Reflections on the Modification of the Paradigms of Processing the Accounting Information in an Interactive System

Traian Cristin Nicolae
„Ovidius" University of Constanta, Faculty of Economic Sciences, Romania
traian.nicolae.profesor@gmail.com

Abstract

The purpose of this paper is the brief exploration of the paradigms- models of accounting information processing. The classic paradigm of batch accounting, which has its origins in Luca Pacioli, is currently subject to the concerted assault of new technologies. We are witnessing a period of technological transformations and in the economic-legal environment with a major impact on accounting, the theory and practice of information systems of entity accounting. How could we describe the changes to the accounting of companies, entities? We are aware of the difficulties of penciling in the multiple trends that influence the organization of entity accounting. Accounting standardizers, public accounting regulatory bodies, accounting professionals, members of academic bodies in universities - we are all facing new perspectives of the development of Accounting, but also new challenges. The classic flows of the processing of identifiable data are transformed by the new provisions of the legal regulatory framework.

Key words: accountings paradigms, new technology
J.E.L. classification: M41, F60

1. Introduction

The widespread use of hard and soft information technology tools radically changes both the structuring of data flows and the way users perceive accounting information.

The users of the financial-accounting data generated by the accounting data processing systems and made aware of through the annual financial statements, currently have new possibilities of perceiving business development trends. (www.hyperledger.org)

We are in full swing of a set of interconnected processes regarding the development of the financial-accounting data processing processes and the amplification of the informational content of the summary accounting reports. (www.hyperledger.org)

2. Theoretical background

The existence of multiple processes regarding the development of summary accounting reports can be found in the phenomena of the activity of economic entities and in the space of legislative regulations. The abundance of accounting data sources involves a great deal of disparate, seemingly unrelated information. There is a growing trend to integrate intelligent processes in accounting applications (algorithms, mathematical models, artificial intelligence), based on high computing capabilities. A specific characteristic of these technologies is the inclusion in the analysis process of unstructured data in different formats (video, audio, geographic locations, smart devices, etc.). (www.hyperledger.org)

The financial-accounting algorithm is the programmed code that contains a series of accounting rules and formulas, which are executed in a certain order to accomplish a task specified by the users of the financial statements. Financial-accounting algorithms offer a new perspective on data, in which, with the help of complex computing techniques, accountants understand data, collected in increasingly large volumes and in increasingly varied forms: text, numbers, images, video, audio. (www.hyperledger.org)

The evolution of analysis methods has materialized in the development of analysis capabilities based on artificial intelligence (AI) algorithms. A typical AI algorithm analyzes its financial-accounting environment and takes actions that maximize its chances of success.

Artificial intelligence (AI) is the ability of computers to perform duties and tasks commonly associated with human intelligence in financial and accounting activities. In its broadest sense, AI includes any technology designed to mimic, in one way or another, the way human analysis of accounting input data works. AI technology learns, adapts to the surrounding conditions, by assimilating and processing information and storing it for use in other similar situations. (www.hyperledger.org)

Developing an algorithm to solve a financial-accounting problem is essentially equivalent to discovering a solution to the accounting problem. After identifying the accounting algorithm, the next step is to represent it in a form that can be communicated to a computing machine. The accounting algorithm must be transcribed from conceptual form into a clear set of instructions. These instructions must be represented in an unambiguous manner. In this field, studies are based on knowledge of grammar and language and have led to a wide variety of algorithm representation schemes (called programming languages), based on various approaches to the programming process (called programming paradigms). (www.hyperledger.org)

Along with the development of algorithms, various algorithm libraries appeared, some of them being open-source, and others owned by the companies that developed them.

Accounting data processing algorithms are customized according to the restrictions imposed on the entity's activity sector. (www.hyperledger.org)

3. Research methodology

The research methodology used in this article consists of empirically researching a set of accounting data available on the Internet and building models of accounting records.

The use of artificial intelligence systems to create profit-maximizing algorithms, together with elements of machine learning and algorithm optimization, can give companies a relevant competitive advantage that will allow them to create new products and services or improve existing ones. Profit maximization can be done, on the one hand, by reducing expenses, and on the other hand, by maximizing income. If expenses are an internal factor that is mostly under the company's control, revenues depend on a series of external factors that must be known, monitored and optimized. (www.hyperledger.org)

Several types of algorithms can be used in the process of analyzing external factors.

Matching algorithms are similar to ranking and recommendation algorithms, but they match buyers' desires with sellers' variables. (www.hyperledger.org)

Cross-merchandising algorithms promote a seller's other goods and services to a buyer based on the buyer's browsing history or preferences. (www.hyperledger.org)

Personalized pricing algorithms analyze consumer preferences to determine a personalized price for a specific good or service. (www.hyperledger.org)

Advertising algorithms are needed to create targeted advertising by providing personalized content and recommendations. (www.hyperledger.org)

Dynamic pricing algorithms analyze the price of the product compared to other similar products and change the price, dynamically adjust a seller's prices automatically in response to competitors' prices and changes in the market; in general, it is a repetitive process, which takes place between two limits - a minimum value and a maximum value of the price.

Price prediction algorithms are more complex algorithms that can be based on a predefined prediction model, e.g. regression analysis. In this case, the programmer chooses the factors relevant to sales, and the algorithm uses past observations to adjust the model to maximize revenue. In this case, the algorithm benefits from having a historical data set on which to test the parameters of its model to maximize returns. (www.hyperledger.org)

Sales forecasting algorithms are using past sales data, industry-wide comparisons, and economic trends, these algorithms can forecast sales results and help companies inform business decisions and predict short- and long-term performance. (www.hyperledger.org)

Predictive analytics use predictive algorithms and technologies such as Business Analytics to identify patterns, behaviors, exceptions, predict possible trends and estimate consumer behavior and preferences. (www.ziare.ro)

4. Findings

4.1. Synthetic review on the application of computer models in the accounting and financial information system

According to publicly available data, the implementation of digital transformation programs in the field of accounting is a business priority, starting in 2020. (www.hyperledger.org)

A computer-assisted audit is, in essence, a classic audit, which instead of employing users as testers, use software programs (research assistants), creating fake user accounts, or programmatically constructed traffic. While this obviously provides a great deal of control over the handling and collection of data, it also creates a number of difficulties. First, it involves spoofing: the researcher invents fake data and injects it into the platform, hoping that these fake accounts cannot be distinguished from real users. This can cause the same legal problems described above. However, it is also more likely that the fake data injection can be claimed as harmful by the vendor itself. The processes for obtaining a user account (as well as the information required) differ for each platform. An effective audit needs more tests and therefore it is necessary to create an audit software program to investigate a certain platform. This method is unlikely to produce enough data for a proper audit, especially if multiple variables need to be considered to properly understand how the algorithm works. (www.hyperledger.org)

General analysis of the results can be useful in solving some problems. In this approach, test data sets are created (either in a protected regulatory environment or using synthetic data) that can be used to assess whether the overall statistical results suggest that problems exist. For example, standard statistical evaluation techniques could be used to determine whether results or accuracy are different for specific subgroups of individuals, suggesting problems of fairness. This is particularly useful for static models, although it can be more difficult with continuous learning systems. (www.hyperledger.org)

The use of big data can bring significant gains to a business, which can translate into benefits for consumers, employees and society in general. Organizations can choose better strategies and allocate resources more efficiently. (www.hyperledger.org)

Data creates significant value for the economy, driving innovation, efficiency and productivity. The use of large volumes of data and the development of their analysis and processing capabilities have generated substantial benefits for businesses in the sense of streamlining the activity and improving the quality of services, for example, by improving the decision-making process, forecasting, predicting market trends and by allowing a more good segmentation and understanding of consumer needs. (www.hyperledger.org)

The use and management of big data affects many fields of activity, not only digital ones. Big data applications have demonstrated a high level of adaptability to the diverse requirements of the scientific and industrial fields in which they are used. big data influences the activity of entities, they being obliged to reconsider their organization and business processes taking into account the data they have and which could be transformed into a competitive advantage in the new market based on accounting information. (www.hyperledger.org)

The decision-making process is moving from a model based primarily on the experience of the decision-maker to one based on information. The use of big data offers a new perspective by improving the practices of analysis and predictive modeling, with a positive effect in the real-time decision-making process. By processing large data sets collected on existing or potential customers, businesses can tailor both their products/services to customer needs and their pricing strategies. The use of price algorithms also brings companies advantages related to cost reductions and/or revenue increases. Just as it helps companies increase their productivity, big data allows public administrations to improve their efficiency in managing their areas of interest, it helps global organizations analyze information for strategic planning. (www.hyperledger.org)

The use of big data solutions and the development of their analysis and processing capabilities have generated substantial benefits for businesses in the sense of streamlining the activity and improving the quality of services, these can be transferred to consumers, employees and society, in general the big data solution cannot be treated as a market itself, but represents a technology that can be implemented in almost any industry and has the capacity to significantly influence the operation of that industry. (www.hyperledger.org)

The use of digital platforms increases consumer choice, generates alternative business models, based on new technologies and access to the global market. The use of dynamic price algorithms brings advantages to companies, which adjust, in real time, the price level to changes in the demand/offer ratio, ensuring the rebalancing of demand and supply. The high level of transparency of retail markets, due to the possibility to compare prices on the Internet, has generated fiercer price competition, both online and offline, as well as an increase in the visibility of products/brands on the Internet, with beneficial effects on consumers while raising competition concerns related to tacit coordination or anti-competitive agreements. (www.hyperledger.org)

On the one hand, the use of big data technologies helps companies to increase their productivity, achieve increases in operational and transactional efficiency, allows public administrations to improve their efficiency in managing areas of interest, helps global organizations in analyzing information for the development of strategic planning. On the other hand, these technologies can raise competition issues by changing market dynamics, creating new barriers to market entry, thus offering players already present on the market a competitive advantage while increasing the risk of possible abuses dominant position. (www.bnr.ro)

4.2. A case study of multi-entry accounting for a set of bank transactions

Table no. 1 Transactions

Transactions	Textual description of the transactions
01.02.2024	The Super77 company purchases 10,000,000 Deposit units in transferable digital currency (DUTDC) on 01.02.2024 at the exchange rate of 1 DUTDC = 1 m.u. (monetary unit) (Nicolae, 2010).
01.02.2024	The sum is sent to the account of *Digital transfer control unit (DTCU).*
30.03.2024	The change in the exchange rate is registered 1 DUTDC = 1.2 m.u. The amount is updated in the account of Digital transfer control unit.
30.04.2024	The change in the exchange rate is registered 1 DUTDC = 1.3 m.u. The amount is updated in the account of Digital transfer control unit *(DTCU).*
31.05.2024	The change in the exchange rate is registered 1 DUTDC = 1.25 m.u. The amount is updated in the account of Digital transfer control unit *(DTCU).*
30.06.2024	The change in the exchange rate is registered 1 DUTDC = 1.4 m.u. The amount is updated in the account of Digital transfer control unit *(DTCU).*
31.07.2024	The change in the exchange rate is registered 1 DUTDC = 1.5 m.u. The amount is updated in the account of Digital transfer control unit *(DTCU)*
05.08.2024	The company sells the DUTDC - exchange rate is registered 1 DUTDC = 1.52 m.u. The sum is sent to the account of Digital transfer control unit *(DTCU).*

Note: Debit = D, Credit = C

Source: Case study data proposed by the author

Accounting data
(Accounting records made by the author)

Table no. 2 *Calculations at 01.02.2024*

Calculations
Purchase cost: 10,000,000 Deposit units in transferable digital currency (DUTDC) x 1 mu = 10,000,000 mu

Source: Calculations made by the author

Table no. 3 *Purchase of Deposit units in transferable digital currency (DUTDC) at 01.02.2024*

Account - D	**Account - C**	**Amount**
Deposit units in transferable digital currency (DUTDC)	*Available electronic money*	10,000,000

Source: Calculations and records made by the author

Table no. 4 The sum is sent to the account of Digital transfer control unit (DTCU) at 01.02.2024

Account - D	**Account - C**	**Amount**
Digital transfer control unit (DTCU)	*Deposit units in transferable digital currency - Mirror Account (DUTDC-MA)*	10,000,000

Source: Calculations and records made by the author

Table no. 5 *Calculations at 30.03.2024*

Calculations
Revenues of re-estimation = 10,000,000 Deposit units in transferable digital currency (DUTDC) x (1 – 1.2) = 2,000,000 mu

Source: Calculations made by the author

Table no. 6 Re-estimation of Deposit units in transferable digital currency (DUTDC) at 30.03.2024

Account - D	**Account - C**	**Amount**
Deposit units in transferable digital currency (DUTDC)	*Financial revenues - electronic currency*	2,000,000

Source: Calculations and records made by the author

Table no. 7 The sum is sent to the account of Digital transfer control unit (DTCU) at 30.03.2024

Account - D	**Account - C**	**Amount**
Digital transfer control unit (DTCU)	*Financial revenues - electronic currency Mirror Account*	2,000,000

Source: Calculations and records made by the author

Table no. 8 *Calculations at 30.04.2024*

Calculations
Revenues of re-estimation = 10,000,000 Deposit units in transferable digital currency (DUTDC) x (1.3 – 1.2) = 1,000,000 mu

Source: Calculations and records made by the author

Table no. 9 Re-estimation of Deposit units in transferable digital currency (DUTDC) at 30.04.2024

Account - D	**Account - C**	**Amount**
Deposit units in transferable digital currency (DUTDC)	*Financial revenues - electronic currency*	1,000,000

Source: Calculations and records made by the author

Table no. 10 Re-estimation is sent to the account of Digital transfer control unit (DTCU) at 30.04.2024

Account - D	Account - C	Amount
Digital transfer control unit (DTCU)	*Financial revenues - electronic currency Mirror Account*	1,000,000

Source: Calculations and records made by the author

Table no. 11 *Calculations at 31.05.2024*

Calculations
Cost of re-estimation = 10,000,000 Deposit units in transferable digital currency (DUTDC) x (1.3 – 1.25) = 500,000 mu

Source: Calculations and records made by the author

Table no. 12 Re-estimation of Deposit units in transferable digital currency (DUTDC) at 31.05.2024

Account - D	Account - C	Amount
Financial expenses - electronic currency	*Deposit units in transferable digital currency (DUTDC)*	500,000

Source: Calculations and records made by the author

Table no. 13 Re-estimation is sent to the account of Digital transfer control unit (DTCU) at 31.05.2024

Account - D	Account - C	Amount
Financial expenses - electronic currency Mirror Account	*Digital transfer control unit (DTCU)*	500,000

Source: Calculations and records made by the author

Table no. 14 *Calculations at 30.06.2024*

Calculations
Revenues of re-estimation = 10,000,000 Deposit units in transferable digital currency (DUTDC) x (1.4 – 1.25) = 1,500,000 mu

Source: Calculations and records made by the author

Table no. 15 Re-estimation of Deposit units in transferable digital currency (DUTDC) at 30.06.2024

Account - D	Account - C	Amount
Deposit units in transferable digital currency (DUTDC)	*Financial revenues - electronic currency*	1,500,000

Source: Calculations and records made by the author

Table no. 16 Re-estimation is sent to the account of Digital transfer control unit (DTCU) at 30.06.2024

Account - D	Account - C	Amount
Digital transfer control unit (DTCU)	*Financial revenues - electronic currency Mirror Account*	1,500,000

Source: Calculations and records made by the author

Table no. 17 Calculations at 31.07.2024

Calculations
Revenues of re-estimation = 10,000,000 Deposit units in transferable digital currency (DUTDC) x (1.5 – 1.4) = 1,000,000 mu

Source: Calculations and records made by the author

Table no. 18 Re-estimation of Deposit units in transferable digital currency (DUTDC) at 31.07.2024

Account - D	Account - C	Amount
Deposit units in transferable digital currency (DUTDC)	*Financial revenues - electronic currency*	1,000,000

Source: Calculations and records made by the author

Table no. 19 Re-estimation is sent to the account of Digital transfer control unit (DTCU) at 31.07.2024

Account - D	Account - C	Amount
Digital transfer control unit (DTCU)	*Financial revenues - electronic currency Mirror Account*	1,000,000

Source: Calculations and records made by the author

Table no. 20 *Calculations at 05.08.2024*

Calculations
Downloading the book value of *Deposit units in transferable digital currency (DUTDC)* = 10,000,000 *DUTDC* x 1.5 = 15,000,000 mu
Earnings from e-currency = 10,000,000 *DUTDC* x (1.52 – 1.5) = 200,000 mu
Total amount collected = 10,000,000 *DUTDC* x 1.52 = 15,200,000 mu

Source: Calculations made by the author

Table no. 21 Sale of Deposit units in transferable digital currency (DUTDC) at 05.08.2024

Account - D	Account - C	Amount
Available electronic money	*Deposit units in transferable digital currency (DUTDC)*	15,000,000
Available electronic money	*Earnings from Deposit units in transferable digital currency*	200,000

Source: Calculations and records made by the author

Table no. 22 The sale is sent to the account of Digital transfer control unit (DTCU) at 05.08.2024

Account - D	Account - C	Amount
Deposit units in transferable digital currency - Mirror Account (DUTDC- MA)	*Digital transfer control unit (DTCU)*	15,000,000
A Deposit units in transferable digital currency - Mirror Account (DUTDC- MA)	*Earnings from Deposit units in transferable digital currency Mirror Account*	200,000

Source: Calculations and records made by the author

5. Conclusions

Our brief analysis results in a set of ideas regarding the possibilities of digital processing of large volumes of accounting and financial data.

The use of big data solutions and the development of their analysis and processing capabilities in accounting have generated substantial benefits for entities in the sense of streamlining the activity and improving the quality of accounting data processing services, which can be transferred to users of financial statements. Big data systems are a technology that can be implemented in almost any accounting service industry. (www.hyperledger.org)

The use of digital platforms increases the choice of users of financial statements, generates alternative models of accounting, based on new technologies and access to the global market of accounting services. (www.hyperledger.org)

The use of dynamic accounting data processing algorithms brings advantages to the reporting entities, which adjust, in real time, the financial-accounting reports.

The high level of transparency of financial reporting, due to the possibility of accessing financial reporting, has generated an increase in the visibility of financial statements of entities on the Internet, with beneficial effects at the level of users. (www.hyperledger.org)

The use of BD technologies helps entities to increase their productivity, achieve increases in operational and transactional efficiency, allows public administrations to improve their efficiency in managing areas of interest, helps global organizations in analyzing information for the development of strategic planning.

6. References

- IASB (International Accounting Standards Board), 2011. *International Financial Reporting Standard 13 Fair Value Measurement*. [online] Available at: http://eifrs.ifrs.org
- IASB (International Accounting Standards Board), 2022. *International Financial Reporting Standards (IFRSs)*. [online] Available at: http://eifrs.ifrs.org
- * * * *Law of the Fiscal Code of Romania*
- Nicolae, T., 2010. *Standarde contabile [Accounting standards]*. Constanta: Ex Ponto Publishing House.
- Nicolae, T. C., 2015. *Contabilitate financiară aprofundată: caiet de studiu individidual: învățământ la distanță(ID) [Advanced financial accounting: individual study book for distance learning (DL)]*. Constanta: Ovidius University Press Publishing House.
- www.arbc.ro
- www.ziare.ro
- www.bnr.ro.
- www.hyperledger.org.
- www.insse.ro.