Establishing an electronic invoice management platform based on information system

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Abstract. In order to meet the needs of power supply enterprise marketing business to issue e-invoice, realize the online issuance and control of VAT e-invoice, a unified e-invoice management platform is established. Through the construction of e-invoice service application platform as a data transmission channel, and upgrading the VAT invoice system, the invoice data can be uploaded to the tax bureau system in real time, thus realizing the transformation of power supply enterprises from paper invoice to e-invoice. Electronic invoice is different from the previous paper invoice. It can transmit and save the contents of the invoice through digital media, which reduces the management cost of paper documents, facilitates the users to save and use the invoice, and improves the service level of power supply enterprises. The practice shows that the system runs reliably and achieves good application effect and economic benefit in 27 local power companies.

1. Introduction

According to the requirements of relevant fiscal and taxation policies, the upgraded version of VAT invoice system will be implemented in China from January 1, 2015, and the VAT electronic ordinary invoice will be promoted nationwide from December 1, 2015. With the continuous development of the Internet plus tax action plan, the invoice of the generic name of the self printed enterprise is included in the cleaning area. The electronic invoice should be generated occasionally[1]. From the perspective of internal business management and control of power supply enterprises, invoice plays a vital role in enterprise finance and tax management. With the transformation of economic development mode and the rapid development of Internet technology, the traditional invoice management mode can no longer meet the requirements of modern tax management. The construction of e-invoice management platform will accelerate the application of e-invoice and other technologies in front-end businesses such as engineering construction, material procurement, power purchase and sales transactions, which is of great significance to realize invoice information interconnection, cross supply chain collaborative management, and comprehensively support lean and efficient financial intensive real-time control system.
2. Analysis on the necessity of building electronic invoice management platform in power supply enterprises

2.1. Upgrade VAT invoice system
The State Administration of Taxation has decided to gradually and comprehensively promote the use of the upgraded version of VAT invoice system in China since April 1, 2015. In the past, the electricity invoice was a general machine printed invoice with a large number of invoices and concentrated time. With the local tax departments gradually stop the general machine printed invoice, the power supply business places at all levels of power supply enterprises are facing the problem of no invoice to issue. Therefore, it is urgent to complete the upgrading of the VAT invoice system, and realize the effective control of the whole life cycle of the application, distribution, issuance, red flush and upload of the VAT electronic ordinary invoice.

2.2. Construction of e-invoice service application
In order to further adapt to the needs of tax modernization and the company's lean management requirements, through the construction of e-invoice service application, the "online issuance and online control" of VAT e-invoice is realized. All invoice data is stored, queried and counted in the e-invoice service application, which effectively supports the company's financial invoice data application and management requirements. At the same time, it further reduces the operating expenses of enterprises, saves social resources, facilitates consumers to retain and use invoices, and is conducive to the construction of a notarized and transparent tax environment[2].

3. Design and implementation of electronic invoice management platform in power supply enterprises

3.1. Functions of electronic invoice management platform
3.1.1. VAT invoice system. It is mainly used to meet the business needs of power supply enterprises to issue VAT electronic invoice. At the system level, it supports the configuration and management of tax control panel, taxpayer identification number, customer / supplier master data, as well as the application requirements of basic services such as multi disk scheduling and remote tax reporting. At the business service level, it can effectively monitor and statistically analyze the e-invoice acceptance requests and key data information such as front-end business issuing, red flush and upload.

(1) Issue of electronic invoice. Build the electronic invoice module to realize the online issuance of VAT electronic invoice. After receiving the invoice issuing request forwarded by the e-invoice service application, the VAT system processes the business information, generates the e-invoice data, and returns the invoice issuing result.

(2) Invoice management. Online collection, the system can monitor the balance of electronic invoice. When the amount is less than a certain amount, it can manually or automatically submit the invoice application request to the tax bureau, and write the invoice sales results of the tax bureau into the tax control equipment to realize the online collection and purchase function of the invoice. Invoice distribution provides the function of distributing the blank electronic invoice in the tax control server to the billing terminal, and supports the query of distribution records. Invoice return provides the function of reclaiming the blank electronic invoice not issued by the billing terminal to the tax control server, and supports the query of the reclaim record. After the invoice is successfully issued, the invoice data is uploaded to the tax bureau through the SSL channel established with the tax side. Red ink offset of invoice supports red ink offset of the original blue ink invoice. After the tax control system receives the red ink invoice request and passes the verification, it can generate the red ink invoice and return the invoice issuing result at the same time. Online copy, the invoice details and statistical data form copy data, which is transmitted to the tax bureau to copy tax, provide tax control panel copy status query, manual remote copy tax work.
(3) Query statistics. Query functions such as issued invoice, invoice inventory, invoice upload status and Golden Tax disk status are provided. Combined condition query and statistics are supported.

(4) Monitoring function. Business monitoring, real-time monitoring of the current e-invoice issuing, red flush, long-distance business processing, and relevant early warning and error logging for abnormal processing.

System monitoring provides the system resource monitoring function of the billing server and peripheral auxiliary server, shows the usage of hardware resources, and provides early warning error log when the system is abnormal.

3.1.2. Application of electronic invoice service. Through the new e-invoice service application, it realizes the functions of e-invoice push, query, download, verification and flow, stores the e-invoice data in the system, supports the statistical analysis and management of the e-invoice information, and provides the functions of e-invoice PDF generation and signature, so as to meet the needs of customers to query and download the format invoice in the system.

(1) Invoice format file management. It is a business form decided by the electronic invoice of VAT. After the transaction of the business system is completed, the electronic invoice will be applied for, and the format file of the specified format will be generated according to the requirements of the tax bureau, that is, the PDF format file. The generated PDF format file can be pushed to various business systems, supporting users’ online viewing, downloading and other functions.

(2) Collection and management of invoice information. The output invoice information collected by the VAT invoice system and the electronic invoice information collected by the external suppliers to the third-party platform will eventually be transmitted and stored to the electronic invoice service application through the interface, realizing the query, export, log tracking and other functions of input invoice data and output invoice data.

(3) Invoice statistical analysis. Multi-dimensional analysis is carried out for the collected electronic data of sales invoice and input invoice of the business system, including data statistical query, statistical analysis and billing business analysis. It provides support basis for business innovation and risk analysis of the provincial company's business departments, realizes business data sharing and intercommunication, and provides data basis for sales analysis.

(4) E-ticket management. It is mainly for the electricity bill business, which realizes closed-loop management of the electricity bill paid by the State Grid residents, so that the client users can understand the detailed electricity consumption situation and Analysis on the electricity bill. Users can obtain detailed transaction information, provide payment details, ladder power consumption, power consumption details and other information, realize the query and acquisition of monthly bills, annual bills and other bills in any period, and put forward reasonable suggestions on the consumption of bills[3].

3.2. Technical realization of the platform
3.2.1. System overall design. The construction goal of this project is mainly to meet the business needs of power supply enterprises to issue e-invoice. The overall scheme includes two parts. The e-invoice service application is the first level deployment of headquarters, the second level deployment of provincial (municipal) companies, and the VAT invoice system is the second level deployment of provincial (Municipal) companies. The overall design of the system is shown in Figure 1.
3.2.2. System architecture design. On the basis of ensuring the safe and stable operation of the system, the resources should be reasonably planned, and the software, hardware and space resources of the information system should be efficiently utilized according to the actual situation and construction needs of the provincial (municipal) company. At the same time, the resource interface should be reserved for the deepening application and improvement of the business system, so as to improve the practicability, agility and scalability of the system. The system architecture design is shown in Figure 2[4].

3.3. Business process and data acquisition
3.3.1. Business hall billing. Before the electronic invoice is issued, it is necessary to check the customer's transaction information to see whether the bill is settled. The settled user can obtain the invoice issuing information. According to the business content, the marketing system pushes the
receivable data to the secondary e-invoice service application after price tax separation according to the matching tax rate. The secondary e-invoice service application converts the receivable data into invoice data and then pushes it to the VAT invoice system for invoice processing. The invoice metadata is submitted to the primary e-invoice service application and returns the format file information. The business rotation diagram is shown in Figure 3[5].

Figure 3. Business hall billing

3.3.2. Channel side billing. Before the electronic invoice is issued, it is necessary to check the customer's transaction information to see whether the bill is settled. The settled user can obtain the invoice issuing information. According to the business content, the marketing system pushes the receivable data to the secondary e-invoice service application after price tax separation according to the matching tax rate. The secondary e-invoice service application converts the receivable data into invoice data and then pushes it to the VAT invoice system for invoice processing. The invoice metadata is submitted to the primary e-invoice service application and returns the format file information. The business rotation diagram is shown in Figure 3.

Figure 4. Channel side billing
4. Application and effect evaluation of information system

4.1. Application of information system
The application scope of electronic invoice management platform is 27 provincial electric power companies, which realizes the full coverage of electronic invoice business. In 2020, power supply enterprises will issue 150 million electronic invoices of electricity charges, with a total amount of 246.1 billion yuan.

The application of e-invoice management platform meets the needs of power supply enterprises to issue e-invoice, and realizes the paperless electronic monitoring of the whole process of invoice online application, issuance, verification, query, storage and management. At the same time, the application analysis of electronic invoice information in data statistics, tax statistics, billing business and other aspects provides support for business innovation, risk analysis and other applications for the business departments of the provincial company, opens up the financial data channel, and provides data basis for sales analysis.

4.2. Application effect of information system
Since the electronic invoice management platform has been put into operation, the function of each module is applied well, and the system runs stably. On the one hand, it improves the convenience of use and optimizes the customer experience. E-invoice can be pushed to customers through SMS, email, wechat and other ways, and can be issued anytime and anywhere. It does not have to go to the power business hall, so it is easy to store and keep. On the other hand, it reduces the operating cost and resource consumption. It is estimated that the average comprehensive cost of each paper invoice can reach 1.6 yuan. After 27 provincial power companies apply the electronic invoice management platform, they will save at least 240 million yuan for the industry in 2020.

5. Conclusion
Electronic invoice is the product of the information age. The promotion of the electric invoice business of power supply enterprises is an important part of implementing the Internet plus tax action plan, and also facilitates users to get and print electronic invoices in a timely manner through the Internet, and improves the efficiency and service image of the business hall[6]. This paper studies the design and implementation of the electronic invoice management platform for power supply enterprises. Through in-depth analysis and design of the functional structure of the system, this paper expounds the design idea of the system implementation from two aspects of the overall architecture and physical architecture, and intuitively displays the business process. The construction and application of electronic invoice management platform realizes the real-time intercommunication of business, financial and tax invoice systems, which is of great significance for accelerating bill circulation, reducing bill management cost, improving service level of power supply enterprises, and better supporting business development of the company.

Reference
[1] Zhiyong Zhang, Lei Cai. (2018) Electronic invoice helps "Internet plus tax". J. China management accounting, pp.60-67.
[2] Liming Xiong. (2017) Research on the electronic invoice of power supply enterprises. J. Tax payment., 35.
[3] Wei Shuai. (2019) Analysis on the full implementation of VAT electronic general invoice. J. China chief accountant, 136-137.
[4] Linsen Liang. (2018) Design and implementation of marketing electronic invoice system for power supply enterprises. J. Information and computer (theoretical Edition), pp. 117-120.
[5] Tao Li, Xiaoping Du, Xiaoyuan Du, Mingzhe He. (2019) Based on the "Internet plus" invoice integrated management platform. J. Journal of State Grid Technology Institute, 22:48-51.
[6] Peipei Cao. (2019) Post evaluation and Prospect of e-invoice application. J. Accounting learning, 165-167.