



Research on Innovation of Electric Power Smart Marketing Management Mode under Internet Environment

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Abstract. The conventional smart marketing management mode of electric power mainly uses the distributed integrated management system of storage, processing and collection, which is easily influenced by the random change of electricity data, resulting in the low intelligent marketing management index. Therefore, under the Internet environment, it is necessary to innovatively design a brand-new power marketing management mode. That is to say, the environment of electric power smart marketing management is analyzed, and the electric power smart marketing management center is designed, thus the optimization model of electric power smart marketing management is constructed. The results of case analysis show that the management index of the designed electric power smart marketing management model is high, the management effect is good, it is reliable and has certain application value, which has made certain contributions to improving the comprehensive strength of electric power smart marketing in China.

Keywords: Internet environment; Electricity; Wisdom; Marketing; Management; Mode; Innovate

1 Introduction

The conventional power marketing management mode mainly adjusts the marketing direction based on users, but this influence mode is difficult to adapt to the changing power market and reduces the comprehensive profit of power enterprises. Therefore, it is necessary to build an effective power marketing management mode [1-3] under the Internet environment. In fact, the power marketing management mode is of great significance to China, mainly in several different aspects. On the one hand, innovative power smart marketing mode can improve the competitiveness of enterprises, ensure the timeliness of power supply and distribution information, increase the influence of power supply and distribution services, and enable users to enjoy more complete power services [4-6] and enhance their sense of experience; Secondly, innovative

power marketing management model can promote the transformation of China's power enterprises and lay the foundation for China's subsequent economic transformation and development. In fact, the power marketing model of traditional institutions in China has strong limitations and is always in the seller's market, which seriously affects the service quality of power enterprises [7-10]. Innovative power marketing management model can fundamentally promote the development of power market to the buyer's market, build an intelligent power service system and comprehensively improve the efficiency of power supply and distribution in China. Thirdly, it can provide targeted services for users. The traditional power marketing management model has a low user status and can only passively accept the power supply and distribution requirements, and cannot adapt to the power market. Improving the pertinence of power supply and distribution can always be an advantage for Chinese power enterprises in the market competition.

The research shows that there are many shortcomings in the marketing service of power enterprises in China. First, it is difficult to implement basic power information construction [11-13] and ensure the safety of power marketing management due to the lack of a perfect market analysis and forecasting system. Secondly, the formed power marketing service system is seriously out of touch, so it is difficult to adapt to the development of the power market, nor can it form a supporting management system, and it does not understand the actual requirements of users. Under the above background, relevant researchers have designed several conventional smart power marketing management modes, including the complex power marketing management mode based on blockchain [14-17] and the power marketing management mode based on big data. However, most conventional power smart marketing management modes mainly use the distributed integrated management system of storage, processing and collection, which is easily affected by the random change of electricity data, resulting in a low intelligent marketing management index. Therefore, this paper innovatively designs a brand-new power smart marketing management mode under the Internet environment.

2 Innovative and optimized design of smart marketing management mode of electric power under the Internet environment

2.1 Analysis of electric power smart marketing management environment

Power marketing has certain conversion, so it is necessary to effectively analyze the management environment of power smart marketing when innovating the management mode of power smart marketing. At present, China's external power market demand is relatively high, and it is gradually moving towards marketization. In addition, under the background of the development of power industrialization [18-20], China's installed capacity is increasing rapidly, and market-oriented reform is urgently needed. China's electric power enterprises are mainly supervised and reformed by the supervisory committee. Influenced by the construction of economic civilization,

the demand of China's electric power marketing market is gradually increasing, and the requirements for marketing quality are getting higher and higher. Based on this, we can design the power supply service quality evaluation index according to the demand of the power supply service system, as shown in the following (1).

$$MPOR = \frac{\sum MPOF}{\sum POF} \times 100\% \tag{1}$$

In the formula (1), *MPOR* represents the proportion of multi-household power outages, *MPOF* represents multi-household power outage time, *POF* represents customer power failure repair event. In order to count the time of power users, it is necessary to design a second power supply service quality evaluation index, as shown in the following (2).

$$MPOFPC = \frac{\sum MPOF}{N} \tag{2}$$

In the formula (2), *MPOFPC* represents the ratio of the number of power outages of multiple households to the population, *N* represents the population of the region, the weight coefficient [21-23] within the modern power supply service system can be determined by combining the above indicators, and the weight coefficient of smart marketing can be calculated for the above electric power marketing evaluation indicators, as shown in Figure 1 below.

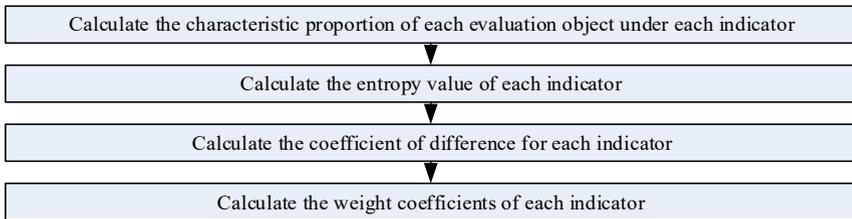


Fig. 1. Calculation process of power marketing evaluation weight coefficient

As can be seen from Figure 1, the internal environment of electric power smart marketing can be further analyzed according to the above-mentioned calculated evaluation weight of electric power marketing. First, the electric power marketing management departments mainly upgrade their management according to the basic intelligent mode, and most of them belong to the linear management departments [24], and their subordinate levels are divided by administrative regions; Secondly, the development scale of electric power enterprises is relatively large, with strong professionalism and large development space; Finally, the competition consciousness of power enterprises is weak, so it is urgent to develop the market according to the consumption

demand, strengthen the legal concept and improve the marketing quality of personnel in power enterprises.

2.2 Design Power Smart Marketing Management Center

According to the above-mentioned analysis of the power smart marketing management environment, an effective power smart marketing management center can be designed. The marketing center must effectively change the existing business model and implement standardized marketing in combination with the existing power smart marketing framework. Based on the above-mentioned design principles of the power smart marketing center, the design objectives can be planned. First, the electricity bill meter reading can be intelligent; Second, the establishment of intelligent copying process and early warning mechanism; Fourthly, a typical knowledge base of electricity accounting is constructed, and the electric smart marketing center designed based on the above design principles is shown in Figure 2 below.

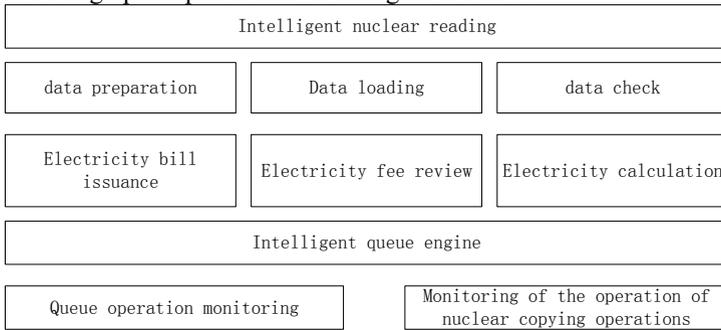


Fig. 2. Structure of Power Smart Marketing Center

As can be seen from Figure 2, the marketing accounting process set up in the above-mentioned electric power smart marketing center is based on the basic meter reading and verification, and various advanced electric power applications are set up at the same time.

Combined with the above-mentioned framework of power marketing center, an intelligent business framework can be designed. Firstly, the meter reading sections are grouped and managed, that is, the existing meter reading sections are classified according to their attributes and maintained and managed according to the responsibility distribution relationship. The grouping and numbering principle of meter reading sections should ensure uniqueness, and the grouping unit and basic power supply unit should be specified [25]. The distribution and maintenance management of meter reading section mainly uses centralized payment control mechanism to adjust the electricity fee distribution cycle, thus generating a targeted intelligent meter reading plan. During the operation of the power marketing center, it is necessary to generate a list to be processed according to the automatic data preparation sequence, and send the work link to the data preparation link to complete the data loading processing. The

data added to the marketing set need to be automatically checked in the data preparation sequence to maximize the fluency of power marketing management.

2.3 Construction of electric power intelligent marketing management optimization model

According to the above-mentioned generated power marketing center infrastructure, an effective power intelligent marketing management optimization model can be constructed. First, a power marketing data set can be generated according to the user's electricity demand, and its expression is shown in the following (3).

$$D = \{(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)\} \tag{3}$$

In the formula (3), $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ its optimization objective R at this time is shown in the following (4).

$$R = \min \sum_{i=1}^n (y_i - wx_i)^2 \tag{4}$$

In the formula (4), y_i , x_i both represent the I-th selected power marketing index item, w represents the marketing parameters, after obtaining the optimization goal, the original marketing data set needs to be divided again, and the data set needs to be trained again to eliminate irrelevant variables until the features are completely eliminated, and then the generated power marketing optimization function is generated J_M as shown in the following (5).

$$J_M = \sum_{i=1}^n \sum_{j=1}^k u_{ij}^M \|x_i - c_j\|^2 \tag{5}$$

In the formula (5), u_{ij}^M represents the membership degree of power marketing samples, x_i represents the fuzzy clustering center, c_j represents the marketing index. According to the above-mentioned calculated optimization parameters of electric power smart marketing management, an optimization model of electric power smart marketing management can be generated. The hierarchical distribution diagram is shown in Figure 3 below.

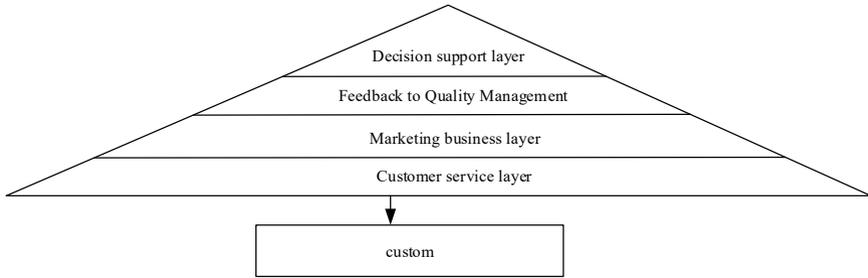


Fig. 3. Hierarchical distribution diagram of electric power smart marketing management optimization model

As can be seen from Figure 3, the optimized power marketing management optimization model has several basic levels. First, the customer service layer can effectively interact with power customers, generate smart marketing standards, share power marketing management service resources, and realize electricity consumption information query; Secondly, the marketing business layer, which mainly completes the collection and processing of basic marketing information, belongs to the support layer and provides users with real-time electricity consumption information. Finally, the marketing business quality management layer and decision-making layer have a good supervisory role and can set management authority of different modules. Using the above-mentioned optimization model can effectively predict the power supply demand and implement reliable marketing strategies.

3 Example analysis

3.1 Overview and preparation

According to the requirements of the case analysis of smart marketing management of electric power, this paper selects X electric power enterprise to conduct the case analysis of marketing management. It is known that X electric power enterprise was established in 1978, which contains more than ten functional rooms and several power supply centers, and has the functions of dispatching, substation and measurement. At present, the production state of X electric power enterprise is stable, the capacity of main transformer is high, involving more than 100 transmission lines, and the total electricity sales exceed 3 billion kWh. In order to reduce the power supply and distribution loss rate of X enterprise and improve its comprehensive profit, it is necessary to change its marketing method. The overview of high-loss lines of X enterprise is shown in the following table 1.

Table 1. General situation of high-loss lines in X enterprise (unit: 100 million kWh)

Serial Number	Name (code) of power supply (power bureau)	Line name (code)	Accumulated power supply	Accumulated line loss	Accumulated line loss rate (%)
1	SD Electricity Bureau	HKII344\SL308 SZI312	4585.99	578.53	12.615
2	SD Electricity Bureau	HKIV304\HZ336	2805.12	319.31	11.383
3	SD Electricity Bureau	HH314	1899.54	274.41	14.446
4	SD Electricity Bureau	HKIII338	3099.23	341.23	11.010
5	SD Electricity Bureau	HM306	585.10	50.73	8.670
6	SD Electricity Bureau	SX334	1847.68	-350.50	-18.970
7	SD Electricity Bureau	TC314	863.66	88.65	10.264
8	XS Electricity Bureau	NDIIX\WNIIX	3135.77	251.57	8.023
9	XS Electricity Bureau	NZX\WCX	2566.04	236.58	9.220
10	SY Electricity Bureau	DXX	425.82	56.05	13.163
11	SY Electricity Bureau	DKIX\DKIIX	1571.48	211.14	13.436
12	SY Electricity Bureau	TSX	915.90	83.64	9.132
13	SY Electricity Bureau	TGX	334.31	45.72	13.677
14	CD Electricity Bureau	YSX	857.86	-99.79	-11.632
15	CD Electricity Bureau	LSX	393.21	36.92	9.389
16	CD Electricity Bureau	SMIX\SMIIX348	2487.24	652.96	26.252
17	CD Electricity Bureau	STX306\SMX334	2479.49	-243.27	-9.811
18	CD Electricity Bureau	SHX318\STX328	427.08	-319.74	-74.867
19	CX Electricity Bureau	MZIIX342	396.72	275.62	69.474

From Table 1, it can be seen that the line loss rate of enterprise X is moderate. Combined with the above line loss situation, this paper uses SWOT analysis method to generate a smart marketing management framework, as shown in Figure 4 below.

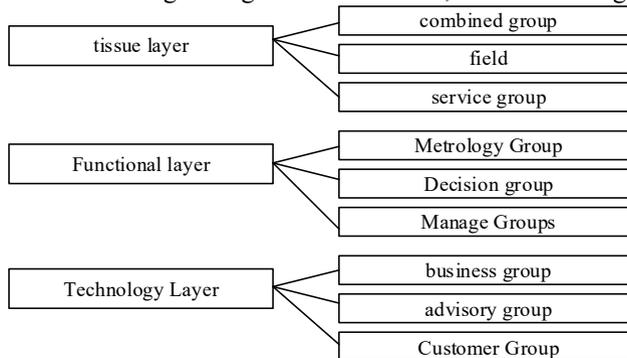


Fig. 4. Smart Marketing Management Architecture

As can be seen from Figure 4, on the basis of the above-mentioned intelligent marketing management framework, subsequent marketing management case analysis can be carried out and accurate case analysis results can be obtained.

3.2 Application effect and discussion

Combined with the above general situation and preparation, we can make an example analysis of power marketing management, that is, use the smart power marketing management mode under the Internet environment, the complex power marketing management mode based on blockchain and the power marketing management mode based on big data designed in this paper to conduct smart power marketing management in the research area, extract the evaluation parameters of management effect, and use Formula (1) to calculate the power marketing management indicators under the three power marketing management modes. The results of the example analysis are shown in Table 2 below.

Table 2. Example Analysis Results

Evaluation Parameters for Smart Marketing Management Mode of Electric Power	The electricity marketing management indicators for the intelligent marketing management model of electricity in the internet environment designed in this article		Power marketing management indicators for complex power marketing management models based on blockchain		Power marketing management indicators based on big data for power marketing management model	
	economic benefits	management efficiency	economic benefits	management efficiency	economic benefits	management efficiency
Expansion and installation of power marketing industry	0.9513	0.9548	0.5123	0.5485	0.5841	0.4545
Electricity marketing electricity price electricity fee	0.9845	0.9246	0.4415	0.4147	0.4246	0.4123
Electricity inspection	0.9365	0.9471	0.5546	0.5268	0.5285	0.5845
Energy Measurement	0.9948	0.9258	0.4354	0.4215	0.4326	0.5162
power supply contract	0.9274	0.9395	0.5175	0.5453	0.6214	0.4412
customer service	0.9589	0.9684	0.4238	0.4254	0.5252	0.5582
line loss	0.9543	0.9256	0.5966	0.6549	0.5436	0.5641
Meter reading quality	0.9423	0.9441	0.5784	0.6413	0.5855	0.4369
Business fee items	0.9967	0.9745	0.6253	0.5251	0.4143	0.6852
Electricity order	0.9842	0.9395	0.6744	0.5436	0.6954	0.6245
Electricity transaction settlement	0.9368	0.9854	0.4269	0.4544	0.4894	0.4477
Signing of electricity supply and consumption contract	0.9474	0.9278	0.4841	0.6465	0.5586	0.5365
Electricity invoice management	0.9259	0.9654	0.5584	0.4414	0.5287	0.4855
Acceptance of electricity business	0.9841	0.9369	0.6241	0.4568	0.5584	0.5259

As can be seen from Table 2, the intelligent power marketing management mode designed in this paper has higher management index values under different evaluation parameters of power marketing management effect, while the conventional complex power marketing management mode based on blockchain and the power marketing management mode based on big data have relatively lower management index values

under different evaluation parameters of power marketing management effect. The analysis results of the above examples show that the management mode of electric power smart marketing designed in this paper has good management effect, reliability and certain application value.

4 Conclusion

With the development of industrialization and economy going hand in hand, China's demand for electricity is increasing, and people's requirements for the quality of power supply and distribution are getting higher and higher. In addition, the development of the Internet has promoted the progress of information technology and broken the original power marketing model. In order to ensure China's comprehensive power supply and distribution strength and improve China's power marketing level, effective power smart marketing management is needed. The conventional power smart marketing management model does not form an effective marketing management service system according to the actual requirements of users, and the selected marketing management indicators are also very single, which does not meet the current power marketing management requirements in China. Therefore, this paper designs a brand-new power smart marketing management model under the Internet environment. The case study shows that the designed smart marketing management mode of electric power has good management effect, reliability and certain application value, and has made certain contributions to promoting the development of electric power enterprises in China and improving their adaptability to the market.

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