

# Research on the Promotion Strategy of Marketization of Electric Power Big Data from the Perspective of Risk Cognition

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## **Abstract:**

Electric power big data has great application value, the development and utilization of electric power big data with the help of big data collection, storage and mining is a momentous way for electric power enterprises to improve quality and practice sustainable development, as well as a necessary choice for the future development of social economy. At present, the marketization of electric power big data is not very respectable, the reason of which is in the circumvention of potential marketization risk by related market subjects. From the perspective of risk cognition, this paper makes a comprehensive observation and analysis on the factors that lead to the enhancement of risk cognition during the marketization of electric power big data, such as privacy leakage, rights and interests definition, security guarantee, etc., as well as the factors that lead to the reduction of risk cognition, such as the natural monopoly, high authenticity, high value, relatively weak privacy and natural public welfare of electric power big data. It is found that there are two problems during the electric power big data marketization: exaggeration of enhancing risk cognitive factors and neglect of mitigating risk cognitive factors. The marketization of electric power big data has its particularity in the industry, and it could be relatively easy to promote its marketization, but because of the existence of the above cognitive problems, this process has not become a reality. In conclusion, in order to promote the marketization of electric power big data, it is necessary to adopt reverse operation to the factors of enhancing risk cognition and mitigating risk cognition among them, and formulate the promotion strategy of marketization of electric power big data comprehensively, including detailing privacy protection measures, systematically improving the technology of data information protection, actively strengthening laws and regulations of industrial big data application, promoting "public welfare" to reduce "data exploitation" sense of customers and strengthen enterprise responsibility awareness through self-pressure, etc.

**Keywords:** *Electric power big data, Marketization, Risk cognition.*

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## I. INTRODUCTION

With the rapid development of global digital society construction, especially the outbreak of Novel Coronavirus accelerating the digital transformation of social development, the big data application has

entered a period of accelerated development. The electric power big data can not only measure the economic prosperity degree of a region, but also provide the image of electricity consumption behavior for electrical appliance manufacturing enterprises and other manufacturing enterprises, which has considerable market value; At the same time, it can also provide assistance for technical innovation of electric power industry during the emission reduction, promote great changes in development concept, management system and technical route of electric power system, and play a vital role in reshaping core value of electric power enterprises, transforming electric power development mode, carrying out government decisions, promoting energy conservation and sustainable development of society. The development and protection of data resources in any field, however, are a pair of contradictions. During the marketization application of electric power big data, there are also ethical problems such as privacy protection and data security risks, which hinder the marketization application to some extent. How to deal with the ethical problems appearing in marketization application of electric power big data is a practical issue to be solved urgently.

## **II. RISK PERCEPTION THEORY AND ITS RELATIONSHIP WITH MARKETIZATION OF BIG DATA**

### 2.1 Overview of Risk Perception Theory

"Risk cognition" is to study individual's activities and behavioral responses to certain risk event, and it is the cognition, attitude and judgment of individual to various objective risks existing outside [1]. The concept of risk cognition was first raised by Bauer from Harvard University, who thought that individual's consumption behaviors are risky, and any consumption behaviors have uncertainty of consequences. Bauer uses the concept of risk cognition to describe people's attitude and intuitive judgment to the risk. Slovic defines risk cognition as individual's perception and knowledge of various objective risks existing in the outside, and emphasizes the influence of individual's experience obtained through direct judgment and subjective perception on risk cognition [2]. Pidgeon defined risk cognition as "including individual belief, attitude, judgment and perception as well as cognition of cultural and social factors in disaster and benefit to a wider extent" in the Royal Society of England, which is a typical research on risk cognition [3]. The interpretation of risk cognition has produced multi-dimensional and multi-angle knowledge with the deepening of scholars' research, and the whole society is paying more and more attention to risk. However, with the increase of multi-dimensional factors, individuals also have multi-dimensional views on the certainty of risk information, corporate behavior, government supervision, etc., which makes the resulting risk cognition more complicated.

### 2.2 Essence of Marketization of Big Data in Risk Perception Theory

The big data technology not only brings convenience, but also increases the data risk such as technology security, content security and management fragility, which leads to a series of ethics problems about big data and triggers the conflict of interest between the group and people. As the product of the development of science and technology and the progress of human beings, big data technology is a double-edged sword like other technologies, and as a tool, big data technology itself cannot be classified as

the good or the bad. However, individuals and companies of big data technology use big data technology for different purposes and motives, so the application of big data technology often has advantages and disadvantages, and it is hard to define it. Therefore, the "distinguishing advantages and disadvantages" of big data technology mainly depend on the users of big data technology rather than big data technology itself.

At present, there are some differences on the application of big data technology in the society. The reason why there are objections and doubts is that scholars predict the risks brought by big data technology. They worry that these risks will aggravate the conflict among the benefit subjects to increase the ethical risks and social problems of the whole society, and destroy the benign order of the society. In fact, the application of any technology has two sides. Only by grasping the characteristics and development trend of big data technology, can we predict and judge various risk problems to reduce various ethical risks brought by big data technology effectively, and balance the risks and benefits among relevant subjects of data application. The application of big data technology enables individuals or groups who have data and can analyze data to take the lead in social development. Meanwhile, the problem of human nature in society has been magnified and exposed because of the conflict of interest. The risk problem brought by big data technology has continuously aroused the attention of the society, and the public's panic psychology in personal data security is becoming increasingly serious. When the public's awareness of the risk of big data technology application exceeds a certain security threshold, the big data technology application may evolve to "abnormal" direction due to oppositions.

As a new technology, big data technology not only brings positive influence to people's social life, but also threatens people's security, and even has unpredictable influence on ethics. Therefore, from the perspective of risk cognition, in order to give full play to the positive role of big data technology transformation, improve users' satisfaction and experience towards power industry, and realize users "adapting" to marketization of electric power big data, we must improve the cognition level of big data risk problems, manage new risk problems arising from big data technology transformation timely and effectively, and keep a high vigilance against possible risks brought about by big data technology.

### **III. ANALYSIS OF FACTORS LEADING TO ENHANCED RISK COGNITION IN THE MARKETIZATION OF ELECTRIC POWER BIG DATA**

Electric power big data is a kind of big data, which has the general characteristics of big data. The development of technology, however, has two sides. Big data technology not only improves people's work efficiency, lightens the burden of staff, promotes social data transformation, and serves the development of various industries, but also produces common risk problems such as privacy disclosure, data rights and interests, information security and so on. These data risks become the biggest challenge to block the marketization application of electric power big data.

### 3.1 Personal Privacy Disclosure

The right to privacy belongs to citizen's extremely significant personality right, it involves individual vital personality rights and interests. In each link of power generation, transmission, transformation and distribution, electric power enterprises contain various kinds of structured, semi-structured and unstructured business data which is large in number, master a great amount of customer personal information and enterprise information, and are about personal privacy information and business secrets [4]. On the one hand, electric power big data records the data generated by the operation of each link of the electric power enterprise and the data generated by the power users during the power consumption; On the other hand, the power consumption that is connected with the power user closely will involve the personal basic information provided by the user, the household electricity information and the association information among family members. In addition, through the collection and analysis of the power consumption data of the users, significant business index data information such as the business status and business dynamics of the enterprise can also be obtained. The power enterprise can largely improve the management ability and execution efficiency of the power enterprise, increase the service satisfaction of users through the internal utilization of these data by using these internal data, and obtain low-cost economic benefits through market development, but if the power enterprise does not reasonably save and control a large number of data information during the data collection and transmission, it is likely to cause privacy data leakage to threaten the relevant personal interests of users seriously. At present, the data privacy protection mechanism of power customers has the problems such as unclear data protection objectives for different types of data, lack of differentiated protection for different business scenarios and privacy protection goals, and inability to implement privacy protection for different kinds of data in combination with data application characteristics appropriately [5]. These isolated data without effective protection, even after desensitization or encryption, are hard to resist the attacks and correlation analysis of multi-external data hackers, and there is also a potential danger of privacy disclosure.

### 3.2 Definition of Data Rights and Interests

Data information of different kinds and levels will be produced in each link of power generation, transmission, transformation and distribution, which will bring different interests and values in the process of application. Electric power big data is highly recyclable and can be continuously refined to generate huge benefits in the process of use. On the premise of protecting the interests of power users, electric power big data can play a unique and great role in the aspects of energy conservation, emission reduction and sustainable development in each link of power system. Theoretically, these power data that generate economic value come from power users, and the data gained by electric power enterprises through big data are generated from power users and enterprises, and the direct beneficiaries of data value are power enterprises. Existing in the electric power big data application environment, the power consumer, as the data producer, should be the owner and user of their own power consumption data, having certain dominant power and decision right to their own data, and should have the right to know and decide the processing and use their e-records such as identity privacy, power consumption records, family files and so on. However, the rights and interests between the data producer's customer and the power enterprise of the

data beneficiary are easy to part with each other under the control of cost-benefit mechanism, and the customer often doesn't know where their data are going and how to be used. The power enterprise, as the data collector and digger, will not inform the customer before using the data information actively. Who has the right to use the data, and how is the right to use the data defined? Whether these large amounts of data belong to the data producer or the data collection enterprise or the relevant government departments are also one of the crucial risks which need to be paid attention to in the current marketization application of electric power big data [6].

### 3.3 Data Security Management

With the gradual transformation from traditional power grid to smart grid, the data of electric power enterprises exponentially increases, storage and management is a huge challenge, when in the face of such fast-growing and large-scale data. At the same time, affected by the regional economic development and the asynchronous construction of smart grid, the power enterprises lack differentiated management measures for different kinds of data currently, and the data protection system of electric power enterprises in remote areas has not yet been established fully. Generally speaking, there are great risks in the safety management of the current electric power big data, any of which is easy to cause major social ethical problems. In addition, the fully coming of the information age makes it difficult to "self-data forgetting", while data collection and permanent storage are becoming convenient and cheap. How to keep these plenty of saved data to ensure its security becomes an unavoidable data use problem. Over time, people's memories, perceptions and perceptions of other people and things will fade, but the computer's storage records will not. Power data includes the data for monitoring the operation status of power grid, owner information of power users, power consumption information, etc. How will these data be handled in the future? How to manage such a large number of data? What fields and forms will be used? If these questions cannot be answered well, the risk of big data ethical problems will always exist. Especially for vital enterprise data which need to build a stable information security system, it is far from enough only to build an information protection platform. It is more significant for enterprises to improve their own quality and establish a set of information security system perfectly to avoid the business secrets of enterprises, even some data related to the survival of enterprises, backed up by the third party unknowingly or stolen by hackers and competitors easily. Electric power big data has the characteristics of high speed, scale, diversity and value, so it is more suitable for centralized storage for its development and application, which can bring more large-scale economic benefits through analysis and processing. At present, however, most management mechanisms of electric power enterprises still have certain data security management risks, and the effective measures to protect privacy information data in each link are not strict enough, and once these data are lost or damaged because of improper management, it will cause serious consequences, which can not only restrict the survival and development of enterprises, but also threaten personal safety and national security.

#### **IV. ANALYSIS OF THE FACTORS LEADING TO THE REDUCTION OF RISK PERCEPTION IN THE MARKETIZATION OF ELECTRIC POWER BIG DATA**

It is impossible for big data applications in all fields to get rid of the specificity of their respective industries, and their risk problems will have their own specificity inevitably. Electric power big data has the characteristics of real-time generation, large scale of data per unit time and more application of data analysis results for management and service. These characteristics make the risk problems generated by its data application have common performance and lower risk cognition level than other industries because of its specificity.

##### **4.1 Natural Monopoly of Electric Power Big Data**

Inner trust can have a significant impact on the level of risk cognition, which means the more trust, the lower risk perception and the more acceptable the risk. The power industry typically consists of state-owned large-scale enterprises, whose property rights belong to the central government and the local government respectively, and it is a key industry supported by the state. This attribute enhances the trust of users to the marketization application of electric power big data. Marketization application of power big data has monopolistic and indispensable nature obviously, which, to some degree, strengthens people's sense of trust for electric power big data application, so the level of risk perception of the application has been reduced. First, similar to utilities such as gas and tap water, the electric power industry has regional exclusivity obviously. The final product produced by the power industry is electric energy. The transmission route of electric energy from power generation enterprises to power customers can only be completed through the power grid, which is unique. Only one power supply enterprise or organization can exist in one region and vice versa [7]. This characteristic determines the monopolization of electric power big data resources. There is only power grid as the only channel to gain plentiful data. Other economies have no feasible way to gain information, so the final rights and interests of the generated data are also monopolized by electric power enterprises. It is difficult for other economies to intervene, which reduces the risk of data leakage of users to some extent. Secondly, power big data is indispensable. Real-time detection of each link of power generation, transmission, distribution and power utilization through electric power big data, discovering system failure in time and predicting potential risks in advance is an indispensable technical guarantee for the normal operation of the system and social harmony and stability. Nowadays, electric power products have become a basic resource of production and living, with universal applicability and high demand, involving the whole members of the society and the necessity of social production and life. Even if the short power interruption will bring great losses to the society and affect the normal life of citizens, the application of electric power big data is becoming increasingly indispensable in order to make sure the stability of public utilities and infrastructure.

##### **4.2 High Authenticity of Electric Power Big Data**

The source of data information is also a big factor affecting the risk cognition level of users. The phenomenon of data distortion will send a wrong information to the society, mislead the economic

behavior of enterprises and infringe the relevant interests of users, which can disturb the market economic order seriously to make users lose their trust in the data, so as to intensify the risk perception. Both the standardization of big data information sources and the high authenticity of information weaken the risk problem of power industry, and to some degree people's risk perception will also decrease. Electric power big data is the product of the development of modern information technology, which has a high level of automation, informatization and scientificity. The source of power big data covers the complete data set of each business link of the electric power industry, such as reading data of smart electricity meter, basic information data of customers, geospatial information data, etc. The infrastructure used for data acquisition, transmission and application is complete relatively, the collected data has a high level of real-time and authenticity, and the potential value of data is enormous. The scope of electric power big data acquisition is pretty extensive, including all enterprises and families in a certain area, and has the inseparable connection with thousands of enterprises, which is the advantage that other kinds of big data can not compete. In terms of data collection means, power enterprises are different from other companies or platforms, having collection channels that are open and generally applicable. The nature of the enterprise also determines that there is generally no problem of data fraud. In addition, the power industry is a basic industry related to national economy and people's livelihood. Power system is the largest energy supplier, which has crucial monitoring and information feedback functions for power supply and power grid operation. Its data ownership and generation speed are unmatched by other enterprises, enjoying highly representative.

#### 4.3 High Value of Electric Power Big Data

The marketization application of electric power big data has extremely high economic value and special social value, which enables enterprises to achieve certain economic indicators, makes users enjoy the special value brought by the marketization of electric power big data, benefits users from the special value and brings satisfaction and actual acquisition sense to some degree, so as to reduce the risk cognition of users and make users hold a positive attitude towards the marketization application of electric power big data. First of all, big power data can reflect the operation of national economy accurately. Electricity consumption data contains a great amount of economic information. On the basis of enterprise power data, asset data, customer data, etc., using big data technology to construct electric power economic indicators, economic operation situation can be reflected objectively to assist the forecast of economic development trend. Electric power big data can identify the housing vacancy rate accurately, reflect the residential density of local people, and provide crucial decision-making basis for the government departments to make macro-control policies. Especially during the outbreak of COVID-19, the electric power big data promotes the prevention and control of epidemic and the following resumption of production of enterprises. The "Electric Power Recovery Index" reflects the resumption of work and production in various industries comprehensively, accurately, efficiently and timely, providing scientific support for the government to judge the situation and grasp the epidemic situation accurately; After normalization of the resumption of work and production, "Electric power consumption index" helps the government to judge the degree of regional economic activity and economic recovery accurately, and provides support for the government to issue the next economic policy. The electric power big data application not only has the extremely high economic value, but also has the high social value specially. Relying on electric power big data application

to assist pollution prevention and control, collect power consumption data of different industries, find pollutant discharge and key industries with pollution risk accurately through comparison of big data, track real-time production of the industry under production restriction and shutdown through power consumption trend analysis, find and punish illegal production and illegal enterprises timely and improve environmental monitoring efficiency of ecological departments. Besides, from the perspective of households, the daily electric power data will not change greatly under normal circumstances, and the data in each period is relatively stable. However, if the monitoring finds that the electric power data for a period of time is quite different from the monitoring data at ordinary times, it is necessary to make the judgment on the causes of abnormal data in time, especially for the elderly households who live alone and if the monitoring finds that the power consumption of the users remains unchanged for a long time, in cases where no one lives, such as going out, the local community can be immediately contacted through multiple channels to understand the basic situation of residents and take effective actions for possible problems timely.

#### 4.4 Relatively Low Privacy of Electric Power Big Data

With the comprehensive arrival of the big data era, personal information data has become a kind of high-profitability social resources like material goods, and become a necessary resource for investment profit competition. Therefore, a large number of privacy leaks appear and the normal life of citizens is affected. It should be noted that the privacy level of electric power big data is different from other industries such as telecommunication and finance. For example, the user data of telecommunications enterprises has higher privacy level and stronger sensitivity, referring to the business strategy, financial situation, ID card number of an individual user, transaction record, family relationship and movement tracking of enterprise users, all of which have extremely high privacy. The mass data generated by electric power big data in various links of power generation, transmission, distribution and power utilization can be used for inward efficiency enhancement and outward appreciation, which also has certain privacy. However electric power enterprises mainly distinguish specific subjects by recognizing such information and monitor users' power consumption. The information obtained in this process such as total power consumption data, real-time monitoring and distribution of power consumption will not affect the privacy of individual users generally. The user information involved in electric power big power data is relatively shallow. Only when the detailed individual information of the user and the real-time data of the user's electricity consumption are controlled at the same time, can the user's privacy be threatened. The influence of grasping the information of just one link or the shallow information of each link is relatively weak. Therefore, compared with other industries, the private information generated by the marketization application of electric power big data will not threaten the personal safety and privacy of users to some degree, so that the users' cognition of the data risks generated during power consumption will be far lower than that of other high privacy industries.

#### 4.5 Natural Public Welfare of Electric Power Big Data

The power industry typically consists of state-owned large-scale enterprises, and electric power big



data is a special application with the characteristics of state-owned enterprises. All the time, the public utility attribute of the electric power industry is obvious, and the electricity price is relatively fixed. This special public utility attribute reduces the risk caused by the marketization application of electric big data greatly and the "data exploitation sense" produced by users when they use electricity, and thus decreases the risk cognition degree of users to the marketization application of electric power big data. Electric power enterprises are traditional state-owned enterprises that are technology-intensive and capital-intensive, integrating enterprise marketability and social service [8]. Most state-owned enterprises are different from non-state-owned enterprises, whose main purpose is to develop public utilities and provide social services followed by profits. Most of their main business objectives are to maximize social welfare, even some of which simply demand no losses on their economic goals. The most direct purpose of state-owned enterprises to apply big data technology is to serve the operation of enterprises, facilitate management and improve service efficiency with weak purpose of data profitability, and it is more reliable in data security assurance. The non-state-owned enterprises are very different. Most of them are profit-oriented and offer less free services; They mostly use big data for the direct purpose of "data realization", or use big data analysis technology to track consumers accurately, so as to achieve targeted marketing, improve economic efficiency. One of the main purposes of electric power big data application is to supervise the operation of power grid so as to conduct necessary power user management. Its original objective is not to use data to create wealth for enterprises, but to save certain manpower, material and financial resources in the process of reaching the management goals and meet the social demand more efficiently. For example, the targeted tracking of big data application in the power industry is helpful for the implementation of projects such as household power supply project, rural power grid transformation and smart grid upgrade, the division of different power customers with different demands in accordance with data analysis, the implementation of step price, and the support policies for poverty areas.

## **V. PROMOTION STRATEGY OF MARKETIZATION OF ELECTRIC POWER BIG DATA ON THE BASIS OF RISK PERCEPTION**

### **5.1 Basic Ideas for Promoting the Marketization of Electric Power Big Data**

Under the current social and economic conditions, the huge potential economic value of marketization of electric power big data is becoming obvious. The main reason why its marketization application still remains in the potential stage is that it is still stuck in the inevitable ethical risk. As long as the risk of big data marketization application can be handled properly, the marketization of big data of electric power will surely develop rapidly.

More generally, there are also inevitable risks such as privacy protection, rights and interests definition and security management in the marketization application of power big data. The risk is not trivial and must be addressed. The risk of big data application is very complex, and has encountered difficulties like many other industries. However, because of the differences between industries and fields, it is different in the aspect of difficulty degree and solution methods. The particularity of power industry determines that its big data application has natural monopoly, which means its big data application is irreplaceable. Electric

power big data has high authenticity and high value, which represents the huge economic value of electric power big data. It is extremely significant to fully excavate these values and promote the marketization application under the background of hundreds of years of great changes and fierce international scientific and technological competition. At the same time, making good use of the relatively weak privacy and natural public welfare characteristics of electric power big data and combining with appropriate strategies, we can solve the risk problems it faces and find a breakthrough for the marketization of big data in China as a whole without taking much effort. In a word, the particularity of electric power big data makes marketization has the general characteristics of "irreplaceable, high value and relatively easy to solve", which enlightens us that the basic idea of promoting the marketization of electric power big data is: according to the particularity of electric power industry, formulating correct strategies, resolving the risk contained therein, the marketization application of electric power big data can be better promoted.

## 5.2 Basic Strategies for Promoting the Marketization of Electric Power Big Data

Electric power big data can collect and integrate electric power data information through various channels, analyze and dig out corresponding economic value and social value, and develop and utilize in many aspects. According to the risk perception theory and the particularity of electric power industry, it can be concluded that people's risk perception of marketization application of electric power big data is obviously weaker than that of other applications of big data. Therefore, the risk in the market application of electric power big data can be well handled by grasping the basic thinking of regulating big data market, formulating flexible regulation strategy and adopting a series of measures.

### 5.2.1 Detailing the privacy level of protection

*Data Security Law of the People's Republic of China*, which has been implemented since September 1, 2021, makes clear provisions on how to ensure data security and promote data development and utilization, and explicitly puts forward the requirements for data classification and hierarchical protection [9]. There are different data features and protection objects in different business links. Even if the same kind of data is applied in different scenarios, the data protection demands are different, so the risks of data privacy disclosure are different. Firstly, the power industry should establish scientific and reasonable data management system to realize the effective classification of different types of data and different carrier data, and promote the standardized development of data management. Secondly, according to the classified management of different data, establish customer data privacy protection measures, further classify customer categories and form differentiated grade protection measures to ensure the integrity of information, strengthen the privacy protection quality of electric power enterprises, and effectively enhance the security of data information management to improve the privacy protection effect [10]. In order to avoid inaccuracy of protection measures, different protection measures shall be adopted for different levels of customers. Electric power enterprises shall focus on customer data with high privacy level, carry out highly confidential management on these data, and adopt multi-level protection work; For customer data with low privacy level, enterprises can adopt low-level protection measures such as anonymous protection technology to ensure their information security. Create privacy level protection

system to ensure that power enterprises can realize security management of private data when marketization application of electric power big data, support power big data application with consideration of data privacy and security, and ensure data security of power customers [11].

### 5.2.2 Systematic improvement of data information protection technology

Electric power industry is important and related to national economy and people's livelihood. The safety operation of any link will have influence on the operation of the whole power grid, and then on the stability of the whole society. Marketization application of electric power big data has two sides, which facilitates social life, but also has some adverse effects inevitably. Its technical defect is undoubtedly the cause of ethical problems in the process of marketization application of electric power industry. To solve the problem, we must start from the technology itself, we need strong technical support, use technical means to ensure data security, technically improve the application process of big data, purify the application environment of big data, and prevent big data ethical problems. Electric power big data application should systematically promote information protection technology in power generation, transmission, distribution and power utilization links, provide an important barrier for power information security by upgrading intrusion detection technology, data encryption technology and authentication technology, firewall technology, virus protection technology, etc., and avoid all kinds of information disclosure and immoral application behaviors. Electric power enterprises shall deploy anti-virus software and system uniformly, load anti-virus system into enterprise computers and servers to ensure that anti-virus software can monitor real-time data in enterprise computers and check and kill viruses automatically. Improve the data desensitization technology, desensitize the data in different degrees, in different ways and in different contents according to different levels of privacy information, and convert and store the desensitized information in special formats, so as to maximally ensure the characteristics and significance of the original data, ensure the data availability and maximize the data value.

### 5.2.3 Actively improve industrial application of big data laws and regulations

It is necessary to form laws and regulations to standardize the ethical problems of electric power big data. *The Decision on Strengthening the Protection of Network Information* issued by China further strengthens the legal protection of citizens' personal information security, clarifies the obligations and responsibilities of Internet service providers, and endows the competent government departments with necessary regulatory means [12]. Germany is the first country to pass the privacy protection laws and regulations, especially severe punishment for information disclosure, which explicitly stipulates that it is illegal for enterprises to provide personal information to banks, telecommunications or conduct any other acts of divulging customer information.; Japan has launched several laws to protect personal information security, stipulating that relevant departments must take appropriate measures to maintain and manage personal information. With the relevant experience, electric power enterprises should take the initiative to accelerate the issue of industrial data protection act, formulate the marketization regulation system of electric power big data, protect the collection and use of electric power data information in accordance with the law, and deal with the ethical problems of electric power big data. For example, the direct

protection of privacy data shall be adopted, the scope of personal privacy protection shall be explicitly stipulated through legislation, distinguish whether the data information from the electricity user's meter belongs to the user's personal privacy or business secrets, the definition principles and specific punishment measures of the data service or commodity shall be provided, privacy disclosure or privacy embezzlement shall be defined. Clarify the data openness, sharing requirements and use principles in the process of marketization profit and social service of electric power big data, further clarify the boundary of users' personal information and rights of data use, ensure that the power industry collects necessary data within a reasonable scope, practically protect the privacy of customers, deter unethical behavior of big data information through the fairness and rationality of law, and truly ensure that there are laws on which information behaviors can be followed.

#### 5.2.4 Strengthen "public welfare" and reduce customers sense of "data exploitation"

The sense of "data exploitation" is the root of the public's resistance to the marketization application of big data. The essence of the problem comes from the "information asymmetry" between the data producer and the data owner. In order to reduce the customer's sense of "data exploitation", on the one hand, the power industry should take the initiative to return the data dominant power to the customer, and not possess or pay to use the large amount of data information produced by the power customer, and can't commercialize and market the data information simply; It is necessary to keep confidential and private data effectively, ensure the privacy and security of customers, and do not take the electric power data of customers as a methods of profit-making, so as to improve the data safety sense of power customers. On the other hand, the power industry is one of the most vital infrastructure industries in the energy industry, and electricity is the most widely used and convenient energy product. According to the characteristics of high value and high truthfulness of big data and monopoly of data information, in the era of market economy, application of electric power big data, as the technical support in the field of public utilities, must pay attention to market benefits and actively strengthen "public welfare". Electric power enterprises must clearly define the scope of data and information used for marketization, commercialization and social service provision, consciously follow the laws and regulations formulated by the government and industry, such as safe production, protect customers' privacy rights and interests, maintain market economic order, etc., consciously standardize enterprise behaviors, regard electric power big data as an important basis to provide high-quality products and services for power customers, and promote customer's sense of use and satisfaction. Multi-channel data development shall be used for perfecting public utilities and infrastructure. Starting from the "public welfare" of public goods, the enterprise's big data advantages shall be utilized actively to provide reliable support for the national society. At the same time, electric power enterprises shall adhere to the open and well-informed principle, actively explain the data collected by electric power big data, improve the authority of enterprises, and issue specific measures combining with public concern to deal with social conflicts. For some special users who need to collect main privacy data to provide power services, the situation shall be explained realistically and the required data shall be collected after obtaining consent; Effective measures shall be taken to protect the collected privacy data, reduce the risk concerns of customers, unblock the channels for application of electric power big data, and practically fulfill the social responsibilities of the power industry as a state-owned enterprise.

### 5.2.5 Strengthen the sense of enterprise responsibility by self-pressure

Electric power products belong to public products. The application of electric power big data needs to realize its own economic benefits under the principle of marketization operation, and at the same time ensure the stable supply of electric power service to meet the social demand [13]. In the era of market economy, people's demand for public social goods is diversified, high demand and high standard. At the same time, the relevant information of electric power big data has the characteristics of high authenticity and high value, so the electric power industry should adhere to the attitude of high responsibility and strengthen its own responsibility consciousness for its development and application constantly. First of all, according to their own public attributes, power enterprises should clarify their corporate positioning and take the initiative to be responsible for the safety of electric power big data, that is, when collecting and using data, enterprises must give priority to users, take the initiative to bear corresponding ethical and legal responsibilities, and strive to ensure that the data safety of power users is not infringed. Secondly, when electric power big data is used to achieve a certain goal, electric power enterprises should respond to data security protection and risk taking actively. The cooperation of big data application between electric power enterprises and other enterprises should take data security as the primary condition, and never take uncontrolled data exchange as the cost of earning profit. At last, electric power enterprises should conduct targeted trainings on data security storage and data security awareness for employees, to develop a high sense of responsibility to actively protect data in the whole enterprise, and create favorable internal environment for rational use of electric power big data. From managers to employees, they shall have good computer usage habits and data protection awareness, for example, do not use storage media other than work on computers. According to unified regulations of data management department, prevent enterprise employees from downloading some software threatening data security through Trojan link, and cut off some common and extremely hazardous risk sources; The power big data shall be backed up on a regular basis, implement the management and accountability mechanism, and reasonably set the computer protection password to effectively reduce the risk of privacy disclosure of electric power big data.

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