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Abstract. This article mainly explores the application of C# software for modeling the contract drafting stage of power enterprises. Through a user-friendly operating interface, the content that needs to be edited in the contract text is imported into the corresponding part of the contract text template. Editable intelligent software is used to maximize compression of work time, comprehensively improve the efficiency and accuracy of power enterprise contract management work, focus on work goals to improve the quality of contract editing and review management work, and optimize the contract management system. This approach deepens the digital transformation of contract management, efficiently connects the front-end and back-end management software of enterprises, and has broad prospects for promotion and application.

Keywords: Contract Management, Modeling, Digital Transformation.

1 Introduction

Contract management is an important part of daily management work for power enterprises. Compared with other industries, the types of contracts in power enterprises have certain professionalism and particularities. Due to the large management scope, wide range of involvement, and large number of contracts signed throughout the year, process modeling can be carried out for necessary links in daily contract management work to improve work efficiency, reduce error rates, and further improve standardized management to meet the increasingly rigorous requirements of internal control management and external auditing.

2 Current Status of Contract Management in Power Enterprises

As a basic livelihood industry of the country, power is an important guarantee for social stability. To enhance the competitiveness of power enterprises, it is required to transform towards digitalization and intelligence and improve contract management level.
First, it is necessary to improve the basic work of contract management[1]. The process flow chart of contract management in power enterprises is shown in Figure 1. It can be seen from this mind map that the contract management process of power enterprises generally has 8 main contents. Through comprehensive analysis and years of work experience, among them, the contract text drafting process in the contract text drafting, approval and signing stage is the basic work in contract management. However, traditional general text editing tools cannot provide an ideal error prevention and correction mechanism[2]. Therefore, this process can be optimized through modeling to balance the quality and efficiency of contract editing and review work.

![Power enterprise contract management process mind map](Fig. 1. Process Flow Chart of Contract Management in Power Enterprises)

Taking the contract statistics data of a power enterprise from 2019 to 2023 as an example, as shown in Figure 2, it can be seen that the main contracts (excluding material procurement) of power enterprises are project contracts and technical service contracts, accounting for 84% to 94% in the past 5 years. Therefore, if the drafting stage of these two types of contracts is modeled, it will effectively improve the efficiency of the basic work of contract management.
3 Modeling of Contract Text Drafting Stage

This article models the process in the daily contract management work of power enterprises, taking the project contract commonly used in daily management of power enterprises as an example. The main contents of the modeling include:

### 3.1 Drafting Contract Text Template

Standardized contract drafting and review is an important way to ensure the quality and validity of contracts. Enterprises should establish a sound contract drafting and review system to ensure the standardization and uniformity of contract content, format and clauses, and avoid contract disputes caused by problems such as non-standard contract format, ambiguous clauses, and unclear expressions[3]. Through years of operation, power enterprises have accumulated a wealth of experience and established an internal contract review system and standardized contract approval process to ensure the integrity, enforceability and legality of contracts.

Currently, power enterprises can model according to their own common contract types based on their own situations. This process is mainly completed by contract management personnel and legal personnel with rich experience and strong professional capabilities, to ensure that the clauses in the contract template comply with the requirements of relevant national laws and regulations such as the Civil Code of the People's Republic of China and the internal management system of the power enterprise, ensuring the legality and compliance of the contract template. At the same time, the content...
that needs to be edited in the contract template is marked, as shown in Figure 3, where the highlighted part is the marked content that needs to be edited. The specific content of the clauses in the contract is formulated by each enterprise and is not listed in this article.

![Fig. 3. Modeling of Project Contract Text](image)

3.2 Preparing Pre-edited Contract List

After modeling the contract text, the content that needs to be edited in the contract text is focused on and summarized. For project contracts, the main content that needs to be edited generally includes: contract name, contracting scope, party B unit, commencement date, completion date, contract amount, responsible persons of both parties, tax rate, acceptance and payment method, person in charge of party B, communication address, zip code, telephone number, etc. An Excel database is used to establish a pre-edited contract list, as shown in Figure 4.
3.3 One-click Generation of Contract Text

C# software is used for specific program development to import the content that needs to be edited in the pre-edited contract list into the corresponding positions in the project contract template, and batch generation of contracts can be achieved by one-click replacement. C# software is an object-oriented programming language derived from C and C++ released by Microsoft. Combined with the most commonly used Excel and Word software in daily contract management work, the pre-edited contract list edited in Excel serves as the input, and the contract template drafted in Word serves as the output. The main function is to read the content that needs to be edited from the corresponding cells in the Excel file and fill them into the corresponding positions in the Word document template. For the tax-inclusive price and tax rate in the contract, the program can directly calculate the tax-exclusive price of the contract and generate the corresponding uppercase amount. The file name of the one-click generated contract text will also be automatically generated, without the need for editing or replacement. The main workflow is shown in Figure 5.

![Fig. 4. Pre-edited Contract List](image)

![Fig. 5. Software Workflow](image)

3.4 Automatic Numbering and Encryption of Contract Text after Internal Approval

Based on the internal management requirements of power enterprises, the drafted contract text needs to be approved by relevant personnel in the legal affairs system, and after the approval is completed, it will be automatically assigned a contract number by
the legal affairs system before it can be finally signed. Therefore, each contract text still has a process of automatically adding a contract number and encrypting the contract, which is also achieved through C# program editing to batch number and encrypt the contract text or add watermarks to complete the signing of the final version of the contract text.

4 Key Technologies of Contract Text Modeling

4.1 Paragraph Title Numbering Structure Extraction Technology

By analyzing the structure and clause numbering rules of the contract document, regular expressions are designed to extract the outline structure and determine whether the input part belongs to the body or title of the document. Factors such as retaining automatic numbering in the template, considering paragraph position, are taken into account to identify the heading numbering structure of different types of contracts. The correct text or numbers are inserted from the pre-edited contract list to ensure the correct output of the template.

4.2 Automatic Information Recognition and Update

Identify clause references and locate dates, Arabic numerals, and Chinese uppercase amounts. Through comprehensive statistics, analysis, and text structure conversion, redundant items are removed, and strong type recognition and update conversion are performed through C# to re-output in the required standard form, as shown in Table 1.

Table 1. Key Technologies and Corresponding Functions for Automatic Information Recognition and Update

<table>
<thead>
<tr>
<th>Method Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NumToDate(string x)</td>
<td>Converts a string (x) representing a date to the &quot;yyyy year m month d day&quot; format. If the conversion fails, &quot;date error&quot; will be appended to path_prefix.</td>
</tr>
<tr>
<td>NumToChinese(decimal number)</td>
<td>Convert decimal numbers to Chinese representation. It handles integer and decimal parts, as well as negative numbers. The result is a string containing Chinese characters representing the currency value.</td>
</tr>
<tr>
<td>MoneyToUpper(string LowerMoney)</td>
<td>Converts a currency amount (in string format) to uppercase Chinese representation. It takes into account integer and decimal parts, adds the appropriate Chinese characters to represent numbers, units and separators, and also handles negative numbers.</td>
</tr>
</tbody>
</table>

Note: The provided code mixes English and Chinese variable names and comments.
4.3 Marked Template to Standardized Input/Output Technology

The content in the marked template is located, and a standardized contract template is generated. By automatically identifying the number of rows in the table, content items and categories that match the working table that is directly filled in are generated, and redundant table rows are deleted, simplifying user input and supporting simultaneous asynchronous processing and unified output file for different files and different parts of documents. Part of the main programming content of this program is shown in Figure 6.

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Diagnostics;
using System.Drawing;
using System.IO;
using System.Text;
using System.Text.RegularExpressions;
using System.Threading.Tasks;
using System.Windows.Forms;
using OfficeOpenXml;
using Spire.Doc;
using Spire.Doc.Documents;
namespace Excel_word;
public class Form1 : Form
{
    private string path_prefix;
    private Button button;
    private IFolder components = null;
    private TextBox textBox;
    private Button button2;
    private Button button4;
    private Button button5;
    private Button button6;
    public Form1()
    {
        InitializeComponent();
        public static string MoneyToUpper(string LowerMoney)
        {
            string text = null;
            bool flag = false;
            if (LowerMoney.Trim().SubString(0, 1) == '·')
            {
                LowerMoney = LowerMoney.Trim().Remove(0, 1);
                flag = true;
                }
            string text2 = null;
            string text3 = null;
            string text4 = null;
            int num = 0;
            LowerMoney = Math.Round(double.Parse(LowerMoney), 2).ToString();
            if ((LowerMoney.IndexOf('.') > 0)
            {
                if (LowerMoney.IndexOf('.') == LowerMoney.Length - 2)
                {
                    LowerMoney = "0";
                }
            }
            else
            {
                LowerMoney = "0.0";
                }
            };
```

Fig. 6. Screenshot of Main Program Developed Using C# Software

4.4 Technology for Converting Revised Contract to Standard Contract Template

Inherit requirements between versions of the same month. Use the stored path prefix and set multiple private fields, such as contract-related fields (contract name, party B unit, commencement date, etc.) and other auxiliary fields for generating file names, to ensure consistency between documents of different months for subsequent file updates and retrievals.

5 Advantages of Contract Text Modeling

The program developed using C# software can match contract texts under different contract templates, and by adjusting the input content that needs to be edited in the pre-edited contract list, it can be flexibly applied to the needs of different enterprises and
different types of contracts. The main advantages of batch generating contracts through this software are:

5.1 Improving Contract Drafting Efficiency

Based on the existing template, after marking the content that needs to be edited in the contract template, when drafting the contract, contract management personnel only need to input the text in the content that needs to be edited in the pre-edited contract list. Each piece of content only needs to be input once, without the need to replace and edit repeatedly appearing content, greatly saving the time for drafting the contract text and subsequent inspection and verification. Generally speaking, based on a general text editing tool, it takes at least 10 minutes to draft an initial draft of a project contract text, while using this software only requires inputting one line of content that needs to be edited, generally taking only 3 minutes, reducing the time by more than 70%. Especially when a large number of new contracts need to be signed, this software can effectively improve work efficiency.

5.2 Effectively Reducing Error Rates

Figure 7 shows the statistics of the number of errors in the initial draft from 2019 to 2023. The vertical axis represents the number of errors. In 2019 and 2020, there were errors caused by incorrect amounts (mainly uppercase conversion and calculation of tax-exclusive amounts) and omissions in replacement, which needed to be checked repeatedly or detected in the contract approval stage, and these two categories accounted for more than 85% of the errors in the initial draft. Starting from 2021, this program was used for one-click replacement, and it can be seen that from 2021 to 2023, the number of errors related to contract amounts and replacement omissions dropped to 0. As long as all the content entered in the Excel pre-edited contract list is correct, contract management personnel can avoid all errors related to amounts and replacements, controlling the overall error rate of the initial contract draft to within 1%, greatly improving the accuracy of contract editing work and effectively reducing the error rate of the initial contract draft, comprehensively enhancing the quality of contract preparation[4].
5.3 **Strengthening Standardized Contract Management**

Due to the optimization of the contract drafting process, for standardized contract management work, the contract template can be adjusted in a timely manner to ensure that subsequent contracts are executed in accordance with the latest template. For example: after revision of the company's internal system, the contract template can be modified according to the revised requirements; when the Contract Law was adjusted to the Civil Code, only the original template needs to be modified to complete all subsequent modifications after contract generation.

5.4 **Improving the Flexibility of Contract Management**

Through efficient use of the pre-edited contract list, the content that needs to be edited can be adjusted flexibly according to needs to adapt to multiple versions of contract templates. For different types of contracts, only the content that needs to be edited and input in the contract template needs to be marked, and then the input content in the pre-edited contract list can be adjusted, followed by minor adjustments to the program to complete the corresponding adaptation program. At the same time, based on the pre-edited contract list, different types of contract management software can be generated, facilitating the classification management, amount statistics, year-end settlement, etc. of contracts, and there are broad derivative applications to be developed.
6 Application Prospects of Process Modeling

6.1 First Phase of Application

The first phase of process modeling application is in the contract text drafting stage, relying on the pre-edited contract list to achieve one-click batch drafting and generation of the contract text initial draft. The author of this article has applied it in practice for 3 years. During the application process, various problems encountered were continuously improved, and the issues that occurred during the application process have been modified. The errors related to amount switching and replacement omissions in the initial contract draft have been completely solved, and these two types of errors have not occurred in the past 3 years. Currently, the first phase of application is relatively mature and has the prospect of further promotion.

6.2 Second Phase of Application

The first phase of process modeling application can be combined with the enterprise's internal approval software, that is, to directly apply this software in the enterprise's contract approval stage. The contract drafting personnel edit the pre-edited contract list and then import it into the enterprise's contract approval software. Subsequently, the approving personnel only need to approve the content in the pre-edited contract list. After the approval is completed, the contract drafting personnel can automatically generate the contract text with the enterprise's internal contract number through the internal approval software, complete electronic stamping, and one-click generate and export the final version of the contract text.

6.3 Third Phase of Application

The third phase of process modeling application is based on the second phase, directly combined with the demand and procurement end. The pre-edited contract list is decomposed and filled in, and corresponding permissions are set for each stage. When the demand department submits the demand, the contract name, contracting scope, commencement date, completion date, and party A's responsible person are filled in the pre-edited contract list. After procurement, the procurement personnel fill in the contract amount, tax rate, etc. In the contract drafting stage, the contract drafting personnel fill in party B's responsible person, acceptance and payment method, etc., and verify and modify all previous stages. After the contract has completed internal approval, the approved pre-edited contract list is exported. In this way, one software can complete processes 2 to 5 in Figure 1, greatly improving the original work efficiency. At the same time, by reasonably using this program in combination with financial management and other systems, a contract management database and contract management information system[5] can also be established, relying on various capital expenditure projects and annual maintenance contract lists of enterprises as the basic framework, and using big data to strengthen the contract management mechanism to achieve full life cycle management of contracts[6]. In this way, an industry contract management database can be
established to enable comparisons with similar types of contracts, allowing enterprises to rapidly conduct in-depth analysis and research on the current situation and future expectations through big data[7]. The application prospects of process modeling are shown in Figure 8.

Fig. 8. Application Prospects of Process Modeling

7 Conclusion

The framework of contract management in power enterprises is not an overnight process but a systematic and long-term one[8]. Process modeling of the contract drafting stage can achieve a balance between the quality and efficiency of contract editing and review work, which is an inevitable path for the digital transformation of contract management in power enterprises[9]. Relying on this software, work processes can be further standardized, software functions can be made more intelligent, and divergent thinking can be expanded through mind maps to derive more usage functions, such as: relying on the pre-edited contract list to form a contract ledger after completing the subsequent contract execution, automatically importing it into the enterprise's digital file repository after completion, continuously improving the contract management and supervision system of power enterprises, and establishing a large database within the enterprise and among various enterprises in the industry for data comparison to scientifically control the operating costs of enterprises and further improve the overall management level. Power enterprises should actively learn from and continuously pay attention to
the optimization and improvement of domestic and foreign contract management regulations and systems[10], guide the integration of various contract management processes with the production practices of enterprises, give full play to the role of contract management, and enhance international competitiveness.

References


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