Trends in the Development of
Digitalized Paradigms of De-construction in Accounting

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Abstract

The purpose of this paper is the issue of the new paradigms applicable to the digitization of accounting - a set of processes and phenomena generated by the application of new technologies and tools with a major impact on accounting activities. The paradigms currently developing in the notional field of accounting are influenced by the need to adapt Accounting to the new challenges generated by the applicability of a set of new IT technologies. The widespread use of smart terminals - phones, laptops - for the primary acquisition of input data in the accounting computer system allows real-time processing of accounting data, generated by economic flows in the world businesses. Multi-dimensional and multi-criteria processing of accounting data opens new perspectives in financial, accounting reporting. Thus, a new perspective appears, compared to the traditional paradigm of accounting. How will multiple parties materialize in accounting? The possible perspectives are open.

Key words: accountings paradigms, new technology.
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1. Introduction

Blockchain technology, digitization and data provide a significant opportunity for the finance function to improve business partnership by guiding and facilitating decision-making within an organization. Technological progress drives efficiency and at the same time provides the basis for value-added roles. (www.hyperledger.org)

A multi-capital approach provides an enabling framework for rethinking how value is created and measured over time. The accounting and finance function must know and communicate how value is created today, how it will be created in the future, and whether profitability is sustainable. (www.hyperledger.org)

Financial information tells only part of the story of value creation. Value is created and destroyed outside of the statement of financial position. Strategic and operational factors, often intangible and difficult to capitalize on, make up a large part of the enterprise's market value. The drivers of future cash flows, which represent key areas of opportunity and risk, are varied and include governance and culture, social license to operate and firm reputation, innovation and intellectual property, talent and human capital, data, operational excellence, business processes quality business and quality relationships with customers and suppliers. (www.hyperledger.org)

Transforming finance functions to be at the heart of decision-making and value creation is a tough endeavor and cannot be achieved overnight. It involves investing in four key factors, which require the involvement and support of the entities' executive managements.

2. Theoretical background

In Accounting digitization and the existence of multiple capitals challenge the role and contribution of the accounting function and accounting professionals and have important implications for the accounting profession and its members who work as employees. At a time when most of the value of companies is not reflected in the statements of financial position of entities, and

digital, data-driven activity is decisive for future success, accounting and accounting professionals must move from isolated roles in processing data to roles that are central to the decision-making process. (www.hyperledger.org)

Although the use of digital technologies is essential for all accounting information systems, each field has its own particularities, determining different speeds of implementation. Following the analyzes carried out in the market studies, the following can be concluded: (www.hyperledger.org)

• BigData technologies (BD) and/ or complex data analysis solutions are used in digital platforms that mediate the alternative transport of people, in the communications sector and by large retailers, but much less used in the banking sector, within comparison platforms of prices and in e-commerce;

• The implementation of BD solutions brings general benefits, valid for any sector in which they were implemented, such as: optimization of operational/technical processes, efficiency of operational costs and resources, but also for a series of activities specific to each field of activity;

• Investments in the digitization of accounting are consistent, involve significant resources and long implementation periods;

• Barriers/ risks in the implementation of BD technologies in accounting are generated by the high costs related to the purchase/development and implementation of solutions, the inherent complexity of the data, the lack of skills within the companies to interpret the data, the difficulty of hiring specialized personnel, ensuring security and preserving data confidentiality;

• The use of BD technologies can bring competitive advantages to companies, such as: adjusting, in real time, the price level to changes in the demand/ supply ratio, thus ensuring the rebalancing of supply and demand.

Companies' use of identical/ similar algorithmic models, a common database, and similar pricing strategies can facilitate coordination, driving up prices. (www.hyperledger.org)

If companies end up implementing machine learning (ML) algorithms, which automatically adjust the price, the coordination brings a series of challenges at the level of activities of prevention/monitoring/identification of anti-competitive practices and requires an adaptation of the competition authorities in resource perspective. The need for specialists and specific analytical tools to analyze cases where the use of algorithms is suspected to result in tacit coordination or facilitate anti-competitive understandings is thus accentuated. (www.hyperledger.org)

It is important to emphasize that, from the perspective of the objective pursued and the consequences generated by a certain policy of using price algorithms, the relevant decision-making factor is still the human one. Even if, from a technical perspective, we often talk about algorithm decisions, from a business perspective, the decision to follow a certain strategy is a human one, algorithms being only means chosen to follow a certain objective. Therefore, we are still talking about business decisions and their associated effects, even if they involve a delegation of implementation to an algorithmic component. (www.hyperledger.org)

3. Research methodology

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

The notion of BigData (BD) appears in the digital world in the 2000s, with reference to a large set of data, at that time, impossible to manage and process with existing technical solutions. The exponential growth of information and communication technologies, the expansion of Internet access globally in recent years have stimulated the emergence of the digital economy and allowed the development of business models based on the collection and processing of big data - BD. The term BD refers to tools , the processes and procedures that allow the creation, processing, storage and management of large data sets. The explosion of data volume characteristic of the BD phenomenon also comes from unstructured data, and the large volume of data that must be processed requires specific techniques, tools and architectures. BD generates value by storing and processing large volumes of digital information (structured, semi-structured or unstructured), which can no longer be analyzed with traditional techniques. (www.hyperledger.org)

The evolution of BD is related to the evolution of modern technology and includes a series of preliminary stages: the evolution of computers, the development of the Internet, the development of processing and storage capacities, the emergence of new analysis methodologies, etc., and on the

other hand, the emergence of the Internet of Things (IoT) and of smart phones, bank cards and social media provide ever-increasing amounts of data, changing the nature of data volumes. (www.hyperledger.org)

BD platforms/ technologies are associated with large sets of varied and complex information that require a set of specific techniques and technologies for their collection, processing and analysis, most of them in real time. These generally consist of data storage systems, servers, databases, data management and other utilities for managing large volumes of data.

Major BD challenges include collecting, storing and analyzing data in a reasonable amount of time, querying, viewing, transferring, updating and keeping information and data sources confidential. Lately, the main characteristic of BD is no longer the large volume of available data, but the use of specific methods of their analysis, such as predictive, behavioral or social network analysis. (www.hyperledger.org)

4. Findings

4.1. Survey of the specific evolutions regarding the application of information technologies (IT) in accounting

BigData (BD) represents the technology to process and analyze, cost-effectively, the large and varied volumes of available data, at the desired speed, with the aim of improving business operations and decision-making processes. (www.hyperledger.org)

The BD concept has 5 main characteristics, also called 5-V: (www.hyperledger.org)

• The large volume of data available and the number of data sources – operational, public, commercial or social data;

• The high speed with which data is created, processed and analyzed;

• The great variety of data – the increase of data sources and their types – tabular data, documents, e-mails, blogs, instant messages, metering data, static images, audio, video, etc.;

• Data veracity – data accuracy is essential in obtaining correct results. The variety of sources and the large volume of data makes it difficult to control the accuracy of the information;

• Data value – BD access aims to increase the value of primary data. As a rule, initial information has little value compared to its volume. The increase in value is achieved by analyzing and processing large volumes of data. (www.hyperledger.org)

There is no predefined threshold of the 5 characteristics, which indicates entry into the domain of BD. Due to the constant evolution of technologies, the sizes of data sets, which can be characterized as BD, are constantly increasing. (www.hyperledger.org)

In addition to the 5 characteristics, BD differs from other databases by the type of data that is processed and analyzed: structured data (which exists in a database and can be selected through simple search algorithms) and unstructured data (documents text, e-mails, video, pictures, audio files, presentations, web pages). (www.hyperledger.org)

The most widely used BD architecture uses the Hadoop platform, developed by Apache in 2005. The open-source platform can process structured and unstructured data from almost all digital sources and is based on a cluster-type architecture that stores and processes quickly and cost-effectively reduced large volumes of data, with different structures. (www.hyperledger.org)

Since 2010, Hadoop has been widely adopted by organizations, both for the purpose of storing large volumes of data and as a platform for their analysis. Currently, Hadoop is used by many companies for which the volume of data generated daily exceeds the processing and storage capacities specific to conventional systems: Adobe, AOL, Amazon.com, EBay, Facebook, Google, LinkedIn, Twitter, Yahoo. (www.hyperledger.org)

BigData Analytics (BDA) is the process of analyzing large volumes of data. BDA is the complex process of analyzing BD to discover patterns, correlations, market trends, customer preferences that help organizations make better strategic and operational decisions. BDA contains 2 main stages: Data Management and Analytics (data analysis). (www.hyperledger.org)

The data analysis process started in the 80s with existing data analysis tools and statistical reports (Data Warehouse, Business Reporting), rapidly evolving in the following years to Descriptive, Diagnostic, Predictive (BDA), Prescriptive and Cognitive Analytics. (www.hyperledger.org)

Descriptive analysis – answer the question – What is happening? It uses tools, such as Google Analytics, Excel, Data Warehouse, which, based on existing data, provide an accurate picture of the evolution of the business, in relation to comparable periods. (www.hyperledger.org)

Diagnostic analysis - answer the question - Why is it happening? Diagnostic analysis is an advanced form of analysis that uses technologies such as Business Intelligence and Data Mining to understand, based on existing data, the causes of how the business has evolved.

Predictive analytics – answers the question – What is going to happen? It is an advanced form of analysis, which uses the results of descriptive and diagnostic analyses, predictive algorithms and technologies such as Business Analytics to identify patterns, behaviors, exceptions and predict possible trends. (www.hyperledger.org)

Prescriptive analysis – answers the question – What actions need to be taken? It uses advanced analytical techniques – AI (Artificial Intelligence) and BDA, to make strategy recommendations and provide business directions. (www.hyperledger.org)

Cognitive analysis - also called BD 2.0, represents the new generation of BD. Cognitive analysis represents the new approach in identifying information and making decisions. Inspired by the way the human brain processes information and draws conclusions, the analysis extends the capabilities offered by the first generation of BD, learns from data and extracts hidden patterns from it. Cognitive analytics uses a combination of technologies such as: artificial intelligence algorithms, machine learning, deep learning, BD, predictive analytics. The analysis searches the entire database and provides real-time solutions. Apple's Siri, Google Now and Microsoft's Cortana currently use cognitive analytics. (www.hyperledger.org)

In conclusion, BD platforms answer the following questions:
• - What and why is it happening?
• - What is going to happen?
• - What actions should be taken?

BD technologies have revolutionized industries and changed human culture and behavior. They are used in a number of fields that have a common characteristic: the processing of large volumes of data in order to perform predictive analyses. (www.hyperledger.org)

BD systems can provide information not only to businesses, but also to government organizations and individuals. BD can be used to achieve national objectives, such as: optimizing resources, the ability to respond to natural disasters and improving transport infrastructure management systems. BD technologies are among the 5 areas considered by the European Commission to be a priority for the digital single market, along with 5G communications, cloud computing, the Internet of Things and cyber security. (www.hyperledger.org)

BD has proven its usefulness in areas such as: (www.hyperledger.org)

• Electronic commerce - the most revolutionized field of BD. Uses BD technologies, in particular, to identify preferences, consumer behavior, target markets and consumers, update inventory in real time, develop personalized offers and predict consumer purchasing decisions;

• The medical system – BD is used to reduce costs and improve the quality of the medical service, in the medical monitoring system of patients. It includes unstructured data – doctors' notes, medical tests, etc. BDA helps to predict, prevent and cure diseases;

• Data security – preventing and combating the phenomena of fraud, terrorism and crime, helps to reduce costs or make critical decisions;

• Mobile telephony – the use of location capabilities, including video cameras, microphones, motion sensors, GPS and Wi-Fi capabilities has enriched the volume of data collected and the methods of its collection and use;

• Energy sector – helps in the process of monitoring and controlling the use of electricity. BD is used to pinpoint power outages or other problems that occur in networks, including cyber attacks or natural disasters;

• Traffic management and control – used in traffic optimization and/ or the electronic toll charging system, allowing differentiated rates depending on the distance traveled, vehicle type, etc.;

• Traditional trade - allows optimizing the assortment selection process, identifying stocks in real time, identifying consumer preferences;

• Banking services – in particular, in the case of fraudulent card payments, by implementing mechanisms to identify, in real time, suspicious transactions, but also in the case of facilitating the risk analysis for granting loans;

• Production processes – BD can be used to identify process variations and quality problems;

We can see from this enumeration the interaction with **accounting computer systems**, applicable for various categories of activities.

BD influences the activity of companies, which are forced 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 information-based market. The decision-making process is moving from a model based primarily on the experience of the decision-maker to one based on information and often on the experience of the user. The use of BD offers a new perspective by improving the practices of analysis and predictive modeling, with a positive effect in the real-time decision-making process. (www.hyperledger.org)

Just as it helps companies increase their productivity, BD enables public administrations to improve their IT systems and public sector administration, helping global organizations analyze information for strategic planning. (www.hyperledger.org)

Like any new field, the BD concept also comes with a series of challenges regarding the acceptance and implementation of these specific technologies, as follows:

• The media industry - provides information at a global level, messages or content can be transmitted, consistent with the attitudes, preferences and ideas of the information consumer;

• Research - rapid information processing, facilitating interdisciplinary approaches through more effective integration of different research fields.

4.2. A case study of the accounting of set of transactions

Table no. 1 Table of transactions related to the case study

Transactions	Textual description of the transactions
Initially	On January 1, 2021, an entity acquired a complex distributed ledger accounting software system based on blockchain technology, for which the fair value of 200,000 m.u. (monetary units). The complex blockchain accounting software system has an estimated useful life of 8 years and will be used to organize the entity's accounting, thus being accounted for in the category of intangible assets – computer programs. (Nicolae, 2010).
December 31, 2021	In accordance with its accounting policies, at the end of each reporting period, the entity will update the complex blockchain accounting software system. The accounting specialists of the company exercise their professional judgment, estimate that there have been works to update and modernize the blockchain software in the amount of 100,000 m.u. invoiced by suppliers and 50,000 m.u. made by the entity's specialists. The remaining useful life is re-estimated at 8 years.
December 31, 2022	The accounting specialists of the company find that there have been works to update and modernize the blockchain software in the amount of 70,000 m.u. invoiced by suppliers and 30,000 m.u. made by the entity's specialists. The remaining useful life is re-estimated at 5 years.
December 31, 2023	The accounting specialists of the company find that there have been works to update and modernize the blockchain software in the amount of 50,000 m.u. invoiced by suppliers and 40,000 m.u. made by the entity's specialists. The remaining useful life is re-estimated at 10 years.

Source: Case study data proposed by the author

Accounting data
(Making entries by the author)

Table no. 2 Recording of the purchase of complex distributed ledger accounting software system based on blockchain technology

Account - Debit	Account - Credit	Amount
Intangible assets - blockchain software	*Providers of Intangible Assets - blockchain software*	200,000

Source: Calculations and records made by the author

Table no. 3 Calculations for amortization for year 2021

Calculations and records
As of December 31, 2021, the entity calculates and records the amortization for the period January 1 - December 31, 2021 = 200,000 m.u. / 8 years = 25,000 m.u.

Source: Calculations made by the author

Table no. 4 Record for amortization for 2021 year

Account - Debit	Account - Credit	Amount
Operating expenses on amortization of blockchain software	*Amortization of blockchain software*	25,000

Source: Calculations and records made by the author

Table no. 5 Recognition of works to update and modernize the blockchain software as of December 31, 2021

Account- Debit	Account - Credit	Amount
Intangible assets - blockchain software	*Providers of Intangible Assets - blockchain software*	100,000
Intangible assets - blockchain software	*Revenue from the production of blockchain software*	50,000

Source: Calculations and records made by the author

Table no. 6 Calculations for amortization for year 2022

Calculations and records
Annual depreciation = 200,000 - 25,000 + 150,000 = 325,000 m.u. / 8 years = 40,625 m.u.

Source: Calculations made by the author

Table no. 7 Record for amortization for 2022 year

Account - Debit	Account - Credit	Amount
Operating expenses on amortization of blockchain software	*Amortization of blockchain software*	40,625

Source: Calculations and records made by the author

Table no. 8 Recognition of works to update and modernize the blockchain software as of December 31, 2022

Account- Debit	Account - Credit	Amount
Intangible assets - blockchain software	*Providers of Intangible Assets - blockchain software*	70,000
Intangible assets - blockchain software	*Revenue from the production of blockchain software*	30,000

Source: Calculations and records made by the author

Table no. 9 Calculations for amortization for year 2023

Calculations and records
Annual depreciation = 325,000 - 40,625 + 100,000 = 383,475 m.u. / 5 years = 76,695 m.u.

Source: Calculations made by the author

Table no. 10 Record for amortization for 2023 year

Account - Debit	Account - Credit	Amount
Operating expenses on amortization of blockchain software	*Amortization of blockchain software*	76,695

Source: Calculations and records made by the author

Table no. 11 Recognition of works to update and modernize the blockchain software as of December 31, 2023

Account- Debit	Account - Credit	Amount
Intangible assets - blockchain software	*Providers of Intangible Assets - blockchain software*	50,000
Intangible assets - blockchain software	*Revenue from the production of blockchain software*	40,000

Source: Calculations and records made by the author

Table no. 12 Calculations for amortization for year 2024

Calculations and records
Annual depreciation = 383,475 - 76,695 + 90,000 = 396,780 m.u. / 10 years = 39,678 m.u.

Source: Calculations made by the author

Table no. 10 Record for amortization for 2023 year

Account - Debit	Account - Credit	Amount
Operating expenses on amortization of blockchain software	*Amortization of blockchain software*	39,678

Source: Calculations and records made by the author

5. Conclusions

In my opinion, the application of new, innovative tools and techniques, which appeared as a result of the development of the informational capabilities of information technology (IT), provides the necessary foundation for a paradigm shift in the processing of accounting information, the development of Multiple Party Accounting.

The use of information technology tools on an unprecedented scale - smartphones, tablets, laptops, wireless accounting information transmission devices and 5G, all of which open up new opportunities in processing large volumes of accounting data in real time.

Financial reporting - annual financial statements in the classic sense - are about to be transformed into a system of integrated financial reporting. Integrated financial reporting allows the enrichment of information for the financial-accounting decisions of different categories of users. It improves, dramatically reduces the time required to transmit accounting information generated by entities to users.

A little-studied aspect refers to the energy consumption generated by the use of smart phones, tablets, laptops, 5G devices, etc., much higher consumption compared to the traditional paper-based processing of accounting data.

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