaluated with AI technologies. AI technologies are used to collect real-time feedback data from different sources (e.g., PC, mobile, video equipment) in various formats (e.g., image, voice, text, number). The multidimensional semantic information is obtained by using two-channel convolutional neural networks (CNNs), while CNNs can be trained on top of pretrained word vectors for sentence-level classification tasks (Kim 2014). Machine learning methods (e.g., hierarchical clustering, neural network, principal component analysis) are used to extract and fuse feedback data features (Thi, Le, and Dinh 2015). In this way, ad impact is obtained, and an intelligent analysis is run to compare the impact against expected advertising objectives and goals.

Second, according to the analysis results of ad impact, adjustments are made to targets of media planning and buying as well as the advertising content. When the expected objectives and goals are not achieved, both the targets and the content must be taken into consideration to reveal the causes so that smart responses can be made accordingly. On one hand, according to the feedback data, the performance indicator system for media planning and buying is updated or reconstructed through deep learning and knowledge mapping, and the targets of media planning and buying are also adjusted. On the other hand, the knowledge-aware bidirectional long short-term memory (KBLSTM) model is used to leverage a knowledge graph so as to improve the text learning method of cyclic neural network (Yang and Mitchell 2017), reevaluate consumers' personalized expressions in feedback, and start the smart selection of response strategies to adjust the advertising content.

AI technologies make the “seconds optimization” possible by shortening the gap between the impact evaluation and optimization to a matter of seconds; therefore, the integration and synchronization of impact evaluation and responsive improvement are realized.

It can be seen from the preceding descriptions that the application of AI technologies has made an important impact on the advertising process. On one hand, the traditional advertising process has been reorganized and upgraded into one with a set of new steps including consumer insight discovery, ad creation, media planning and buying, and ad impact evaluation, though the traditional process has not been transformed in a radical and fundamental manner. On the other hand, AI is making the current process more efficient through automation and is driving the advertising operation into a new stage of development. The new process powered by AI, which can be called the four-step process of AI advertising (see Figure 1), has significant differences compared with the traditional one.

**CHARACTERISTICS OF AI ADVERTISING**

By comparing the traditional advertising process with the four-step process of AI advertising, and after analyzing the application of this new process, four characteristics of AI advertising can be summarized as follows:

**Data Based**

Cui (2016) observed that Alimama, a business within Alibaba Group and a middle ground for digital marketing, has achieved effective marketing by leveraging holographic data. With core commercial data and the super media mix from Alibaba, Alimama provides merchants,

brands, and partners with brand and e-commerce advertising as well as marketing services on third-party websites. Wang and Cao (2018) believe that programmatic buying is based on big data technologies. Therefore, big data can be regarded as one of the basics for advertising operation powered by AI technologies. But the essential characteristics of big data in advertising can be revealed only when further studies on how they are applied in advertising operation are conducted.

The traditional advertising process, which comprises fundamental steps such as advertising research, market analysis, strategic planning, ad creation, media mix, media planning and buying, performance evaluation, and feedback, requires large human capital and is a linear process; when one step is completed, it progresses to the next step. In the AI advertising process, a data-based central platform with algorithms at its core is built to support all the tasks in consumer insight discovery, ad creation, media planning and buying, and ad impact evaluation. Without data or algorithms, this new advertising process cannot be completed. Therefore, the advertising process now becomes more dependent on data and algorithms than manpower, and it has been changed from a linear process to one which generates positive spillover effects via a data-based platform with algorithms at its core.

### Tool Based

The traditional advertising process is labor-intensive. The limited resources of advertising professionals and the diversity of the potential audience make it impossible to tailor advertising content for every customer. Yet the application of AI technologies reorganizes the process into four steps: consumer insight discovery, ad creation, media planning and buying, and ad impact evaluation. Each step is conducted with the help of a smart tool, which records consumer footprints, processes relevant data, and automatically generates consumer insights. For example, the Luban design system and the Shakespeare system can generate advertising content and materials with limited input of images or text; programmatic buying tools are used to conduct media planning and buying based on every consumer click and to optimize the planning and buying within seconds. In sum, the AI advertising process has been upgraded from a labor-intensive one to a tool-based one in a progressive way.

### Synchronized

Steps in the traditional advertising process must be performed in sequence and, as such, are time-consuming. Consequently, advertising campaigns require yearly or

quarterly planning. The AI advertising process consists of only four inseparable steps, and they can be performed in parallel (as is the case for each substep within a given step). Ad creation, which is based on consumer insights, can be completed in seconds. Once ad content is created, media planning and buying takes only a matter of seconds, and so does ad impact evaluation and improvement. Therefore, this new process no longer requires yearly or quarterly planning and is highly synchronized.

### Highly Efficient

High efficiency is a characteristic that can be clearly experienced after AI technologies are applied in the traditional advertising process. For example, J. Huang (2015) points out that programmatic buying is highly efficient; Yang, Liu, and Zhang (2017) believe that AI application in ad design has made the design work highly efficient, low cost, and easy to handle. However, high efficiency is not a characteristic that can be experienced in only one or two steps of the AI advertising process; instead, being highly efficient is the overall impression of the whole process and will significantly improve the ad impact. In the traditional process, the difficulty of measuring ad impact causes low efficiency in media planning and buying. The AI-driven process is more real time, accurate, and efficient. The structure of advertising fees is usually measured by cost per action (CPA) or cost per sale (CPS). The former is based on certain consumer behaviors, such as registering, prospecting, putting items into a shopping cart, and so forth, while the latter is based on actual sales volume and, thus, more efficient.

It can be concluded from this analysis that AI has not transformed the traditional advertising process into a reengineered one. Nonetheless, powered by AI technologies and with big data and algorithms applied, the new advertising process is more tool based, synchronized, and highly efficient, and it has significantly improved the advertising operation in its cost, quality, service, and speed. Yang, Liu, and Zhang (2017), in their study on the application of AI technologies in ad design, also found that when AI technologies are applied, the design cycle is shortened, customer communication is simplified, labor and economic costs are reduced, and management is improved.

### CONCLUSION

This article examines how AI has impacted the advertising process and gives a factual account of how AI technologies have been applied and deployed in China's advertising market and how the new advertising process powered by AI works. Examining AI application in



advertising in a systematic way and from a technical perspective, this article finds that the AI advertising process is born out of the traditional process and is not yet a reengineered one. However, with big data and algorithms applied, the AI advertising process, which has significant differences compared with the traditional one, is more tool based, synchronized, and highly efficient. In terms of theoretical contribution, this article proposes the four step process of AI advertising, a reorganized and upgraded version of the traditional advertising process, which enriches theories of the advertising process. In terms of contribution to the development of advertising practices, the four-step process of AI advertising provides traditional advertising companies and digital marketing agencies with guidance on how to reorganize and upgrade the traditional advertising process with the help of AI technologies to improve business performance and meet market demand.

Future research may continue to explore the following six groups of questions. First, how will the four-step process of AI advertising proposed in this article be adopted by different types of advertising companies? The new advertising process is not a reengineered one, but it does have significant differences compared with the traditional one. Only appropriate application in real-case scenarios can lead to highly efficient advertising. Therefore, in real practice, the following questions are also worth considering: How can unwanted activities be removed from the traditional process while keeping those we need? How can remaining activities from the traditional process be integrated into the steps in the new process? How should departments in advertising companies be reorganized and coordinated? What can be done to help AI technicians fit into advertising companies? How can the human capital be reorganized? All of these questions need further exploration, and relevant theories need to be constructed.

Second, in terms of consumer insight discovery, it is still not clear how the European Union General Data Protection Regulation (GDPR), which became effective in May 2018, will affect China's data policy. Data silos created in China for some Internet giants have set high barriers to stop outsiders from acquiring consumer data. How then can the legal and full acquisition of consumer data in the new advertising process be ensured?

The third group of questions covers the prediction of the access path of consumers and its algorithms. The access path may be manifested in massive searches and websites as well as in various devices. How then can the effectiveness of different access paths be evaluated by measuring consumer behaviors? How can this be quickly modeled by machine learning to calculate the contribution of consumer behaviors in different paths?

The fourth group of questions deals with ad creation, media planning and buying, and their algorithm support. How can individually tailored advertising content be created? Currently, media planning and buying is based on data gathered within three months, so how can massive real-time data and AI technologies be leveraged to identify consumers' living environments and predict their consumption intention, and how can the strategy of media planning and buying be adjusted accordingly?

The fifth group of questions relates to feedback, improvement, and algorithm support. How can the parameter in the model of machine learning be adjusted to obtain more accurate consumer feedback, which in turn can be used to optimize the advertising process?

Last, other areas in the advertising market should also be examined. How have AI technologies affected offline retail, outdoor advertising, and other areas in China's advertising market? Future research needs to delve into the answers to these questions and further explore AI's impact on advertising.

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