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Trends, Problems and Countermeasures of China's Bank-Enterprise Electronic Reconciliation under the New Situation

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Abstract: ***In recent years, against the backdrop of "data, intelligence, mobility and cloud computing", big data and blockchain technologies have developed rapidly, and DeepSeek technology is on the rise. In China, the use of electronic software and programs for in bank-enterprise reconciliation is no longer a novelty. However, the latest programming languages, such as PYTHON, which are object-oriented programming software, are easy to learn, understand and use when applied to Bank-Enterprise electronic reconciliation. But many new physical accounts have enabled more features, which poses a challenge to AI for fully automated reconciliation. Starting from discussing the new trends and problems in bank-enterprise electronic reconciliation under the new situation, this article analyzes the key and difficult points of electronic reconciliation and further puts forward corresponding countermeasures in great detail, hoping to provide some inspiration for the electronic reconciliation work of enterprises and commercial banks across the country.***

Keywords: Bank-enterprise electronic reconciliation, Trends, Problems, Countermeasures**.**

1. Introduction

Electronic reconciliation between businesses and banks has been around for nearly 40 years since its attempts in the 1990s. But more complex accounts and scenarios keep emerging. This cycle of "the better the way, the better the devil" seems to have no end. From warehouse reconciliation software, shop reconciliation software to accounts receivable and payable software, these electronic reconciliation software are quite mature. The most difficult electronic reconciliation programs or software to develop are always used to deal with and handle the account reconciliation problems of banks or enterprises with massive amounts of data. At present, finance personnel who is responsible for electronic reconciliation in various enterprises and commercial banks are communicating and coordinating with AI and computer product manufacturers to overcome various difficulties and move towards the trend of 100% AI automation by enhancing computing power and functions.

2. Trends and Problems of Electronic Reconciliation in the New Situation

2.1 The Reconciliation Software is Highly Targeted. There is no Universal Version of the Electronic Reconciliation Software

Previously, accounts were generally divided into payment accounts, receiving accounts and normal accounts (which can both pay and receive money). Receiving accounts are generally used only for collecting customers' payments, such as the accounts used by merchants which specifically for collecting margin or accounts specifically for collecting receivables. For such accounts, the financial staff or the electronic reconciliation software only check the cash inflows and income account entries, and the remaining outstanding items on the reconciliation statement are the cash inflows receivables which have not yet been recorded.

Likewise, payment accounts are generally used only for payments, such as the account used by a merchant for credit first and then payment at the end of the month. But the payment of a payment account must come from the settlement funds that the enterprise has deposited in advance, which is reflected in the direction of income. It can either be paid in installments, that is, deposited as much as is paid, or a large amount can be deposited in one lump sum, paid gradually, and added when not enough. In the reconciliation of such accounts, the ultimate goal of manual or electronic reconciliation is to ensure the accuracy of the outstanding items (unpaid).

A normal account here means an account with all the functions of receiving and paying, which can both receive and pay, and also accept the return of unsuccessful payments. When using electronic reconciliation for such accounts, as in the Balance reconciliation Statement, there are four directions: "Received by the bank, not received by the unit", "Paid by the bank, not paid by the unit", "Received by the unit, not received by the bank" and "Paid by the unit, not paid by the bank". In fact, the so-called "not received" and "not paid" are not actually not received or paid by the unit or the bank, but one of them was not recorded, that is, not recorded in the income account or not recorded in the payment account by one of the two parties. That is to say, a normal physical account (as opposed to the zero-balance accounts opened by administrative and public institutions under the jurisdiction of provincial finances) can have outstanding items in all four directions as above mentioned. The most advanced electronic reconciliation software is programmed and packaged for normal physical accounts, capable of initializing, comparing, generating trial balance sheets and archiving.

To sum up, although there are many electronic reconciliation software available for free trial and purchase on the Internet. However, it is rare to find a universal version of the electronic reconciliation software that can be used for all the businesses and situations mentioned above in the country.

2.2 The Reconciliation Process is More Complicated and There are More Follow-up Work processes

The earliest Accounting law of China in the past stipulated that the reconciliation personnel of both the bank and the enterprise must obtain the statement of the current month at the beginning of the following month for reconciliation, and no later than the 14th of the following month to complete the reconciliation, prepare the reconciliation statement, and exchange signatures and seals for confirmation. Nowadays, there are special accounts opened by enterprises, and some enterprises' dedicated reconciliation personnel may have to reconcile accounts of more than ten accounts by themselves. On the other hand, commercial banks no longer mandate or must reconcile and confirm accounts with entities. For important accounts, more and more commercial banks are now using paper reconciles delivered in envelopes in practice. Another way is that the commercial banks can open their own online banking services system, allowing the reconciliation personnel of the relevant enterprises to log in these system and use the online banking function with portable tools such as U-Keys to complete electronic reconciliation online. But in reality, when commercial banks ask corporate personnel to fill out online electronic statements and confirm them by entering mobile phone verification codes, this model shifts all the financial risks of reconciliation to the enterprises while the banks protect themselves to the safest state. If the financial personnel of the enterprise do not fill in the outstanding items, the bank staff will not know at all and will not check it because almost all the responsibility transfer entirely to the enterprise.

It is precisely because the risks of reconciliation are almost entirely borne by the enterprise itself that the reconciliation workflow of the enterprise needs to be enriched and improved. First of all, reconciliation is the last internal control process of an enterprise after bookkeeping. If the person in charge of the final step and the last line of defense is not responsible, the economic interests of the enterprise are at risk when he or she subjectively fails to reconcile the wrong accounts or does not immediately request reversal, reinstatement and adjustment. Many onlookers believe that if the reconciliation is not done well, the balance of the reconciliation statement is incorrect; As long as the balances on the left and right sides of the reconciliation table are correct, the accounts will not be wrong. In fact, this is a completely wrong perception. Because in the balance sheet on both sides of the trial calculation, it may include duplicate entries, opposite directions accounting, equal amounts of items but the wrong items are crossed out, and the remaining outstanding items are also wrong, etc. These complex phenomena can only be well understood by the reconciliation accountants with long-term experience.

In addition, even after reconciling the accounts, generating the correct reconciliation statement is not enough. The first step is to ask the bookkeeping accountant to correct the wrong accounts. These errors mainly include: duplicate entries, entries in the wrong direction, bookkeeping and account switching, incorrect amounts, incorrect names of entities or individuals in the notes, etc. When requesting reversal and reinstatement, it is necessary to look up the original vouchers, take photos and make copies directly to the person who made the vouchers, and not to cause any bad influence on his or her fame. After the error is corrected, it is necessary to follow up to see whether the cash flow and balance have been reversed or not; and whether they have been recorded in the correct accounting period or not. After reversing the reconciliation statement, the correct reconciliation statement is finally filed electronically and in paper form.

For most listed companies and administrative institutions, the paper versions of the statements and reconciliation sheets at the end of each year must be bound and filed at the beginning of the following year. However, the annual audit for the accounting year should generally be completed by April of next year. Any type of audit will first invoke all of the auditee's bank statements and reconciliation statements. As a result, the reconciliation personnel of each auditee should, on the one hand, make copies and bind them in advance for reference; On the other hand, they should explain any figures, amounts and other information on the statements and reconciliation sheets to the auditors.

So, reconciliation work is a complete system today, and there are many related workflows to be completed after the reconciliation and the completion of the preparation reconciliation sheet.

2.3 Use AI in reconciliation is More Widespread and the Programming is More Complex and Difficult

There are several prerequisites for the wider use of AI in electronic reconciliation: First, with the development of AI technology, electronic reconciliation technology has become more advanced. From data mining to big data, then to BlockChain, till RPA (finance robots) and the DeepSeek we use now. We look at the wide application of many advanced technologies. The Bank-Enterprise electronic reconciliation is still need integrate data for comparison of data by using advanced software and procedures. "One-to-many, many-to-one, and many-to-many" is the three kinds of items comparisons on mathematic logic that were previously impossible to do automatically can now be easily accomplished by programs written in popular programming languages behind advanced software and programs. This saves a lot of effort from manual reconciliation. Second, with the continuous improvement of hardware such as computers and servers, super GPU with high computing power ensures the implementation of powerful algorithms. As is well known, the process of electronic reconciliation is a round after round of iterative comparison between data, and when a match of items between enterprise and bank is found, they are both cancelled out at the same time. The duration of this process depends on the target month, the number of transactions between the enterprise and the bank, and the total amount, due to the high demands placed on the electronic reconciliation software. At the same time, electronic reconciliation software is also demanding higher computer configuration for the enterprise's financial reconciliation personnel. If the computer configuration of the enterprise is insufficient, it may lead computer to freeze, go black or even burn out the CPU of it during the electronic software reconciliation process, causing serious losses. Thirdly, the computer skills of enterprise financial personnel are getting better and better, and their knowledge of AI and network is constantly increasing. More versatile talents who are proficient in both finance and computer science have taken on the role of enterprise financial reconciliation personnel, which makes communication between them and the designers and

programmers of electronic reconciliation software smoother, thus making the newly upgraded or newly developed electronic reconciliation software more practical and faster.

However, electronic reconciliation is lagging behind the demand for reconciliation.

3. Countermeasures for Improving the Efficiency and Effectiveness of Bank-Enterprise Electronic Reconciliation in the New Situation

3.1 Use Advanced Programming Platform and Languages to Program or Package Software

The earliest electronic reconciliation programs were generally based on the programming language VBA (Visual Basic for Application), a macro language based on Visual Basic, which was mainly used to extend the functionality of Microsoft Office applications to achieve automated tasks. It is because most corporate and bank electronic ledgers and electronic statements are stored and delivered in TXT text format or ECXEL table format that it is more convenient to write electronic reconciliation programs by using VBA. VBA makes it easier to change the format of Microsoft spreadsheets and WORD text, and it is quicker to dispatch data within tables and text. On the other hand, VBA's programming language and sentences is simple and easy to understand, and Chinese college students at the same time began to learn computational programming by learning this simple programming language during their school years.

Later, as many electronic statement files used for electronic reconciliation had to be downloaded from the bank's website, and at the same time, the enterprise's electronic subsidiary accounts also needed to be obtained from its financial system by enter on its Intranet. As a result, programming languages with powerful web capabilities naturally became the programming languages for electronic reconciliation software. The most prominent representative of this programming language is Java. It is an object-oriented programming language that not only absorbs the various advantages of C++, but also discards the difficult-to-understand concepts such as multiple inheritance and Pointers in C++. Therefore, it has two characteristics: being powerful and easy to use.

In recent years, Python stands out as an advanced programming language. It was invented by a Dutchman in 1990 and is a class of object-oriented programming languages. At present, Python is widely used in many fields. With powerful libraries such as Pandas (a module, which can dealt with all kinds of graphs) and Numpy (a module, which can process all kinds of mathematic problem), Python has become the preferred tool for data analysis and processing. Thanks to its excellent, easy-to-understand and learnable features, it not only enables electronic reconciliation software manufacturers to program easily, but also allows financial personnel to grasp the core of the algorithm after a simple understanding, so that they can participate in discussions and communications with electronic reconciliation programming engineers to jointly build the software, and eventually write programs that are useful, effective and practical.

On the other hand, now that the electronic reconciliation software is completed, it is no longer required, as in the past, to install a programming language platform on the computer, then open and run the software or mini-program, pop up Windows, import tables or fill in numbers step by step, complete comparisons and generate reconciliation tables. Nowadays, no matter what programming software is used to write the electronic reconciliation software, it has to be "packaged", that is, closed programming with various programming platforms as small software, and when opened and used, a GUI (Graphical User Interface) pops up, also known as the graphical user interface. It is a graphical display of the computer operation user interface.

With this interface, users can import the corresponding files and tables as required by the dialog box, select the accounting period, opening bank and so on, and finally click Start and just wait for the results (the automatic generation of the reconciliation table) in a few minutes, even in a few seconds.

3.2 Continuously Enrich the Work Content of Reconciliation Financial Personnel to Fit the Entire Reconciliation Process

The basic reconciliation process for financial personnel is:

Step 1: Obtain the original electronic files of the bank and the enterprise: one is the reconciliation statement of the previous month (It includes all the outstanding items of the past. If it is the first month for reconciliation, the reconciliation of the previous month must be initialized); Two is the bank statement (or subsidiary account) from the previous month; The third is the corporate bank deposit journal of the previous month.

Step 2: Import or uploaded electronic files into the electronic reconciliation software or mini-program. (The program automatically divides them into four directions/sections of the reconciliation table, namely the bank and enterprise's income and expenditure separation).

Step 3: Automatically adjust the format (unify the various data formats of the bank and the enterprise into the same format, standardizing to the original format such as txt or CSV, and also unify or standardize the different formats of the fields that need to be compared).

Step 4: Sort each record by amount (sorting can minimize the number of iterations for comparison in the program, thereby improving efficiency and reducing the pressure of computing power on software and hardware).

Step 5: Traverse the records of all parties for comparison, cancel out the matched items/entries based on pre-set conditions(reconciliation rules of time, amount, index fields and notes), and leave the remaining entries as outstanding items.

Step 6: Summarize and calculate the outstanding items in all four directions. After a trial balance, generate the Balance reconciliation statement (if unbalanced, prompt manual intervention, and proceed to the next round of reconciliation after the intervention).

Step 7: Display the Balance reconciliation sheet and provide print function, and then automatic archiving functions.

These are the basic steps and procedures for electronic reconciliation. However, the current account functions are constantly improving, and some previously undiscovered special issues can become obstacles to electronic reconciliation, requiring manual intervention by reconciliation personnel during the reconciliation process or after the electronic comparison is completed. The main steps are as follows:

First, when there are situations such as payment return/refund, bookkeeping and account switching, or direct bank deduction of handling fees in the bank account, it is generally necessary to interrupt the electronic reconciliation software or frame these figures and request manual follow-up or adjustment by hand.

Second, the current electronic reconciliation software has a combined amount reconciliation function, which is mainly used to deal with complex situations such as “one-to-many”, “many-to-many (for example, the sum of two transactions on the left column is equal to the sum of five transactions on the right column)” and “many-to-one”. When above situation brought about, the Electronic reconciliation software is usually designed to generate a caution to the reconciliation operator, requiring his or her manual confirmation in order to be safer and more accurate.

Thirdly, when the amount is negative (such as bookkeeping and account switching) or when imported from four directions, the two sides of the trial balance sheet become unbalanced. At this point, most electronic reconciliation software cannot start the reconciliation and instead waits for manual correction or termination.

In addition to the above three main situations, there may also be various problems such as encountering messy code and having incorrect voucher numbers entered manually. Therefore, for complex account reconciliation, enterprise financial reconciliation personnel will no longer be able to completely give up their control and wait for the results, but rather participate more in the human-machine interaction process to ensure the smooth completion of the reconciliation work.

For post-reconciliation work, as mentioned in the previous text, it may involve reversing the accounting errors, cooperating with various internal and external auditors, completing binding and filing, etc. Since these tasks are mostly paper-based archival work, there are also tasks that require high levels of professional competence and professional judgment, which cannot be accomplished by computer programming or electronic reconciliation software at present. However, the precise combination of human and electronic reconciliation software can reduce the workload by 90 percent.

3.3 Continuously Explore and Pursue Fully Automated Electronic Reconciliation in the Context of AI

3.3.1 The standardization of file formats and data formats needs to be automated with electronic reconciliation software Currently, many electronic reconciliation software do not have this function, but they provide modules that use a uniform format or clean data format into a uniform format. Enterprise users are required to perform a uniform operation and clean the original format of data before importing spreadsheets into the software for comparison. For example, convert the bank ledger from PDF format to TXT, and convert the enterprise EXCEL spreadsheet to TXT file, and then import them into the specified direction and path in the electronic reconciliation software.

This pattern takes up the company’s reconcilers and wastes their time, and is at the primary stage. The most advanced electronic reconciliation software can either automatically unify the file format or intelligently extract core values for direct comparison and iteration without unifying the file format.

On the other hand, the data formats of the various fields of a table used for reconciliation in the enterprise account and the bank account may also be different, such as one being text format and the other being numerical format. As a result, it also needs to be standardized into a certain format before starting the comparison. As with the unification of the file format mentioned above, advanced electronic reconciliation software should automatically recognize them and complete this standardization, rather than relying on the reconciliation personnel of the enterprise’s finance department.

3.3.2 The programming ideas for receiving accounts and payments accounts are different and need to be optimized.

1) Key points of receiving account reconciliation programming

For receiving accounts, it is generally difficult to find a unique index for reconciliation due to the different sources and methods of payment. For example, there are ways such as telegraphic transfer, corporate-corporate internet transfer, cash deposit, personal transfer, payment return/refund, etc. to get funds into the account. So the basis for comparing receipts in reconciliation is usually the name of the payer/individual in the remarks of the bank statement against the name of the payer/individual in the abstract of the enterprise income journal. As a result, there are some situations that make the comparison difficult:

One is that the bookkeeper of the enterprise mistypes the name of the entities or the name of the individual, for example, there is one or more typos;

The second is that bookkeepers use abbreviations of their entities, for example, “the People’s Republic of China” is abbreviated as “China”.

So, when writing electronic software programs, the following ideas can be used:

First, use the text similarity feature to prevent one or two characters from not matching. There are some special modules for several languages in PYTHON, which provide function for comparing the names’ text in the enterprise

account with those in the bank account to obtain a similarity (it transfers absolute value to relative number), and the enterprise itself can use it as a parameter. For example, if it is greater than or equal to 60%, it is considered a successful comparison (that is, they are the different names of the same entity), and it can be matched to cancel out the items on both sides.

Secondly, if the length of abbreviation is much less than the length of full name, a self-built library can be created, in which save same meaning items, such as "the People's Republic of China" = "China". This way, when the program encounters the pre-set matched data in the library, it can automatically single them out and confirm their consistency.

2) Key points of payment aacounting reconciliation programming

For payment account, it is difficult to reconciliation if cannot find a unique index (for example, businesses typically use payment voucher numbers as payment numbers because accounting record is prior to payment). On the one hand, the payment business is different from the collection business. Most businesses make payments in large quantities, small batches, and small amounts. As a result, most companies' payment accounts have the largest volume of transactions, which directly leads to a large amount of data reconciliation. On the other hand, the basic account of most enterprises is a payment account, including wage payments and contributions to the Five Insurances and Housing Fund (According to Chinese policy). As a result, the situation of payment accounts is getting more and more complicated. The main reconciliation difficulties:

One is that the bookkeeper inputs the wrong payment voucher number. For example, 6 is mistaken for 8. This leads to a false appearance where two different amount payments with only one common payment numbers. It is wrong, and the AI of reconciliation software must be confused and cannot go on the comparison.

The second is that the payment is returned due to various circumstances, such as the recipient's account number of an entity and account name being incorrect; The account is closed or not activated; The name of the other bank is incorrect, etc. When such returns occur, sometimes the bank system does not correspond the enterprise's payment voucher number in its subsidiary account, resulting in the inability of electronic reconciliation to follow up and the need for human intervention to confirm true information by analyzing the notes, time point, and so on.

Therefore, when writing the reconciliation program for payment accounts' reconciliation, the following should be done:

First, if the voucher number is wrong, we can check the same amount of different transactions. Then, the reconciliation software will lock them by frame or other ways, and prompt manual participation in reconciliation.

Second, when payment refunds occur, human intervention is requested based on the receipt cash flows. On the other hand, it is necessary for enterprise accountants to compare the payment information of old customers based on the previous succeed transactions on a regular basis: personal name or entity name, opening bank and its branch name, individual bank card number or entity's account number, etc. Thus, this measure can continuously reduce such refunds.

3.3.3 The work of comparing and generating reconciliation sheets may be further automated

On the basis of accounting visualization reform, the electronic financial statements and reconciliation sheets are also included into the scope of visualizing enterprise accounting vouchers. At present, in order to facilitate the management of enterprise accounting archives and accounting audits and post-event audits, most large enterprises have begun to implement the visualization of accounting vouchers. therefore, enterprise financial reconciliation personnel can take this as an opportunity to expand the scope of visualizing accounting vouchers from the original accounting bookkeeping vouchers and attachments to the statements (or subsidiary accounts) and balance reconciliation statements of the enterprise's various opening banks, etc. Once the company's bank statements (or subsidiary accounts) and reconciliation statements are visualized, they can be taken at any time for audit inquiry or sampling and verification. As a result, in the context of the rapid development of AI, more than 90 percent of the reconciliation work is fully automated, and the remaining manual collection of paper statements and reconciliation statements and binding procedures are minimal.

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