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Zuca, Marilena; Țînța, Alice

## Article

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## Provided in Cooperation with:

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*Reference:* Zuca, Marilena/Țînța, Alice (2018). The contribution of computer assisted auditing techniques (CAAT) and of the business intelligence instruments in financial audit. In: Academic journal of economic studies 4 (1), S. 183 - 191.

This Version is available at:

<http://hdl.handle.net/11159/1879>

## Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics  
Düsternbrooker Weg 120  
24105 Kiel (Germany)  
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)  
<https://www.zbw.eu/econis-archiv/>

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# The Contribution of Computer Assisted Auditing Techniques (CAAT) and of the Business Intelligence Instruments in Financial Audit

Marilena Zuca<sup>1</sup>, Alice Țința<sup>2</sup>

<sup>1,2</sup>Romanian-American University Bucharest, Romania, <sup>1</sup>E-mail: [marilena\\_zuca@yahoo.ro](mailto:marilena_zuca@yahoo.ro), <sup>2</sup>E-mail: [alicetinta@yahoo.com](mailto:alicetinta@yahoo.com)

**Abstract** *The process of selecting, analyzing and structuring the most relevant information is not an easy task for the financial auditor to look for the most appropriate tools. In the absence of information systems, the auditor together with the management will never get real-time information in order to make effective decisions. Business intelligence systems help to make decisions efficient and to increase productivity of the economic entity. Thus, generating correct, pertinent and actual information, that can be checked by the auditor and improved by the management.*

**Key words** Financial audit, CAAT, business intelligence systems, software for auditing, spreadsheets, audit evidence, opinion

**JEL Codes:** M42

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## 1. Introduction

The modern computerized environment, in which each audited entity carries on business, creates new opportunities but also new risks, additional rules for security, fairness and acceptable margin of error, thus permanently influencing the work of auditors. Increasing the complexity of accounting systems ERP (Enterprise Resource Planning) and the large volume of transactions currently underway have led to the ever-increasing replacement of classical, "manual" audit techniques, with modern computer-aided techniques, known by the name of CAAT (*Computer Assisted Audit Techniques*) (Stanciu *et al.*, 2009). The research is based on the general description of business intelligence solutions and computer assisted auditing techniques, supporting the need to use them in the context of general computerized evolution. Between tradition and modernity, the financial auditor has to make certain choices, with their advantages and disadvantages, with the risks specific to the use of general or specialized software applications in the field of financial audit.

## 2. Literature review

Today, in a computerized era, the need for the auditor to express an opinion based on real time appears, to the detriment of the classical, historical approach. The auditor should assess the quality of the information provided by the data systems, the pressures that come from both internal management and external stakeholders who feel the need to be informed in order to withstand the competitive environment. Audit Practice Regulation 1009 "Computer Based Auditing Techniques" is developed on the basis of the International Auditing Practice (ITC) 1009 "Computer Assisted Audit Techniques" (IASP) approved by the International Federation of Accountants (IFAC) at the 2001 edition.

*Computer assisted auditing techniques* can be defined as computer-based tools to improve the efficiency and effectiveness of the auditing process; thus, influencing a field that is still developing in the 21st century. These techniques include core office software, spreadsheets and word processors, as well as advanced software tools with smart tools for business, capable of performing statistical analysis, along with the development of software programs specialized in audit (Mangiuuc, 2011). In general terms, computer-assisted auditing techniques refer to any computer program used to improve the auditing process. In particular, it refers to data extraction and analysis software that contains *spreadsheets* (e.g. Excel), databases (e.g. Access), statistical analysis (e.g. SAS) etc.

The advantages of audit software systems include: independence from the audited system by using a *read-only copy* that cannot be influenced, the use of audit-specific methods such as sampling, production of software-specific documentation that can be included in the work of the auditor (Dobre and Turlea, 2013).

*The specialized audit software* can perform the following operations: questionnaires, data bedding, simple extractions, missing sequence identification, statistical analysis, calculations, duplicate transactions identification, pivot tables and cross tabulation. Other uses of computer assisted auditing techniques include:

- The ability to create electronic worksheets on a centralized database in which the auditor can coordinate current audits and access information from previous or similar projects. In addition, the auditor will be able to use a standardized audit report format, which improves the quality of workbooks;
- Detecting fraud by using tools that can identify unexpected or unexplained patterns in audited data. No matter how simple or intricate are the computer techniques used, data analysis offers many benefits in preventing and detecting fraud;
- Continuous monitoring as a constant process of gathering, analyzing and reporting entity data to identify business operational risk. Auditors have at their disposal a comprehensive data system while ensuring that the entity continuously monitors all computer systems on all transactions and applications.

### 3. Methodology of research

As a *method of scientific research*, the solution of the practical case that combines *quantitative and qualitative* research was chosen in order to achieve the proposed objectives. A case study is a *qualitative* method by definition, with a complex multilateral approach of a situation, process, concept, entity, with the purpose of obtaining the most complete picture of the entity. We can say that the case study presented is an *instrumental* one - because we have used it because research is necessary to verify (or illustrate) a theory. In this situation, the case is used more as a pretext, the center of gravity of the cognitive interest falls more on the confirmatory or illustrative function of the case than on its informative content.

The methodological approach in this study was largely based on the method of *document analysis* and, from this point of view, the research gave a consistent *quantitative* side: a series of financial documents of a considerable length, which we have organized and analyzed according to the principles of sampling selection technique through the tools provided by the spreadsheets. As a result of the analysis, we conclude that the main categories of users (auditors- academics and investors - financial directors) of the information provided by the financial audit report can have faster access and can benefit from increased transparency and accountability of the financial information presented using the means provided by the modern computing technique.

The opportunity to carry out this case study is explained precisely by the informational context.

How can we improve the application of sample selection techniques by using the most accessible commands in Excel spreadsheets? To answer this question, we organized the case study to pursue the following objectives:

- analyzing how the financial auditor saves time by correctly applying the tools provided by the spreadsheets;
- identifying the most accessible and comprehensible commands in the many commands available in the Excel spreadsheet interface;
- to match as accurately as possible, the required operations with the existing Excel commands, to achieve the most relevant results;
- ensuring that the transparency and comprehensibility of financial data are not affected and that the error level remains as low as possible.

These objectives are presented in Figure 1:

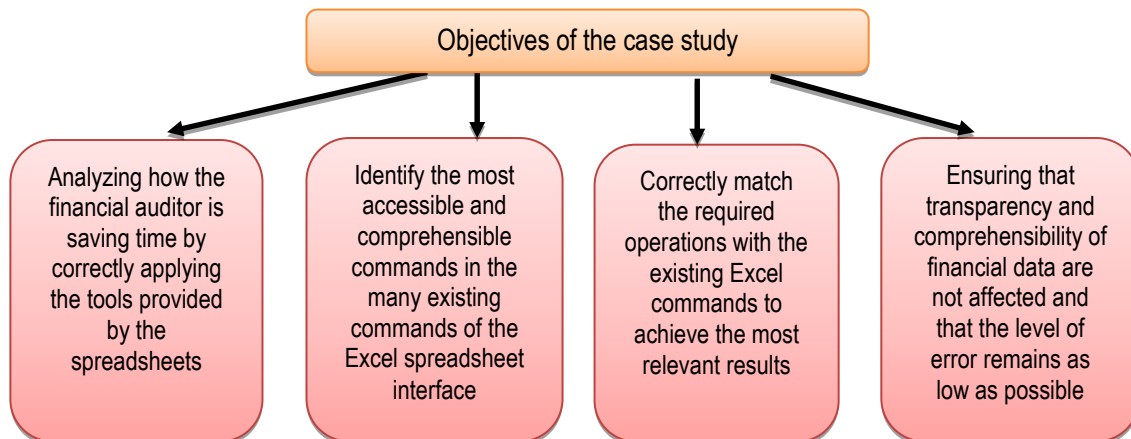


Figure 1. Objectives of the case study (own projection)

#### 4. The advantages of using computer assisted auditing techniques

When *computer-assisted auditing techniques* are used, the financial auditor finds that his work is improved and even more efficient, as he has many advantages over the traditional reviewing system. Of the benefits of using these techniques, we mention:

- Testing the customer's accounting program by making sure that the auditor can verify that it is working properly, as the volume of transactions *audited* is very large. The only effective way to test client programs is by using computer-assisted techniques;
- testing a large amount of data in a short time and with good accuracy, so that the auditor trusts his *opinion*;
- testing the data source by testing the accounting program and its records directly at source, by the auditor, rather than test paper documents that are supposed to be true copies;
- cost effectiveness because, once an audit software is implemented, it can be used annually to obtain audit evidence, provided that the audited entity does not regularly change its accounting program;
- comparing the results obtained using computer assisted techniques with the results of traditional tests. If similar results are achieved, the auditor's overall confidence will increase.

On the other hand, not only the financial auditor benefits, but rather the audited entity itself, which gains more certainty about the accuracy of transactions and the extent to which they are in line with existing policies. Constantly using automated transaction analysis and continuous monitoring, these techniques allow the testing and validation of critical data of the entity in an independent way, in real time.

The management of the audited entity may use this information to proactively identify exceptions and take immediate action to meet the standards. The implementation of these programs helps to increase confidence in the data underlying the financial reporting of the entity.

#### 5. Analysis of specific risks

When the auditor chooses his/her working tools, he/she must evaluate the following features: ease of use, ease of data extraction, ability to access a wide range of data files on different platforms, the ability to integrate data into a different format, the ability to define fields and select from standard formats, the functionality of the menu to process analysis commands, compile and modify simplified questionnaires. The traditional audit method allows auditors to arrive at a pertinent conclusion based on a limited population sample, but does not allow the examination of an exhaustive sample or even all available data. The use of small samples may reduce the effectiveness of the final conclusions, but the auditor argues that sampling is based on generally accepted auditing standards and then the sample will be statistically valid.

*Computer-assisted auditing techniques* solve this problem because they are able to analyze extended data volumes to identify errors. An audit based on these techniques will not examine a sample but *all transactions of the audited entity* during the audit period (Pedrosa and Costa, 2012). Then the auditor tests the data to identify possible anomalies - for example, they might find incorrectly registered tax codes by correlating with the national database or identifying transactions that are duplicated incorrectly. By identifying these possible issues, the auditor can address the management stating that he has tested 100% of the transactions and identified 100% of the anomalies.

Another great *advantage* of computer-assisted auditing techniques is that they allow the testing of specific risks. For example, when the auditor has to verify the invoices issued: by the traditional method, the auditor will randomly select a "statistically valid" sample of 100 invoices from different times during that audited period. Because the total number of invoices may exceed 3,000, there are very small chances that any probable errors will be detected in the selected sample. Instead, using computer-assisted techniques, the auditor can check all 3000 invoices and inevitably identify any existing errors. What do we prefer to say in an audit report? That "The Auditor reviewed 100 invoices and identified 5 inaccurate invoices" or that "the auditor used computer assisted techniques to review all invoices from the audited period, identifying 78 erroneous records"?

However, we must point out that analysis using these techniques is limited only to data saved on a systematic pattern. Unfortunately, few data are recorded and the available database is usually deficient, incomplete, difficult to access, or the auditor is not convinced by the integrity of the data. Therefore, at this time, *computer-assisted auditing techniques* are used together with other traditional techniques and tools. There are audits where computer-assisted techniques cannot be used, and audits that cannot be performed effectively and relevant without these techniques.

## 6. Specialized audit software

There are already various types of computer-based auditing programs, such as special package programs, which need to be adapted to each case by changing the format of the files that are to be interrogated, by indicating the required parameters and the shape of the desired result. In addition, the financial auditor also has programs designed for a particular purpose, special programs where it is not possible to adapt a bundled program because of the type of the computer, the way of processing or the way of organizing the chosen files. And last but not least, we have client utilities used to process data such as Excel for sorting and printing files.

*The Institute of Internal Auditors of the U.S.* conducted an analysis of audit software (*Management of IT Auditing*) and issued some key recommendations for the auditor in choosing the right tools for computer assisted techniques:

1. When establishing the mission, objectives, and priorities of an entity's audit: the auditor should consult the management on the main priorities of the audit engagement and how he can apply computer assisted auditing tools to carry out this mission as efficiently as possible;
2. Determining the type and extent of the audit: what is the stated objective of the audit? What questions will auditors ask and where will they stop the investigations? Finding answers to these questions is very important in order to decide exactly which *audit software* is best suited;
3. Assessing the entity's technological environment in the sense that the selected audit tools will have to work with the other already implemented software, hardware and networking systems. There are cases where the existing IT infrastructure could contain tools useful to the auditor, which he can use with other automated software tools for an improved effect.
4. Assessing the inevitable risks of any audit software so that the auditor is not in a position to draw erroneous conclusions or make assumptions contrary to the entity's operations.

*The audit software* has multiple uses in the financial auditor's activity, as follows:

- Verification of calculations: for example, the program indicates the total value of individual purchase records in the daily register over a given period. The auditor checks whether this total value corresponds to the records in the *General Ledger*;
- Identifying breaking the rules of an entity: for example, the program checks if there are customers who have a value greater than the standard limit;
- identifying anomalies: the program checks for customers who have received discounts greater than 50% or for which the balance in the *General Ledger* exceeds the total sales to that customer;
- making new calculations and analysis: for example, statistical analysis of stock movements to identify stocks with slow movement;
- selecting items for the audit: obtaining a stratified sample of sales from the *General Ledger* that was used as the basis for the debtors' rotation speed;
- Verifying the integrity of documents so that the auditor ensures that all documents have been properly recorded.
- Obviously, the financial auditor may have some difficulty in using auditing software:
- High implementing costs: the initial cost of deployment is high because it is necessary to investigate and understand the procedures used by the client before the audit software can be used to access and query those files;
- Changes are expensive in the sense that if the customer changes his system, then the audit software will require changes and these are not at all cheap;
- The mismatch with the simplified accounting software: the auditor is unlikely to be able to use appropriate audit software on a simplified accounting program.
- Because a simplified program does not provide complete information, it is very difficult for the auditor to identify all the procedures. It will be difficult to justify the cost of special audit software for testing these programs, considering the possible benefits of the audit or the cost recovery of this software:
- Stretching the investigations: the tendency to produce overly laborious, overly expensive investigation programs, where processing and reviewing takes too long. All this leads to an increase in the cost of the audit, without being able to justify its usefulness;
- Volume of results: finally, the results may be too high either due to poor design of the software or due to the use of some inappropriate parameters in a test. This way, the auditor will lose too much time to decide what is relevant in this volume of results;

- Client database: The audit program must run with an effective client database so that the auditor can test the customer's existing accounting system. Some clients may not allow auditors to run the auditing program directly on the actual files because they could corrupt their database. The alternative solution is for the auditing program to run on a backup copy of the actual database, provided that the copied files are identical to those in the client's database.

### 7. The solution provided by business intelligence systems and CAAT

At present, it is difficult to identify and sometimes apply the methods by which the *audit mission* is made more effective. Auditors use specific programs to conduct their audit, starting with obtaining auditing evidence. The auditor should obtain sufficient adequate audit evidence to make relevant conclusions, and this is done using various procedures and control tests. The timing of inspection, observation, investigation, confirmation, calculation and analytical procedures depend on how long the *audit evidence* is available.

The use of *CAAT and business intelligence systems* contributes significantly to reducing the time needed to obtain audit evidence as it provides fast, real-time access to audited data (Berberich, 2005). The process of identifying anomalies and exceptions is accelerated, leading to simplification of the audit work and even automatic generation of certain reports. Among the multitude of solutions offered by the computerized environment, we will analyze how spreadsheet technology works to facilitate the work of the financial auditor.

Although the technology of electronic *spreadsheet* has been widely spread and became very popular, being considered to be one of the first computer applications for the general public, the financial auditing practice has had a privileged place between the domains that use the spreadsheets, especially due to the almost perfect combination of the requirements of the audit work and the facilities offered by these IT applications. Most software programs specialized in financial auditing have their origins, more or less obvious, in spreadsheet applications. In fact, in many cases, there are tabular spreadsheets specialized in auditing models specific to auditing practice.

### 8. Case study using spreadsheets to identify anomalies

TENNIS S.R.L. is a company that mediates the sale of sports items, especially in the field of tennis - tennis rackets, balls, equipment. The merchandise is purchased from various vendors and then sold exclusively on the internet. The company sells about 200 kinds of tennis rackets, each identified by a unique product code.

Customers' orders are made directly online, most of them for a racket or two. The software that receives the orders automatically checks the order details, customer address, and credit card information before the merchandise is ready and shipped. The integrity of the command system is regularly checked by an independent Internet service company.

As an *external financial auditor* of TENNIS S.R.L., you have just begun planning the audit of the company's sales system. You've decided to use tests to verify the entry of customer data into the sales system. This test will include making false orders to the company's online system.

Here is a list of the types of tests that will be performed in the client's *financial statements audit* to confirm the accuracy and integrity of the entry of the data entered into the sales system:

- Enter an order for a negative number of tennis rackets. Reason: to ensure that the system only accepts a quantity expressed in positive numbers, although the company cannot deliver a negative product anyway;
- Enter an order for 10 tennis rackets. Reason: The system must perform a check to identify possible errors. A warning message should appear on the screen, requiring the client to confirm once more a command that exceeds a certain limit, for example, more than 2 rackets;
- Enter a command without completing the payment details. Reason: to make sure those orders are paid before the merchandise is shipped. This limits the number of bad payers;
- Enter a wrong article code. Reason: to make sure the system detects the wrong code and issues an error message rather than picking up a similar code and accepting the order;
- Enter incorrect data from the customer's credit card. Reason: to make sure the system detects the wrong data, so orders are paid before the goods are shipped. This limits the number of bad payers;
- Enter your customer's address in the wrong way. Reason: to ensure that the online system has access to a database of correct addresses and codes. Any error should display an error message. The merchandise will be shipped to a valid address.

*Audit tests* that can be programmed on TENNIS S.R.L.'s Audit Software for the Sales and Inventory System are the following:

- Checking the calculations from the daily sales situation. Reason: to ensure that the daily sales situation is properly implemented and checks the balance of the balance sheet;
- Analyzing the age of the commodity in the inventory register. Reason: to make sure that it detects old commodity, which must be recorded as a net inventory value, not as a sales price;
- Selecting an inventory sample at the end of the year as part of a physical inventory check. The reason: to compare the goods from an effective sample of goods registered as available in the online system and to faster examine it, compared to a manual system;
- Selecting a sample of invoices issued to verify your shipping documents. Reason: to analyze the integrity and accuracy of the documents recorded in an effective sample and to examine it more quickly than a manual system does;
- Verification of numbers on invoices. Reason: to make sure the chronological order of numbering and registration in the sales log is correct;
- Controlling receipts for all the invoices issued. The reason of the test: all orders are paid online, therefore unpaid invoices would be a violation of system rules and the auditor should investigate them;
- Checking the provision for the customers. Reason for the test: to identify why the merchandise is returned, as returns may be caused by errors in the control system. By investing in provisions, the auditor checks the system itself.

Below we will illustrate how the *spreadsheet* helps the financial auditor to identify duplicates of invoices issued to customers, a common practice in audit practice, as it responds to a situation where the auditor finds himself quite frequently: upon receipt of a large list (invoices issued), the *auditor* should ensure that there are no duplicate records (multiple accounting records of the same invoice). Even if duplicates are allowed (if several payments are recorded on the same invoice) it may be necessary to analyze in detail the cause of the duplication and the accuracy of the records.

	A	B	C	D	E	F	G	H	I	J	K
1	Facturi emise in 2013										
2	NrFact	DataFact	Societate	Valoare (lei)							
3	ABC1234	05.01.2013	SC AAA SRL	1488							
4	ABC1235	06.01.2013	SC AAB SRL	1181							
5	ABC1236	07.01.2013	SC ADA SRL	506							
6	ABC1237	08.01.2013	SC AEA SRL	1318							
7	ABC1238	09.01.2013	SC AAF SRL	1808							
8	ABC1239	10.01.2013	SC ASA SRL	749							
9	ABC1240	11.01.2013	SC AXA SRL	1042							
10	ABC1241	12.01.2013	SC AAV SRL	1992							
11	ABC1242	13.01.2013	SC AZA SRL	1976							
12	ABC1243	14.01.2013	SC AAR SRL	1277							
13	BBB2222	01.02.2013	SC BAB SRL	862							
14	ABC1237	02.02.2013	SC BSB SRL	1257							
15	BBB2224	03.02.2013	SC BQB SRL	1695							
16	BBB2225	04.02.2013	SC BXB SRL	1929							
17	BBB2226	05.02.2013	SC BCB SRL	1350							
18	BBB2227	06.02.2013	SC B2B SRL	669							
19	ABC1237	07.02.2013	SC BVB SRL	522							
20	BBB2229	08.02.2013	SC BZB SRL	911							
21	BBB2230	09.02.2013	SC BMB SRL	1314							
22	BBB2231	10.02.2013	SC BBX SRL	1159							
23	ABC1237	07.03.2013	SC CCC SRL	1926							
24	CCC3334	08.03.2013	SC CAC SRL	1071							
25	CCC3335	09.03.2013	SC CSS SRL	584							
26	CCC3336	10.03.2013	SC CDD SRL	608							
27	ABC1237	11.03.2013	SC CQC SRL	1537							
28	CCC3338	12.03.2013	SC CCE SRL	564							
29	CCC3339	13.03.2013	SC CEC SRL	1755							
30	CCC3340	14.03.2013	SC CXX SRL	1998							
31	CCC3341	15.03.2013	SC CZC SRL	1892							
32	CCC3342	16.03.2013	SC CAA SRL	1520							
33											

Figure 2. Details of the original data set (own projection)



Figure 2 presents the set of data containing the list of invoices issued during the period January - March 2013 by the audited entity, a set of data for which it is necessary to identify possible duplicates (invoices registered several times). As it can be seen, each invoice is accompanied by the name of the customer to whom it was issued and the total amount of the invoice.

The new features of the 2013 version of Microsoft Excel allow the duplicate records to be identified by a quick and simple method. This involves going through the following steps:

- Step 1 - selecting the cell range containing the invoice numbers (in this case from A3 to D32), followed by choosing the *Conditional Formatting* command from the *Home* menu section of the main menu. Within this command (which is also organized as a menu), select the *Highlight Cell Rules* option, then the *Duplicate Values* option. The command results in a dialog box through which the user can choose one of the highlighted variants (by choosing background color and text color). The whole process is presented systemically in Figure 3.

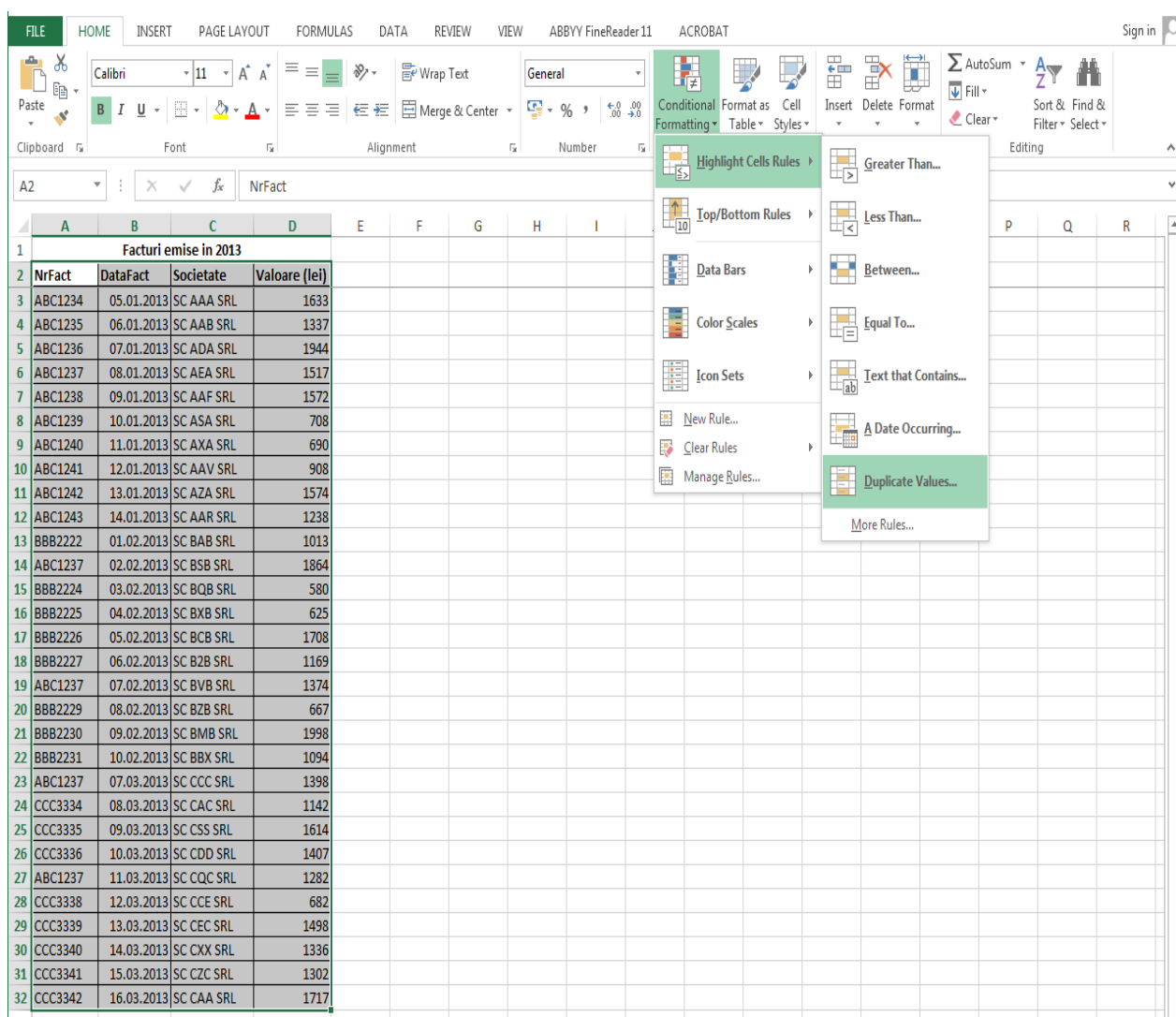


Figure 3. The first stage of the identification process (own projection)

- Step 2 - since the duplicate invoice numbers have been highlighted (by different colors), it is now only necessary to bring them to the top positions in the list so that the auditor does not have to go through the entire list in order to observe all suspicious records. Making this re-ordering, involves selecting one of the different colored cells from the list of invoice numbers (selecting a duplicate invoice number), followed by the *Sort* order option in the drop-down menu (right-click), and within it, selecting *Put Selected Font Color On Top* (places the first cells with this color). The process is synthetically presented in figure 4.



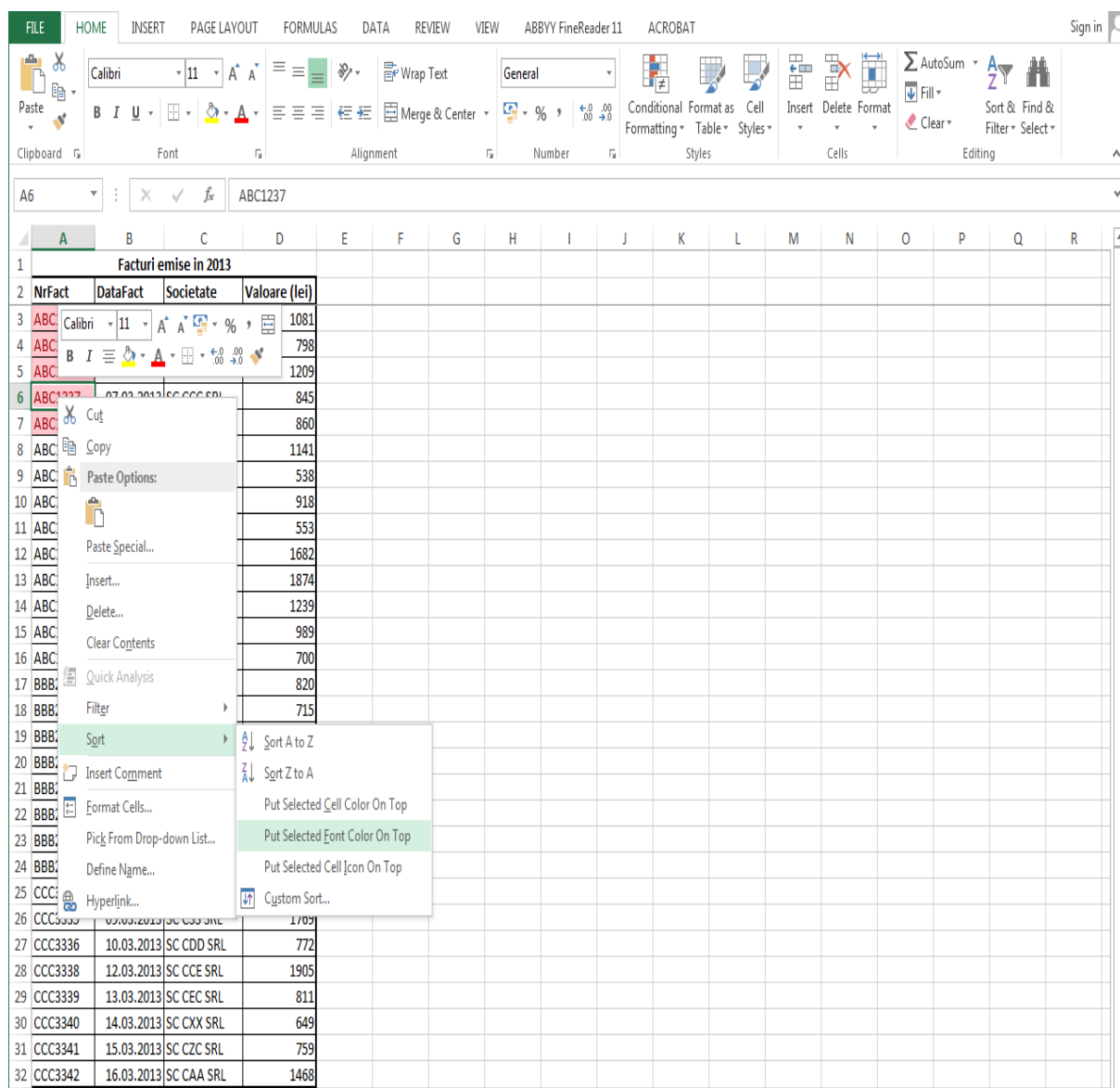


Figure 4. Second stage bringing duplicates on the first positions (own projection)

## 9. Conclusions

In the computerized modern age in which we live and work, financial auditors increasingly turn to *PC tools*, even special financial audit programs, in order to make their work more efficient, but especially to be able to formulate the most pertinent and secure *audit opinions*.

Most financial auditors use only the tools provided by the computer to perform the financial audit. The modern *computerized environment*, in which each audited entity carries on business, creates new *opportunities* but also new risks, additional rules for security, fairness and acceptable margin of error, thus permanently influencing the work of auditors.

When using *computer-assisted auditing techniques*, the auditor finds that his work is improved and much more efficient because he has many advantages over the traditional system of documentary and financial statement verification.

*Tabular spreadsheets* are the main tool provided by modern technology to facilitate the work of the financial auditor, from selecting representative samples to identifying anomalies.

The auditor must consider the *IT environment* in designing audit procedures to reduce the auditor's risk to a low, acceptable level, and the auditor's specific objectives do not change if the accounting data is processed manually or by computer.

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