

Retraction

Retracted: Analysis of Enterprise Marketing Data Management Integration and Innovation Path Based on BD

Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] L. Wang and A. T. Hoang, "Analysis of Enterprise Marketing Data Management Integration and Innovation Path Based on BD," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 3886823, 11 pages, 2022.

Research Article

Analysis of Enterprise Marketing Data Management Integration and Innovation Path Based on BD

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In recent years, the marketing data sources of enterprises are not sufficient, and the quality of data cannot be guaranteed. In addition, although the data has the characteristics of “large amount,” there is a lot of data garbage in it, and the amount of valuable data is not large. Taking electric power enterprises as an example, electric power marketing is the key of power supply enterprises, and its development determines the survival and development of enterprises to some extent, which is of great significance to power supply enterprises. Big data (BD) not only brings many positive effects to the marketing of electric power enterprises but also brings some negative effects to electric power enterprises. Based on the background of BD, this paper studies the integration and innovation path of marketing data management in electric power enterprises. The research shows that the accuracy rate of this method is the highest, followed by machine learning, and finally AI. With the increase of the number of samples, the accuracy of this method becomes higher and higher. When the number of samples reaches 13, the accuracy of this method can reach 85%, that of machine learning is 56%, and that of AI is 43%. It can be seen that this method is more suitable for data management integration of electric power marketing. According to the characteristics of the era of BD, electric power enterprises should innovate marketing data management system, construct efficient and perfect data processing flow, fully tap the potential value of data, and make contributions to the development of electric power enterprises.

1. Introduction

Marketing management is very important for the development of enterprises. It is the key for enterprises to obtain and establish sustainable competitive advantages and form dynamic response ability to make great progress in the complex business environment. Marketing dynamic ability is manifested in the dynamic allocation of market resources, which plays an important role in creating customer value and competitive advantage in the complex environment [1]. Taking power enterprises as an example, power marketing is the key of power supply enterprises. Its development determines the survival and development of enterprises to some extent, which is of great significance to power supply enterprises. At present, there are many pressures in power marketing. It is the higher and higher service demand of cus-

tomers, and the tolerance to stop capacitance is also getting weaker and weaker. More and more original data are collected and stored in the daily operation process of power enterprises, and more and more data are to be processed. For this, due to the heavy workload of data processing, power enterprises are still using traditional data processing methods for data integration processing, which has seriously affected their work efficiency and enterprise development [2]. For power enterprises, power marketing is the lifeblood of enterprise survival and development, but how to improve marketing efficiency, how to more effectively target customers under the condition of saving limited marketing resources, so as to achieve the goal of improving efficiency, and how to improve the efficiency of precision marketing are what operators should focus on now. To innovate the marketing management of power enterprises, we must

establish a perfect power data system in order to realize the real-time management and data sharing of data, so as to give full play to the maximum value of power enterprise data.

In the process of power marketing management, we can control the specific needs of customers through a large amount of data, so as to formulate more targeted strategies to enhance the quality and efficiency of the whole management work. In the era of BD, power enterprises must change the traditional marketing data management methods, adopt new methods and technologies, and strengthen the integration and analysis of marketing data, so as to provide sufficient data basis for power enterprise decision-making [3]. Database marketing, in short, means that power enterprises carry out targeted product marketing by collecting consumer information, analyzing consumers' preferences, and predicting the possibility of purchasing specific goods. In the era of BD, data has four characteristics: a large number. Diversity refers to the diversity of data forms, such as log data, pictures, and videos [4]. High speed: the update speed of data is very fast, and the popularity of the Internet has greatly improved the data transmission speed. Value: the embodiment of data value in the era of BD mainly depends on the data processing of the platform. Therefore, how to use BD to effectively combine data content with enterprise marketing, grasp the opportunity of the rapid development of BD technology, act according to the situation, and use the enterprise's BD support as the basis of precision marketing.

While BD brings many positive effects to the marketing of power enterprises, it will also bring some negative effects to power enterprises. The use of BD by power enterprises for marketing may cause consumers' disgust [5, 6]. The marketing management innovation of power enterprises requires the corresponding integration and refinement of the whole power production process and various service links, so as to realize the data fusion and sharing between different departments. At the same time, power enterprises should also combine the characteristics of the BD era, innovate the marketing data management system, build an efficient and perfect data processing process, fully tap the potential value of data, and make it contribute to the development of power enterprises. With the further expansion of the number of databases, the establishment of a professional database analysis team has become the inevitable development of enterprises. Through the optimization of the production and operation mode of the power system, the consumption of intermittent renewable energy, and the guidance of the concept of energy conservation and emission reduction in the whole society, the processing process of unstructured data is to generate a network service database by using a customized service interface and then share it to the data integration platform with the help of ESB. In short, under the current situation, power enterprises can customize their own actual data integration platform to integrate power marketing data [7, 8].

The innovation of this paper is as follows:

- (1) This paper constructs the marketing model of power enterprises under BD. It is necessary to sort out the relevant data of electric power marketing, asset life

cycle management, distribution coordination, etc., which involve various professions, so as to form a marketing management system centered on data. By integrating the viewpoints of relevant scholars in the fields of intellectual capital, organizational learning, big data capability, and power enterprise marketing dynamic capability and combining theoretical induction and logical deduction, this paper puts forward a hypothetical relationship, thus constructing a theoretical model

- (2) The integration method of power marketing data under the background of BD is discussed. Exploring theories and methods that adapt to the processing and refining of power BD can make power enterprises better adapt to the rapid growth of data volume, the diversification of data types, and the continuous improvement of data timeliness. Integrating power marketing data should consider data classification, coupling between internal systems and other factors

The overall structure of this paper consists of five parts.

The first chapter introduces the background and significance of power enterprise marketing and then introduces the main work of this paper. The second chapter mainly introduces the related work of power enterprise marketing. The third chapter studies power marketing under the background of BD. The fourth chapter introduces the analysis and discussion of the experimental part of this paper. The fifth chapter is a summary of the full text.

2. Related Work

2.1. Research Status of Power Enterprise Marketing. The insufficient implementation of marketing caused by the insufficient attention of power enterprises in power marketing is one of the difficulties faced by the marketing management of Chinese power enterprises. From the actual work of the existing power enterprises, there are some problems in the implementation of power marketing, such as insufficient understanding, inadequate implementation of marketing means, and poor implementation of power supply services. Therefore, some scholars have carried out research on the marketing management of power enterprises.

Zhang et al. introduced the marketing innovation mode using multifunctional time-sharing watt hour meters. As the rapid development of Internet communication technology has brought new technologies to the power industry, there are more and more available technologies in marketing data collection and integration, and products applying these new technologies such as multifunctional time-sharing watt hour meters have emerged [9]. Jing et al. proposed that the establishment of real-time sharing platform technology system within power enterprises should integrate and manage the diversified businesses of different departments and enterprises in the enterprise, which is conducive to the formation of good data analysis and extraction [10]. Zhang et al. introduced various innovative marketing methods of

power enterprises, and these new methods are also quite bright spots, which are mainly reflected in using differential electricity prices to guide peak load shifting and reduce power supply costs. After applying to the Ministry of Economy, Trade and Industry for filing, a special charging catalogue can be formulated, such as preferential policies for fully electrified houses and increasing electricity sales [11]. Chang showed that with the separation of power plants and power grids and their independent operation in China, power enterprises should be able to realize the current supply-demand relationship in the power market. At present, China's power consumption market is no longer a simple seller's market, but a buyer's market [12]. You pointed out that in the marketing planning of electric power enterprises, BD information can be used as the basis to formulate effective marketing plans, build data marketing models, divide consumer groups, attract consumers' attention, and create certain economic benefits for electric power enterprises. Customer grouping can bring three benefits to the company's lean management transformation: first, customer service is more targeted [13]. Lin et al. introduced that most power enterprises have initially established information systems for marketing operations and management, and a few power enterprises have also adopted advanced intelligent systems for data processing and processing. In addition, the maturity of load control system technology not only realizes the online detection and control of parameters such as power and electricity but also makes remote automatic meter reading, prepurchase of electricity, power theft monitoring, and so on a reality, which shows that its application field is expanding rapidly and its practicability is also greatly improved [14]. Ling et al. innovate the internal management system and marketing service mode of the enterprise. Using artificial intelligence technology, we can realize the flexibility and diversity of marketing management system, so that marketing and customer information can be quickly transmitted and updated internally [15]. Li summarized the more advanced innovative modes of centralized power marketing. The main technical means of these innovative modes are as follows: the wide application of power line carrier automatic meter reading system and the use of GSM to transmit electric energy calculation data and load management data [16]. According to Yuan and Yang, following the research idea of "obtaining data resources-providing data interpretation-implementing data application," the hypothesis and research model are established according to dynamic capability theory, resource-based theory, and knowledge-based theory, and the influencing factors of power enterprises' marketing dynamic capability under the background of BD are discussed by the method of mutual support of theoretical analysis and empirical research [17]. Jing and Yang showed that in order to deal with the problems of power waste and peak consumption, power supply enterprises have introduced various electricity price policies, such as electric vehicle charging concessions, customer meter integration concessions, and seasonal and periodic peak staggering electricity price concessions [18].

2.2. The Research Content of This Paper on the Marketing of Electric Power Enterprises. From the perspective of resources, this study identifies the important influencing factors of

power marketing dynamic capability and focuses on exploring its action path for power marketing dynamic capability under the background of BD. Following the research idea of "obtaining data resources-providing data interpretation-implementing data application," the hypothesis and research model are established according to dynamic capability theory, resource-based theory, and knowledge-based theory, and the influencing factors of power enterprises' marketing dynamic capability under the background of BD are discussed by the method of mutual support of theoretical analysis and empirical research. However, the power grid company has insufficient ability to grasp customer demand and cannot accurately locate and effectively transmit customer demand. On the other hand, the cost of customer service is high, so it is impossible to provide equal service to all customers regardless of the cost under the limited service resources of the company.

In the marketing planning of electric power enterprises, we can use BD information as the basis to formulate effective marketing plans, build data marketing models, divide consumer groups, attract consumers' attention, and create certain economic benefits for electric power enterprises. Carrying out customer grouping can bring three benefits to the company's lean management transformation: first, customer service is more targeted. Second, resource allocation is more optimized. The third is to promote the strategic goal.

3. Research on Power Marketing in the Context of BD

In the era of BD, massive data analysis can point out the direction for the development of enterprises. The premise to achieve this goal is that enterprises must complete the collection and integration of data in time. However, for enterprises, the most urgent task at present is to improve the enterprise organizational structure and introduce professional data integration, analysis, application, and other professionals. Taking power enterprises as an example, this paper studies the integration and innovation of power marketing data management.

3.1. Power BD Price Characteristics and Model Construction. For the definition of BD, there is no unified statement in the academic circles at present. It generally refers to those data sets that exceed the processing capacity of traditional database systems and cannot be captured, managed, and processed with conventional software tools within an affordable time range, and the amount of data is usually 10 TB [19, 20]. At the same time, it is also necessary to sort out the data related to power marketing, asset life cycle management, and distribution coordination involving various disciplines, so as to form a marketing management system centered on data [21]. By integrating the views of relevant scholars in the field of intellectual capital, organizational learning, BD capabilities, and power enterprise marketing dynamic capabilities, combined with theoretical induction and logical deduction, this paper puts forward the hypothetical relationship, so as to build a theoretical model. The theoretical model of this study is shown in Figure 1.

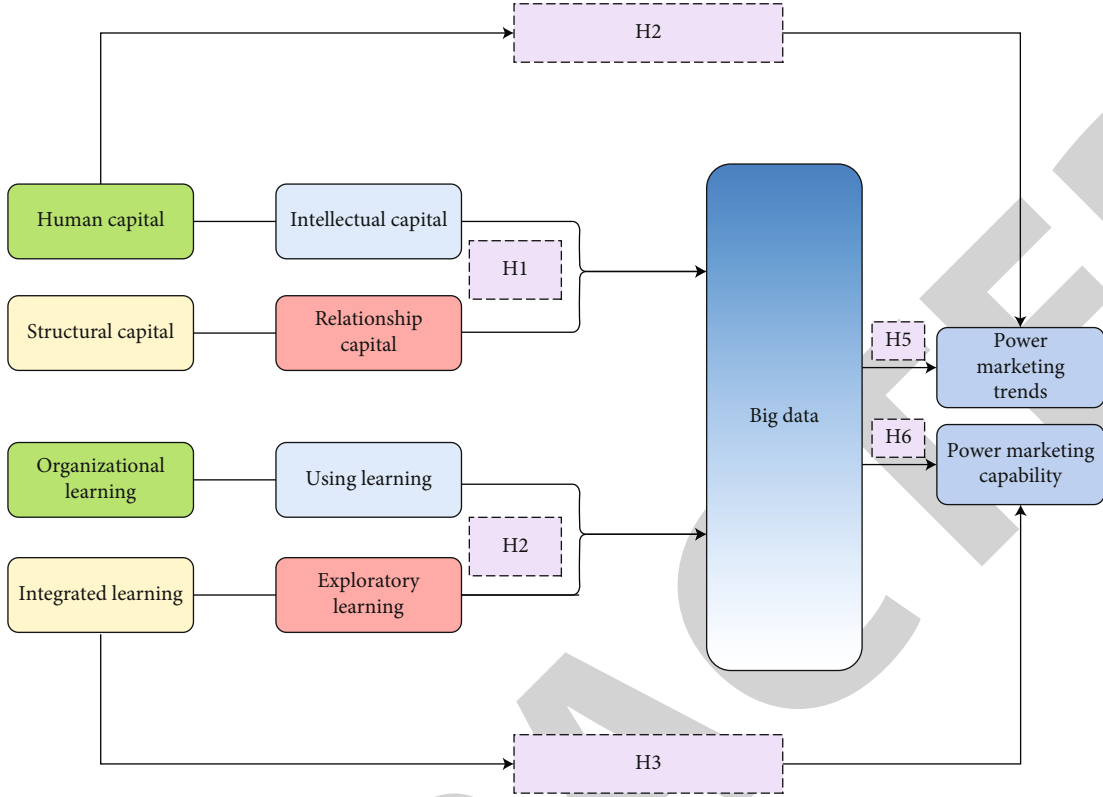


FIGURE 1: Power enterprise marketing model under BD.

With the increasing number of video applications in power industry, the proportion of unstructured data such as audio and video in power data is further increased [22]. The integrity and accuracy of geographic information data will be well guaranteed, and all kinds of map data will be converted digitally in time. Then, the vector graphics are edited, analyzed, and processed accordingly.

Firstly, the dependent variable Y obeys binomial distribution, the binomial classification value is 0, 1, and the overall probability of $Y = 1$ is $\pi(Y = 1)$. Then, m independent variables are X_1, X_2, \dots, X_m , and the corresponding logistic regression models are

$$\begin{aligned} \pi(Y = 1) &= \frac{\exp}{1 + \exp}, \\ 1 + \exp &= -(\beta_0 + \beta_1 X_1), \\ \log \text{it}[\pi(Y = 1)] & \end{aligned} \quad (1)$$

β_0 becomes the intercept, β_1 is the partial regression coefficient corresponding to $X_1 (1, 2, \dots, m)$, and the denominator divided by numerator is called the occurrence ratio of events, namely,

$$\text{odds} = \exp(\beta_0 + \beta_1 X_1), \quad (2)$$

which can be deduced from each other; that is to say, they are equivalent to each other. The logistic regression model, which substitutes the independent variable X_1 value (X_1, X_2, \dots, X_m) of an individual into the formula, first

calculates the estimated value (b_0, b_j) of the regression parameter and then substitutes it to calculate the estimated value $\pi(Y = 1)$ of the individual probability, namely,

$$\frac{\exp}{1 + \exp} = \frac{b_0 + b_1 X_1}{b_0 + b_1 X_1}. \quad (3)$$

From the perspective of specific applications, the systematic application of BD is relatively scarce, which is very serious. For example, some departments have completed the processing of marketing management through only a few simple data processing software. From the perspective of resources, this study identifies the important influencing factors of power marketing dynamic capability and focuses on exploring its action path for power marketing dynamic capability under the background of BD. Marketing dynamic ability is manifested in the dynamic allocation of market resources, which plays an important role in creating customer value and competitive advantage in the complex environment. Taking power enterprises as an example, power marketing is the key of power supply enterprises. Its development determines the survival and development of enterprises to some extent, which is of great significance to power supply enterprises. Finally, connecting the data system with the business system of power enterprises can also effectively manage users' business according to their geographic information and account data.

3.2. Integration Method of Power Marketing Data in the Context of BD. The power industry is facing the emerging data environment. The construction of intelligent network

puts forward higher requirements for the management, sharing, and operation of power BD. Exploring theories and methods suitable for processing and refining power BD can enable power enterprises to better adapt to the rapid growth of data volume, the diversification of data types, and the continuous improvement of data timeliness [23–25]. The integration of power marketing data should consider data classification, coupling between internal systems and other factors. In practice, power enterprises have no rigorous methodology, cannot carry out orderly data management, and there is no detailed data classification standards, which cannot be classified and described according to data attributes. The power enterprise marketing analyzed by BD not only provides optimization suggestions for the future marketing management improvement of the power industry [26, 27].

At present, many managers do not have a clear understanding of the advanced technology contained in the era of BD, resulting in a lot of loopholes in the required supervision work. It is the key for enterprises to obtain and establish sustainable competitive advantages and form dynamic response ability to make great progress in the complex business environment. According to the current situation of power marketing data management, a distributed data integration platform is customized, which can realize the processing of unstructured data and structured data. The platform is divided into three layers, from bottom to top: source data, data integration, and application support. Formulate power marketing strategies according to BD mining target customers, customer attributes, behaviors, etc. Next, the power business system configures the strategy and initiates the task and implements it to the target customers. Finally, the effect evaluation and user portrait update are carried out according to the implementation results to form a closed loop of power marketing activities. The process of power marketing activities under BD mining is shown in Figure 2.

With the further deepening of the reform of China's economic system and the change of the situation of the power market, electric power enterprises are constantly exploring the strategy of changing the power marketing management in order to increase their share in the whole power supply market and increase their economic benefits. At present, there are many pressures in power marketing. It is the higher and higher service demand of customers, and the tolerance to stop capacitance is also getting weaker and weaker. More and more original data are collected and stored in the daily operation process of power enterprises, and more and more data are to be processed, so as to provide more constructive suggestions for users to save electricity better.

Assuming that the length of the line segment of x_i and x_j on the manifold in the space coordinate is $L(x_i, x_j)$, the calculation formula is as follows:

$$L(x_i, x_j) = \rho^{\text{dist}(x_i, x_j)}, \quad (4)$$

where $\text{dist}(x_i, x_j)$ is the Euclidean distance between point x_i and point x_j , ρ is the expansion factor, and $\rho > 1$ is generally taken.

$P_{i,j}$ represents the set of all paths between point x_i and point y_i . At this time, the manifold distance between x_i and y_i can be defined as

$$D(x_i, x_j) = \min_{p \in P_{i,j}} (P_k, P_{k+1}), \quad (5)$$

where $L(a, b)$ represents the line length of a, b two points on the popular line.

On the basis of power marketing, the concept of fuzzy data division is proposed. The objective function is expressed as

$$\min J(U, V) = \sum_{i=1}^c \sum_{k=1}^n u_{ik}^m, \quad (6)$$

where V is the cluster center matrix, U is the membership matrix, and u_{ik} is the k sample point, which belongs to the membership of the i cluster center.

Update the clustering center and membership degree of power marketing as shown in the following formula.

$$v_i^l = \sum_{k=1}^n (u_{ik}), \quad i = 1, 2, \dots, c, \quad (7)$$

$$u_{ik}^l = \frac{1}{\sum_{j=1}^c}, \quad i = 1, 2, \dots, c, n,$$

where l represents the number of iterations.

Data fusion needs to deal with the extraction and correlation of various data sources, such as the life cycle management of power assets involving multiple majors, marketing, and distribution coordination management, which requires the fusion of data from different sources, so as to form a data for enterprise information management system, change the traditional and business system for information construction ideas, promote the sharing of data resources, and give play to the great value of data. Through BD, we can find the market demand and some problems existing in our traditional marketing management process, so as to take demand as the innovation orientation and problems as the optimization direction of management innovation, so as to ensure that power enterprises can maintain stronger vitality in the increasingly fierce market competition, better adapt to the needs of the competition in the entire power market, and constantly improve their core competitiveness in the power market. The processing process of unstructured data is to generate a network service database by using a customized service interface and then share it to the data integration platform with the help of ESB. In short, under the current situation, power enterprises can customize their own actual data integration platform to integrate power marketing data.

4. Analysis and Discussion of Experimental Results

Firstly, the traditional data processing mode is selected as a comparison to test the performance of the power marketing data management system based on BD environment. The

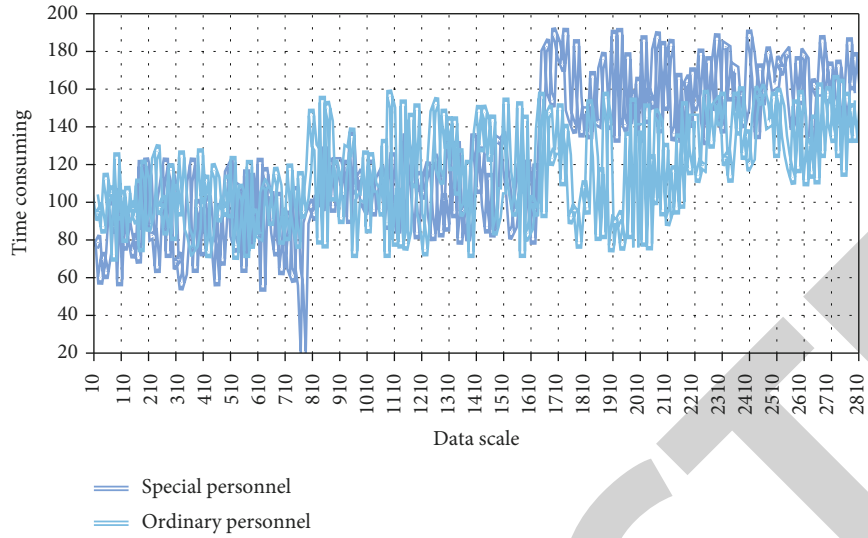


FIGURE 3: Comparison chart of power marketing query performance test results.

TABLE 1: Test of mediation effect of BD capability.

Intermediary path	Indirect effect	Boot SE	Interval lower limit	Interval upper limit
Intelligence → BD ability → power marketing dynamic ability	0.101	0.031	0.048	0.165
Learning → BD ability → power marketing dynamic ability	0.144	0.025	0.097	0.198

TABLE 2: Test results of mediation effect of BD.

Model	Variable	Intellectual capital	Organizational learning	BD capability	Variance ratio	Adjusted R^2
Model 1	Power marketing dynamic ability	0.586	0.264		104.358	0.472
Model 2	BD capability	0.448	0.285		77.288	0.327
Model 3	Power marketing dynamic ability	0.512	0.216	0.171	108.153	0.488

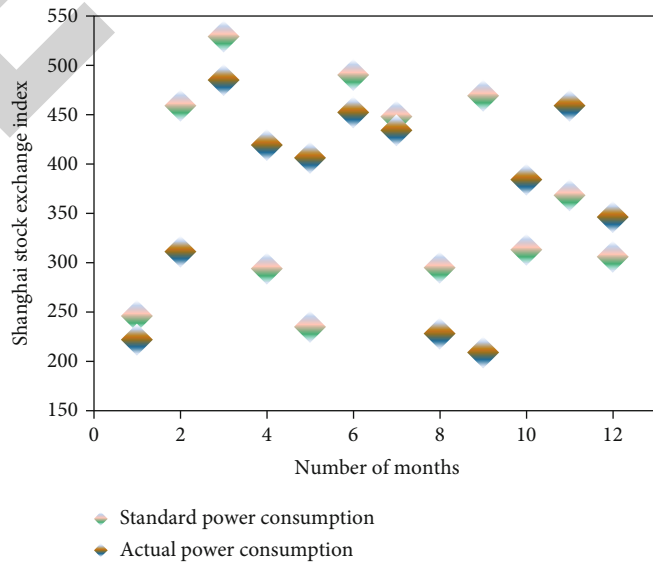


FIGURE 4: Shanghai composite index at the end of each month.

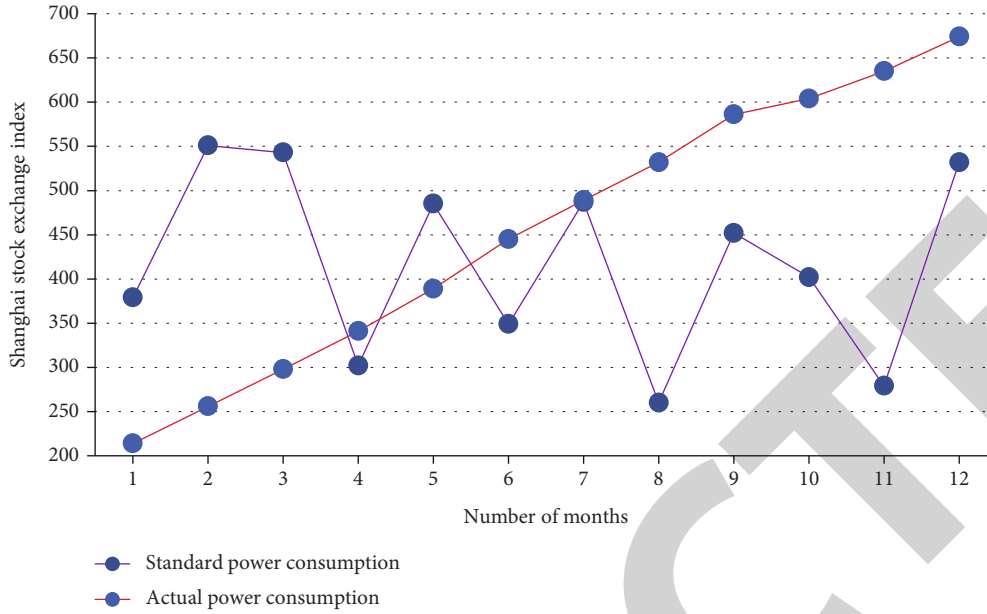


FIGURE 5: Data with trend.

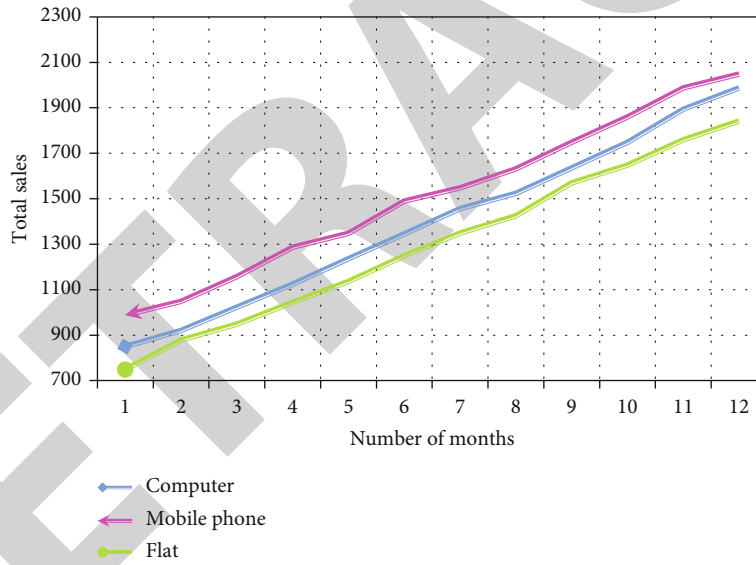


FIGURE 6: Total social consumer goods in China.

organizational learning as independent variables and BD ability as dependent variables, model 2 is established to judge the correlation between intellectual capital and organizational learning and BD ability. The data results of model 2 show that the correlation coefficient between intellectual capital and BD ability is 0.448, and the correlation coefficient between organizational learning and BD ability is 0.285, both of which are significant at the statistical level of 0.002; that is, intellectual capital and organizational learning are positively correlated with BD ability, respectively.

The marketing data of electricity will change with time. For example, in the morning, the electricity consumption will increase with time, while in the early morning, it will decrease with time. Figure 4 shows the data series of Shanghai Stock Exchange’s Shanghai Composite Index at the end of a month.

TABLE 3: “Four points” comparison chart of line loss rate in back office before and after lean management.

Station number	Ratio of line loss	
	May 2020	May 2021
UE01	2.86	2.6
UE02	7.52	5.61
UE03	6.2	4.82
UE04	9.77	8.6

From the scatter diagram above, we can see that this shape is similar to $a^2x^2 + b * x + c$. Draw the formula on the diagram, and get the result shown in Figure 5.

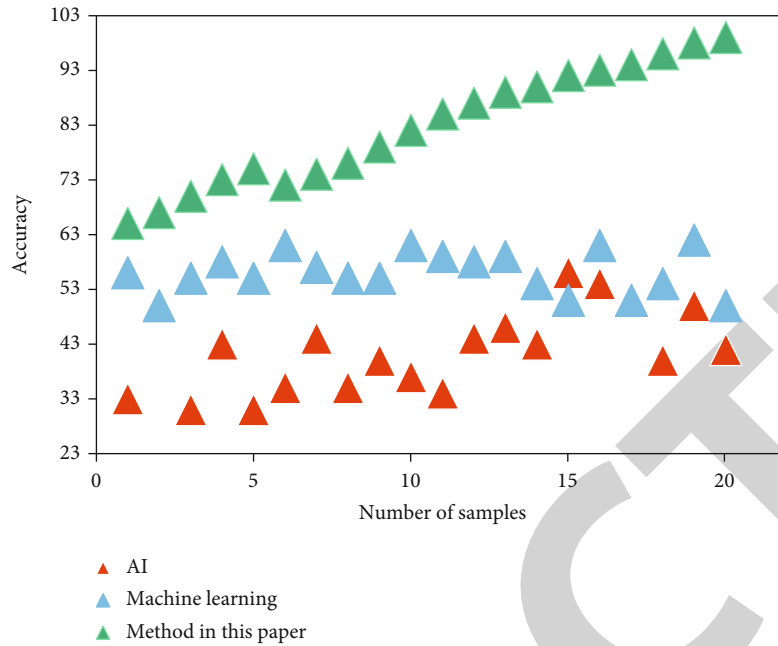


FIGURE 7: Changes in data accuracy of power marketing under different methods.

In this experiment, computers, mobile phones, and tablets are used for experimental analysis. The data will fluctuate in a specific period of time, such as holidays, or some special activities such as shopping on the national day of the month, and the power consumption will remain at a high level. The total retail sales of social consumer goods in China each month is shown in Figure 6.

It can be seen from the above figure that the trend of the three kinds of purposes is almost the same; that is, the total consumption in December of each year is much higher than that in the surrounding months, which is the seasonal fluctuation caused by some special activities. The construction of power BD system makes effective use of modern information technology and integrates the marketing information system and the GIS information system of distribution network into a complete and unified information platform, which can ensure the accuracy of line loss “quartering,” clarify the functional positioning of each system, and realize the linkage of marketing and distribution network two information systems, so as to realize the institutionalization of management. See Table 3 for the comparison of line loss rate between 2021 and 2020.

The above table clearly shows that the line loss rate has been effectively controlled after adopting the “quarter” line loss lean management based on the operation and distribution through information system. In addition, in this process, we can also build the power system database to comprehensively analyze the various businesses of power marketing management, find out the crux, and realize the more diversified development of power marketing management.

In this experiment, artificial intelligence (AI), machine learning, and this method are used to test the data management integration of power marketing, without losing generality. In the experiment, the random test method is used, and

the samples are divided into two parts, in which random sampling is used as the training set, and the rest is used as test data to test the calculation time and correctness of classification. In order to make the experimental data more general, random samples are taken for each group of data sets, and their accuracy is calculated as the basis for the analysis of test results; and all the experiments are carried out on the machine with the same configuration and the same operating system. The experimental results are shown in Figure 7.

On the whole, among the three methods, the accuracy rate of this method is the highest, followed by machine learning, and finally AI. With the increase of the number of samples, the accuracy of this method becomes higher and higher. When the number of samples reaches 13, the accuracy of this method can reach 85%, that of machine learning is 56%, and that of AI is 43%. It can be seen that this method is more suitable for data management integration of electric power marketing.

5. Conclusions

In the era of BD, the internal and external environments of enterprises have changed. To realize marketing data integration and management innovation, enterprises should fully understand the characteristics of BD and the challenges faced by enterprises. Taking electric power enterprises as an example, the electric power industry also needs to keep pace with the times in order to prepare for the establishment and development of intelligent electric power system, and the proposal of electric power BD just reflects the technological and management reform needs of electric power enterprises under the background of the great times. Based on the background of BD, this paper studies the integration and innovation path of marketing

data management in electric power enterprises. The research shows that the accuracy rate of this method is the highest, followed by machine learning, and finally AI. With the increase of the number of samples, the accuracy of this method becomes higher and higher. When the number of samples reaches 13, the accuracy of this method can reach 85%, that of machine learning is 56%, and that of AI is 43%. It can be seen that this method is more suitable for data management integration of electric power marketing. The intelligent production system from data to marketing can effectively process and correlate the key data generated by enterprises to generate information, and the induction and deduction of data information mining can be intelligently operated, which can be transformed into analyzing and solving the actual problems of enterprises to ensure the quality of marketing data integration. In a word, it is of great significance for the development of electric power enterprises to adopt new technologies and methods to realize the integration of marketing data and the innovation of marketing management.

Data Availability

The figures and tables used to support the findings of this study are included in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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