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# Barriers to the implementation of digital accounting based on fourth industrial revolution technologies in Algeria (4IR): A field study

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**Abstract---** This research paper aimed to identify the most significant obstacles to the adoption of digital accounting based on Fourth Industrial Revolution technologies in Algeria. This aims to leverage the benefits of financial integration, eliminate the informal economy, and improve companies' vital and strategic decisions in a business environment characterized by global change and development. The study relied on an analysis of previous studies and a survey of a sample of 86 accountants. The study concluded that there are numerous legal, human, and financial obstacles, in addition to obstacles related to digital infrastructure. It also presented a set of recommendations that may assist in the implementation of modern digital accounting in the future.

**Keywords---** digital accounting; accounting automation; fourth industrial revolution; cloud computing.

**JEL Classification Codes:** M41; M49

## 1. Introduction

Management and financial accounting practices around the world have seen many developments, from the old approach of manual processing and documentation, to the electronic process using digital (electronic) accounting software, to contemporary digital accounting using Fourth Industrial Revolution (4IR) technologies (4IR), broadening the strategic opportunities of businesses due to the use of 4IR technologies in accounting, such as artificial intelligence for data analysis, blockchain for securing records, and other elements of integration due to contemporary digital accounting. Consequently, therefore, the use of Fourth Industrial Revolution technology-based digital accounting emerges as the centerpiece of any sophisticated financial accounting system, particularly against the backdrop of a more competitive and dynamic business environment on one hand, and different kinds of financial corruption on the other.

The current accounting environment in Algeria is also the same as for most other nations in the process of digital transformation, since Algeria has enacted a set of laws and decrees dealing with financial accounting by way of information technology and digitization of certain taxation procedures.

Based on this, we, therefore, ask the following main question:

**What are the barriers to the implementation of digital accounting based on Fourth Industrial Revolution (4IR) technologies in Algeria?**

To address to this question, we herein provide the following sub-questions:

- Does the Algerian environment possess the digital infrastructure necessary to adopt digital accounting based on the Fourth Industrial Revolution?
- Are there Algerian legal texts regulating accounting based on Fourth Industrial Revolution technologies?

- Does the Algerian environment possess the human resources needed to enable the adoption of digital accounting on the basis of Fourth Industrial Revolution technologies?
- Is there a budgetary constraints which will hinder the adoption of digital accounting on the basis of Fourth Industrial Revolution technologies in Algeria?

### **The Hypotheses of the Study**

In order to answer the above query, the following hypotheses may be developed:

- 1- H<sub>0</sub>: There are no constraints related to digital infrastructure hindering the implementation of digital accounting supported by industrial revolution technologies in Algeria.
- 2- H<sub>0</sub>: There are no legal constraints hindering the implementation of digital accounting supported by Fourth Industrial Revolution technologies in Algeria.
- 3- H<sub>0</sub>: There are no human constraints hindering the implementation of digital accounting supported by Fourth Industrial Revolution technologies in Algeria.
- 4- H<sub>0</sub>: There are no financial constraints hindering the use of digital accounting on Fourth Industrial Revolution technologies in Algeria.

### **The Importance of the study**

The importance of the research rests with the development of accounting systems globally and the role that the convergence of accounting with Fourth Industrial Revolution (4IR) technologies plays in meeting the Algerian economy's needs with the view of enhancing transparency, avoiding financial corruption and tax evasion for the protection of the formal economy and foreign investment on one hand, and enhancing the quality of strategic decisions of enterprises engaging in the implementation of digital financial accounting as well as their competitiveness on the other hand.

### **The Objectives of Study:**

There are several objectives of this research, the most significant of which are as follows:

- To introduce the most prominent concepts regarding contemporary digital accounting based on Fourth Industrial Revolution (4IR) technologies.
- To demonstrate the most effective components which can contribute towards the implementation of contemporary digital accounting in the Algerian context.
- To identify of the most important constraints in Algeria that hinder the transformation through a modern digital accounting through Fourth Industrial Revolution technology.

### **The Methodology of Study:**

The researcher employed a descriptive methodology. Regarding the theoretical aspect, we used data collection in terms of prior concepts and previous studies, and an

analytical methodology to the field aspect by using hypothesis testing and result analysis by statistical tools, based on questionnaire data.

## 2. Previous Studies:

- **Study of (Danimir, Mirjana, & Ivana, 2019):** This study tackled the issue of digital transformation and problems facing accounting profession. It aimed to highlight the main challenges that digital technologies impose on accounting by looking at what experts and scholars have written on the subject. The study concluded that the accounting profession is confronted with numerous challenges likely to affect the profession in the future, including the use of large data in accounting, artificial intelligence, cloud computing, and blockchain technology. The incorporation of these technologies into accountancy will define the way accountants carry out their work, and therefore users and accountants will be compelled to acquire new skills so that they can perform their tasks professionally.
- **Study of (Jodie & Ogan, 2019):** The study addresses how Internet-related technologies have revolutionized the accountants' job which can be changed by four technologies: cloud computing, blockchain, large data, and artificial intelligence. It concluded that technology has improved data availability and sharing, which strengthens accounting and auditing procedures, and that these technologies make accountants need certain skills and abilities.
- **Study of (Septyana & Yaya, 2024):** This study shed light on the development of digital accounting and accounting information systems in today's business world. It was to examine the development of digital accounting and accounting information systems in general in today's business world based on the literature review and systematic review of the most authentic and recent publications. This research also found that there has been progress in research reporting the advantages of modern digital accounting and that technology has a decisive contribution in accounting development.
- **In a study of (Bouchahma & Ait Mohamed, 2024):** examined electronic accounting in Algeria, looking at the current situation versus what is expected. The authors sought to point out the advantages of electronic accounting and what is needed to put it into practice in Algeria. The study also demonstrated the need to fix legal loopholes related to regulating electronic accounting and to build up the needed tech infrastructure.
- **Study of (Mohamedl et al. , 2024):** looked at how blockchain, IoT, and XBRL could be used in accounting information systems. It tried to carry out a systematic literature review on the feasibility of applying these technologies to the accounting system to enhance electronic financial reporting quality. The ultimate sample for this research was 309 studies in literature worked on since 2013 to 2023. The results indicated that there are few studies on the integration of these three technologies together in accounting systems, although numerous

studies have been conducted on them separately. There are also certain challenges confronting contemporary digital accounting systems that can be overcome, including the risk of cybersecurity, the need for technological infrastructure, and the absence of subject experts within this field.

- **What makes our study different from the previous studies :**

Our study diverges from past international work by concentrating on the impact of Fourth Industrial Revolution tech on accounting systems, moving past just talking about the relevance and plus sides of digital accounting right now. Most studies have been literature reviews. Some Algerian studies mention electronic accounting and its problems.

The unique feature of the presented study is that, to the best of our knowledge and the information we have previously collected, it is the first to touch upon the issue of the implementation of the modern digital accounting based on the technologies of the Fourth Industrial Revolution, which reveals the most substantial obstacles under study of the field in Algeria.

### **3. What is Digital Accounting on the basis of Fourth Industrial Revolution (4IR) Technologies**

#### **3.1. Digital accounting Concept powered by 4IR technologies:**

Digital accounting has been defined in various ways in the modern context, however, in broad terms, it denotes any modifications in accounting owing to the utilization of computing and networking technology (Spilnyk et al., 2022). Innovations in Fourth Industrial Revolution technologies continue to radically change work and responsibilities in the accounting field, such as customer relationship management, enterprise resource planning, robotic process automation, artificial intelligence, blockchain, and cloud computing (Denise & Christina, 2024). Digital accounting also refers to: financial data and information sent via the internet and shared encrypted in order to be used in different decision-making processes (Moulay, 2025). The Algerian legislature defined the notion of electronic (digital) accounting in Article (3) of (Executive Decree 09/110, 2009) in the following way: A computerized information system, in the sense of this decree, would be regarded as the connection between material resources and computerized information programs, whereby:

- Getting information in regulatory or contractual form.
- Processing of this information.
- Converting data or results into other forms and make them crystallized.

According to the foregoing, the researcher may define digital accounting on the basis of (4IR) technologies as: a credible accounting framework, which is based on modern software and fourth industrial revolution technologies, including artificial intelligence, blockchain, and cloud computing, among others, to process and disseminate accounting

information and relay its findings, anywhere and in real time, with the purpose of enhancing the quality of decisions by diverse users.

It should be mentioned that the historical background of digital accounting information may be returned to the middle of the twentieth century when electronic data interchange (EDI) and electronic funds transfer (EFT) were developed. The contemporary idea of digital accounting can be returned to the early years of the 21st century, when the modern digital technologies related to the Fourth Industrial Revolution came into being and efforts to employ them in the accounting industry took place. Cloud computing, blockchain, the Internet of Things, and so forth are included in these technologies.

### **3.2. Digital Accounting Advantages According to 4IR Technologies:**

Many studies underscored the importance and the benefits of the introduction of modern digital technologies by companies as a strategic requirement to improve their competitiveness and speed up their activities (Septyana & Yaya, 2024). In that regard, contemporary digital accounting provides companies with various advantages, which can be clarified in the following way: (Ibrahim & Ebarekpen, 2025)

- **Enhanced efficiency:** The automation of repetitive elements in digital accounting helps make accounting processes easier, less manual, and consumes fewer resources, with the employees of the company allocating their time to more valuable activities.
- **Better accuracy:** Modern digital accounting allows avoiding the human error that helps to guarantee the uniformity and the accuracy of the financial information.
- **Offering simultaneous financial vision:** Digital accounting in the modern world also allows companies real-time financial knowledge, which assists them to make improved decisions and enable them to capitalize upon opportunities as they appear within dynamic marketplaces.
- **Remote data and information sharing:** Cloud-based digital accounting provides the flexibility of sharing and disseminating information and data between users within any time and place using the internet.
- **Scalability:** The modern digital accounting software has the option of scaling to meet the requirements of the company, in terms of the number of users, the number of added features or the size of transactions.

### **3.3. The adoption of Fourth Industrial Revolution Technologies and Digital Accounting:**

The number of positives and advantages as a result of the integration of Fourth Industrial Revolution technologies with digital accounting is large. The benefits of both technologies can be described based on the findings and the conclusions of various studies, and they are as follows:

- **Adopting cloud computing in digital accounting:** Cloud computing is the foundation of the digital revolution of accounting. Cloud systems improve accountability operations by supporting collaboration and data sharing of accountants and other users on any time and place through the internet as compared to the traditional desktop software. They are also inexpensive since they incur monthly or annual subscriptions which enable companies to save most charges and expenditures incurred in infrastructure and maintenance of traditional accounting system, particularly small and medium-sized enterprises. Nevertheless, cloud accounting has certain security risks associated with being subjected to cyberattacks, and to address it, one needs to evaluate the credibility of cloud service providers (ALTUNDAĚ, 2024). In terms of dependence on cloud accounting, multiple researches show that the number of small and medium-sized businesses willing to use the technology is 30%. AI is used by New Zealand (and about 65% in the United Kingdom) in accounting firms (Jodie & Ogan, 2019).
- **Artificial Intelligence and digital accounting:** **Artificial Intelligence** is deemed to be of significance in the future accounting field, and in addressing the demands of accountants to enhance their own performance and enhance the quality of work undertaken (Amelia A, Carol E, & Brad S, 2006). The accounting software that operates using artificial intelligence allows processing a significant number of financial transactions in time and notifies the accounting system of the error that was identified, which contributes to creating quality accounting information and simplifies the work of an accountant. With the use of artificial intelligence tools and techniques, decision-makers can also increase their knowledge of the transactions captured by the accounting system (Syahmina, & Ulaganathan, 2024). Though the introduction of artificial intelligence into accounting software has many benefits, namely, the improved efficiency, velocity, and accuracy of business operations, it brings many challenges of transparency and accountability of decision-making, especially, algorithmic bias, and certain risks to data privacy and security. This comes on top of the problem of substituting or abolishing certain accounting functions because accounting activities are automated through the use of artificial intelligence (ALTUNDAĚ, 2024).
- **The Use of Blockchain in Accounting:** Blockchain technology streamlines accounting and improves the security and transparency of all financial transactions by means of decentralized, distributed records that are impossible to delete or alter. It offers a dependable electronic account which enhances the efficiency of supervision and audit. It also allows reporting more precisely with the help of smart contracts and the automation of the verification and recording process. Thus, we discover that most accounting companies, in particular, large international companies have incorporated blockchain technology into their functions and initiated products that are prepared to work with this technology (Hongdan et al., 2023).

- **Combining Large Data and Digital Accounting:** The combination of big data and accounting is an important factor to streamline the accounting process of companies and enable them to compile their financial statements faster and more precisely. The Big data presents companies with expansive amounts of data in different sources. This data enables companies to know their financial performance and the different risks they are exposed to including how the sales trends will be. The accountant position will also change depending on the integration of the big data and accounting; not only in the data collection and processing but in the strategic insights offered to the management. Conversely, big data provides new opportunities to assess and use intangible assets, including intellectual capital, to improve strategic decision-making (Leonidas, Georgios, & Constantinos, 2024).
- **Combining the Internet of Things (IoT) with digital accounting:** A number of studies show that when using the Internet of Things (IoT) companies can study and analyze different reports based on an enormous quantity of sensor data enterprises into cloud computing and digital accounting. There is replacement of manual data reading and processing by sensors that give real time accounting information. Financial reports have ceased to be merely financial statements but have the capability to update different data including inventory and manufacturing and depreciation data in addition to monitoring asset. All this minimizes fraud and improves the corporate governance and auditing practices. The Internet of Things can also render forecasting processes more efficient than the existing electronic platforms and different social media platforms (Mohamedl et al., 2024).

#### **4. The Current Status and Prospects of Adopting Digital Accounting in Algeria**

##### **4.1. Legal situation of the Algerian digital accounting:**

The institutions that are under the System of Financial Accounting (SCF) Law 07/11 are allowed to have optional accounting through the use of automated systems. Article 24 (Law 07/11, 2007) stated that: "The accounting will be in manual form or through information computing systems". According to the same article, there is also an indication of the necessity to meet the requirements of reliability, preservation, security, and data retrieval.

Conditions and procedures of computerizing financial accounting in Algeria according to what has been stated in Executive Decree (09-110) can be described in Articles (4 to 24) of the following table:

**Table 1. Requirements and processes of upkeeping electronic accounting as per the Executive Decree (09-110)**

<p><b>Conditions to the electronic accounting</b></p>	<ul style="list-style-type: none"> <li>- An institution, which maintains its accounts through information computing, is bound to adhere to all the accounting principles and tax procedures in existence according to the provisions of this decree.</li> <li>- The adopted accounting software has to be capable of the automatic creation of all the necessary statements and reach the base balances in conformity with the principles of the double-entry accounting and legal and regulatory requirements.</li> <li>- The whole accounting period should be certified, and the computerized accounting system should contain the provisions to ensure the viability of the items written on the electronic daily cards on a daily basis as well as post-certification and should offer the possibility to transfer the registration cards to the supervisory authorities in an independent and straightforward and secure way.</li> <li>- The accounting software developer should give the institution an assurance that the software will meet legal and technical requirements.</li> </ul>
<p><b>Documentation requirements</b></p>	<ul style="list-style-type: none"> <li>- The computerized accounting system should entail archiving processes such that all the accounting records and data of accounting periods (closed and otherwise) can be migrated to storage media without any possibility of alteration.</li> <li>- The computerized accounting system should incorporate a process to enable the required data to be recorded in case of the system maintenance or modification, and to put in place a means to enable the program to save the record of updates in a special card.</li> <li>- A file should be made ready that demonstrates how the computerized accounting system works to enable the auditors to learn the way the processing system works. The file will be stored alongside any modifications that might have occurred to the system as long as there is the need to provide the accounting documents on which it is founded.</li> </ul>

**Source: Prepared by the researcher on the basis of the Executive Decree (09-110).**

Based on the table above, we observe that the legislative environment in Algeria has clarified the conditions and process that must be followed in the maintenance of electronic accounting (traditional digital accounting). Such terms have been largely involved with the level of guaranteeing a procedure of supervision and order, devoid of reference to any terms and processes meant to assimilate the electronic accounting with the technologies of the digital revolution, specifically artificial intelligence, blockchain, the Internet of Things and others.

#### 4.2. Algerian Electronic Accounting Programs:

The real-life accounting in Algerian economic sector is restricted to desktop accounting programs. Some of the most significant of these programs being used in practice are the following:

- a- **PC-COMPTA program:** This program belongs to the company of management software (DLG) that is established in Boumerdes. Simplicity and ease of use are some of the benefits that make it one of the best accounting options to accountants. The benefits of this program are a number, but they include the most significant: (DLG, 2025)
  - It enables one to create many accounts and auxiliary journals freely.
  - It enables the integration of the program to the network and gives a full control of the permissions of each user.
  - It offers the option of retrieving information of other databases and automatically saving it.
- b- **MEGA COMPTA SCF program:** This is a program built by the Microsoft Office (MEGASOFT OFFICE, 2025). It is legally compliant and has the following:
  - Entries auto-corrected.
  - Issuing tax and financial statements.
  - Capability to access the network and any other program and set user permissions.
- c- **SILWANE COMPTA program:** It is a program created by the Intellex team. It is completely systemized as per the ERP systems and can be integrated with the mobile applications and other users through the internet.
- d- **LSCOMPTA program:** This is compatible with the financial accounting system, and it was locally developed without the wide use. This program includes the following:
  - Capability to store information on diverse media and operate in the network.
  - Capability to transform financial statements in different formats, which include PDF, TXT, HTML and XLS.
- e- **SAGE 100 Accounting Software:** Sage 100 software designed by the British multinational firm The Sage Group plc is regarded as being one of the most excellent accounting software applications in the world to manage accounting functions.
- f- **Enterprise Resource Planning (ERP) Systems:** The systems are used by many large multinational corporations based in Algeria and offer integration in terms of managing corporate operations in the financial, human resources, inventory, and supply chain dimensions. The suitability of these systems are SAP ERP and Oracle ERP.

#### 4.3. The Reality of the Transformation to Digital Accounting whose Bases are the Technologies of the Fourth Industrial Revolution in Algeria:

To convert accounting to the new digital form, it is necessary to interfere electronic accounting software with modern Fourth Industrial Revolution (4IR) technologies: blockchain, the Internet of Things, artificial intelligence and other technologies to

enhance the quality of accounting and adapt it to the needs of different functions and systems, including auditing and government systems (banks, tax authorities). On this note, Algeria has made certain significant steps in the digitization of financial accounting. These procedures can be summarized as follows: (Ministry of Finance Portal, 2025)

- **Modernization and upgrading of tax administration:**

Algeria has experienced aggressive tax administration modernization and development in the recent years. This has seen a lot of success in the form of portals and platforms and can be concluded in the following points:

- **Electronic Tax Numbering Portal (NIF):** It is a portal connected to the General Directorate of Taxes and it is offered to help the process of acquiring tax identification numbers of companies.
- **Your Tax System (jibayatic):** This is an information system that was initiated by the Tax Directorate in 2017 to computerize the administration of tax. It strives to streamline the tax operations of the enterprises including tax declaration, payment of taxes, tracking files and other services.
- **Your Contribution Portal (Moussahama'tic):** is a new online system built by the Tax Administration in order to streamline the process of declaring and paying taxes via the Internet and using electronic payment cards.

- **Implementation of the electronic system of invoicing:**

The electronic invoicing system is an official document that substitutes paper invoice with a digitized one. It contains all the basic information, which is required, along with the electronic signature. Algeria has taken the concept of introducing the electronic invoicing system as a tool of curbing tax evasion and economic transparency. It has compelled all natural and law-making subjects to taxation to adopt the electronic invoicing system (Electronic Invoice, 2025). The working mechanisms have also been known, and the main stakeholders are the telecommunications and electronic services companies; large, medium, and small companies, which have technical capabilities; and other sectors, which are at risk of taxation, i.e., jewelry sellers, real estate and automobiles.

- **Adoption of cloud computing:**

There is phenomenal growth in accounting with the shift towards on-premise accounting to cloud-based accounting. This contributed to the growing need of the latter due to its strength and the possibility to decrease operational expenses (CEx) and capital expenditures (CapEx).

This spares the companies of acquiring equipment or using funds in leasing of IT teams thereby providing them with time to innovate and concentrate on the strategic processes.

In the context of local cloud computing implementation, there are certain initiatives to pursue this technology in both public and private institutions such as Mobilis and ICOSNET attempts.

- **Cloud Mobilis:** Mobilis introduced its initial software-as-a-service (SaaS) service to businesses in various forms, including business email, communications management, social networking and collaborative spreadsheets. Concerning the success of Cloud Mobilis in cloud computing, others (Wasel & Rajem, 2019) came to the conclusion that Mobilis embraced nearly the same principles as the world leaders in the cloud storage, servers, and infrastructure. The demand of its services was however nearly nonexistent and so, its experiment failed due to several reasons the most notable one being:
  - ✓ The absence of a culture of extensive use of cloud computing by Algerian managers of businesses.
  - ✓ The distrust in such a service.
  - ✓ Fear of internet outages.
- **ICOSNET:** This firm belongs to the category of the private companies of Algeria which provide a wide variety of services concerning communications and computing. According to the company web site, Table (02) illustrates the different services provided by this company under cloud computing.

**Table 2. cloud computing services of Icosnet**

Cloud computing services
Website hosting in Algeria
Website design
Domain name service
Virtual data center service
Web hosting of electronic projects VPS.
Server hosting Housing

**Source:** The researcher prepared it according to (icosnet website, 2025).

Based on the table above, it is possible to note that Exonat holds massive potential to assist companies to adopt cloud-based digital accounting, particularly due to the legal constraints on the storage of data in the cloud outside the country.

## **5. Field study of the obstacles of the adoption of digital accounting in Algeria**

### **5.1. Sample and Study Tool:**

The field study was carried out in a population of accounting professionals since they are the most related to the accounting reality. Randomly selected 86 people (accountants, treasurers, and auditors) were selected in some provinces in Algeria. The researcher employed the use of questionnaire as the data collection tool as well. The questionnaire was segmented into two parts; personal information and a second part consisting of four themes implicitly referred to the obstacles based on the hypotheses raised. The responses were also measured using Likert scale (scores

between 01 and 05). Table 3 indicates the number of questionnaires distributed and those that can be analyzed.

**Table 3. Population of the sample people on the basis of profession.**

Sample individuals	Number
Certified accountant	46
Auditor	25
Accounting expert	15
Total	86

**Source:** Prepared by the researcher according to the valid number of questionnaires

As indicated in the table above, the sample size of certified accountants is 46, the number of auditors is 25, and the number of accounting experts is 15, which is a suitable number to analyze since there are no vast differences in the accounting processes in Algeria.

We also arbitrated the questionnaire model face-validity by showing it to a panel of professionals and academics, the questionnaire stability test to ensure the internal consistency of the axes by the Cronbach's alpha test. The results of the latter test could be shown in the table given below:

**Table 4. Stability test of questions by use of Cronbach's alpha.**

Themes of the studies	Number of statements	Cronbach alpha coefficient
First axis	04	0.812
Second axis	04	0.779
Third axis	04	0.697
Fourth axis	04	0.752
<b>Total</b>	<b>16</b>	<b>0.863</b>

**Source:** Prepared by the researcher (on the basis of results: V23. SPSS)

As indicated in Table 4, the Cronbach's alpha coefficient of the total axes is (0.863), exceeding the minimum of average (0.7), meaning that the paragraphs and the questionnaire are internally consistent and stable.

## 5.2. Study's Limitations & Used Statistical Tools:

**a- Limitations of the study:** The different limitations associated with this study can be clarified as follows:

-**Thematic Limitations:** In this study, particular attention is paid to the main constraints to the implementation of digital financial accounting on the basis of Fourth Industrial Revolution technologies in Algerian firms operating in the SCF financial accounting system.

- **Human Limitations:** In this study, the researcher used the views of different professionals in the field of corporate financial accounting.
- **Spatial Limitations:** The researcher used a certain Algerian provinces during the field study to generalize the findings.
- **Temporal Limitations:** The study was carried out in the months of June and July 2025, with the initial stage being the pre-research data collection and the final one being the results in the field.

**b- Statistical tools employed in the study:** The researcher resorted to the following set of statistical techniques of analysis and testing of hypotheses:

- Arithmetic mean.
- Standard deviation.
- One-sample t-test, which is founded on the default mean (3).
- The d effect size measure by Cohen, which is a formula ( $D = T/\sqrt{n}$ ).

### 5.3. The Analysis of Results Using Arithmetic Mean & Standard Deviation:

- ✓ **Analysis of the initial hypothesis results:** (There are no barriers that exist regarding digital infrastructure that impedes the implementation of digital accounting founded on Fourth Industrial Revolution technologies in Algeria). According to the results of the calculation of the arithmetic mean and standard deviation under the first hypothesis, it is shown in the following table:

**Table 5. The calculation of arithmetic mean and standard deviation of the first hypothesis.**

Number	Paragraphs	Arithmetic mean	Standard deviation	Sample opinion
1	There is a challenge in accessing the physical components (networks, devices) to prepare more precise real-time financial information in Algeria.	3.67	1.06	Agree
2	Internet instability restrains digital accounting building in Algerian companies	3.70	0.98	Agree
3	Cyber threats impede the incorporation of accounting systems into Fourth Industrial Revolution technologies	4.07	0.95	Agree
4	The Algerian setting does not have dedicated companies able to incorporate digital accounting software with emerging technologies (blockchain, cloud computing, artificial intelligence, and so on).	3.23	1.16	Neutral
<b>Total for the first axis</b>		<b>3.67</b>	<b>0.83</b>	

**Source:** Prepared by the researcher (Based on results: (V23. SPSS)

The table above shows that the research sample concurs with the digital infrastructure barriers in paragraphs (1, 2, 3), but neutral in paragraph (4), so they are not sure whether there are some companies that focus on information technology and can connect digital accounting systems to modern technologies or not. The first axis arithmetic mean was 3.67, which indicated that the sample concurred that there exist some obstacles in regard to digital infrastructure that deter the use of digital accounting using Fourth Industrial Revolution technologies in Algeria.

- ✓ **Analysis of the second hypothesis results:** (There are no legislative barriers to the utilization of digital accounting basing on the Fourth Industrial Revolution technologies in Algeria). The results of the arithmetic mean and Standard deviation of the second hypothesis are shown in the following table:

**Table 6. The calculating results of the arithmetic mean and standard deviation of the second hypothesis**

Number	Paragraphs	Arithmetic mean	Standard deviation	Sample opinion
1	The legal landscape of the Algerian country does not constitute a special law that governs the utilization of the modern technologies in the accounting (blockchain, smart contracts, external cloud computing, etc.)	3.44	1.02	Agree
2	Financial Accounting System (SCF) law should be changed in such a way that the use of global modern digital accounting software in line with the standards of IFRS is possible	4.70	0.51	Strongly Agree
3	No legal requirement exists that the companies must utilize the latest digital accounting	4.40	0.94	Strongly Agree
4	Blockchain records are not considered official documents in Algeria	4.37	0.81	Strongly Agree
<b>Total for the second axis</b>		<b>4.23</b>	<b>0.65</b>	

**Source:** Prepared by the researcher (Based on results: V23. SPSS)

The data in the table above show that the research sample has a strong agreement with the paragraphs (2, 3, 4) and moderate with paragraph (1). The second axis arithmetic mean was 4.23, indicating that the sample was in strong agreement that there are legislative challenges in the way of applying to digital accounting using Fourth Industrial Revolution technologies in Algeria.

- ✓ **Analysis of the third hypothesis results:** (There are no human barriers to applying digital accounting on the basis of Fourth Industrial Revolution technologies in Algeria). The table below presents the result of arithmetic mean and standard deviation of this hypothesis:

**Table 7. The results of the arithmetic mean and standard deviation of the calculation of the third hypothesis**

Number	Paragraphs	Arithmetic mean	standard deviation	Sample opinion
1	Algerian firms experience the scarcity of qualified human resources in the area of modern digital accounting technologies	4.51	0.58	Strongly agree
2	The vast majority of accountants in Algeria use basic electronic accounting packages	4.44	0.76	Strongly agree
3	Algerian accounting professionals do not receive any special training in the current digital technologies	3.91	0.60	Agree
4	Users do not trust the outcomes of contemporary digital accounting	3.42	1.06	Agree
<b>Total for the third axis</b>		<b>4.07</b>	<b>0.56</b>	

**Source:** Prepared by the researcher (by results: V23. SPSS)

The information in the table above shows that the research sample is in strong agreement with the first and second statement, and in the moderate agreement with the third statement regarding the deficiency of professional qualifications, the fourth statement regarding the deficiency of confidence with the modern digital accounting outcomes. The mean of the third axis was 4.07, which implies that the sample overwhelmingly concurred that there are human factors that are hindering the implementation of digital accounting using Fourth Industrial Revolution technologies in Algeria.

- ✓ **Analysis of the fourth hypothesis results:** (There are no financial barriers to the implementation of digital accounting on the basis of the Fourth Industrial Revolution technologies in Algeria). The results of the arithmetic mean and the deviation of this hypothesis were in the following table:

**Table 8. The findings of the computation of the arithmetic mean and the standard deviation of the fourth hypothesis**

Number	Paragraphs	Arithmetic mean	Standard deviation	Sample opinion
1	Firms have financial challenges in developing a technological infrastructure that is capable of supporting the application of contemporary digital accounting	2.72	0.69	Neutral
2	Firms are experiencing financial strains in terms of license fee to acquire advanced digital accounting software or subscription fee to cloud accounting	3.84	0.52	Agree
3	One of the issues encountered by companies during finances is the high cost of cyber security	3.43	0.69	Agree
4	Companies are victims of poor government funding of the financial integration transformation project	4.47	0.76	Strongly Agree
<b>Total for the fourth axis</b>		<b>3.61</b>	<b>0.41</b>	

**Source:** Prepared by the researcher (according to results: SPSS V23)

The information in table above shows that the members of the research sample strongly agree with the weak government funding of the financial integration-based digital transformation project in paragraph four (4), are neutral with the barriers to the ability of firms to build a technological infrastructure in paragraph one (1), and moderately agree with the presence of financial barriers to acquiring software licenses or paying cloud accounting subscriptions, and the high cost of cyber-security in paragraphs two and three (2,3). The average of the axis was 3.61, which indicates that the sample members concur that there exist financial barriers that prevent the use of digital accounting grounded in the Fourth Industrial Revolution technologies in Algeria.

#### **5.4. Hypothesis Testing:**

We used t-test (One-Sample Test) to test the hypotheses in our study as indicated in the table below:

Table 9. Findings of One-Sample Test of the Study Hypotheses.

Test Value = 3				
Hypotheses	Differences Mean	Significance Value Sig	Degree of Freedom	T Calculated
Hypothesis 1	0.66860	0.000	85	7.431
Hypothesis 2	1.22674	0.000	85	17.312
Hypothesis 3	1.06977	0.000	85	17.576
Hypothesis 4	0.61337	0.000	85	13.675

Source: Prepared by the researcher (according to the results of: SPSS V23).

Based on the outcome of the t-test in the above table, we can interpret the outcome of the hypothesis test in the following:

- **To test the first hypothesis:** (T), having been calculated in the prior table is equal to (7.431) not within the positive table (1.984) that is, not within the acceptance zone. It is also found to be statistically significant at 5 percent level. Thus, we can reject the null hypothesis (H0) and accept the alternative hypothesis (H1), i.e. there are institutional barriers concerning the digital infrastructure that do not allow implementing digital accounting based on the technologies of the Fourth Industrial Revolution in Algeria.
- **To test the second hypothesis:** Based on the above table, the value of (T) = (17.312), and the positive table value = (1.984), and hence not within the acceptance zone. It also shows statistical significance of 5 percent. Hence, we can reject the null hypothesis (H0) and accept the alternative hypothesis (H1), i.e. there are legislative barriers to the implementation of digital accounting using the Fourth Industrial Revolution technologies in Algeria.
- **To test the third hypothesis:** According to the table above, the value of (T) is (17.576) that exceeds its value. The positive tabular (1.984) falls outside the acceptance zone and is said to be statistically significant at the 5 percent level. We thus reject the null hypothesis (H0) and accept the alternative hypothesis (H1) that is, there are human barriers to digital accounting implementation using Fourth Industrial Revolution technologies in Algeria.
- **To test the fourth hypothesis:** The value of (T) calculated in the previous table is (13.675), and this is bigger than the value in its table (1.984), which is not within the acceptance zone and is significant at the 5% level. Thus, we reject the null hypothesis (H0) and accept the alternative hypothesis (H1), the existence of financial barriers in the enactment of digital accounting with the help of Fourth Industrial Revolution technologies in Algeria.

It is also possible to demonstrate the effect size (Cohen's d) in the following table:

**Table 10. Effect size (D) calculation of the study hypotheses**

Hypotheses	Effect size D
Hypothesis 1	0.80
Hypothesis 2	1.87
Hypothesis 3	1.89
Hypothesis 4	1.47

**Source:** Prepared by the researcher (based on the  $t$  calculated in Table (9)).

Based on the findings of the above table on Cohen  $d$  effect size, it can be observed that all hypotheses regarding the study had a greater effect size than 0.8. Thus, the effects of barriers are assumed to be large compared to the hypothetical average.

## 6. Results and discussion

The results of this research can be concluded in the following points:

- The benefits of the digital accounting developed on the basis of the Fourth Industrial Revolution technologies can be enumerated, but the simplification of the accounting process and raising its accuracy, making work more transparent, and enhancing the quality of financial decisions and reports are the most significant among them.
- The use of modern digital accounting allows access to the data at any time and the processing of a huge volume of high-order information with the help of artificial intelligence, giving more precise inputs and outputs, contributing to the enhancement of financial and operational results of companies.
- With modern digital accounting, financial integration of accounting with other systems (including banking and taxation), is made possible through blockchain technology and smart contracts. This assists in improving the financial reporting transparency and therefore doing away with financial corruption.
- There are a number of local firms in the Algerian setting that are the pioneers in the sphere of programming and computing, which would make it possible to create the programs and platforms of the contemporary digital accounting, including Mobilis Cloud, ICSONET and other developing IT firms.
- Practical reality indicates that the majority of medium and large enterprises in Algeria is not resistant to the benefits of the Fourth Industrial Revolution technologies and content themselves with the use of the traditional digital accounting using ERP systems, and small businesses are content with the use of simple accounting programs.
- The key barriers to the Fourth Industrial Revolution (4IR)-based digital accounting transition in Algeria are: technical infrastructure barriers, such as slow internet access and outages; legal barriers, such as the absence of adequate legal texts to regulate new digital accounting and the absence of recognition of digital records, human barriers, represented by lack of competence of users and

accountants and their preference to manual work, and financial barriers, represented by the cost of cybersecurity and government support and incentives.

- Along with such personal abilities as remote cooperation and communication, and adjustment to automated work in the accounting system, accountants should be ready to endlessly learn and acquire modern information technologies, which will assist in the new environment.

## **7. Conclusion and Recommendations:**

The usage of the proven electronic accounting software is of great importance to most of companies in financial accounting in Algeria and primarily, small and medium-sized enterprises (SMEs), though to some extent, some advanced software (including ERP systems) are in use in large companies. It is because of the various barriers that present barriers to the implementation of Fourth Industrial Revolution (4IR) technologies and their adoption with digital accounting. Nevertheless, the Algerian government is striving towards the development of accounting in different sectors though it is very sluggish and has various obstacles. In order to remove these obstacles, the researcher presents the following recommendations:

- Professional organizations and firms are advised to strive to equip accountants and other technical users in the field of Fourth Industrial Revolution (4IR) technologies in order to enjoy the benefits of their use alongside financial and management accounting.
- There is a necessity to incorporate modern digital accounting in university curricula in order to equip students on the theoretical and practical basis.
- There is a need to diversify a list of companies and institutions that participated in the implementation of the electronic invoicing system and to work towards adopting a government blockchain platform that integrates the accounting systems of companies, banks and tax authorities to enhance the quality of financial data.
- The implementation of new digital accounting necessitates the incentive of companies, particularly small and medium enterprises to invest in the information system and provide them with sufficient incentives, including tax exemptions.
- On one hand, the legislative environment in Algeria needs to be strengthened and the law needs to be reformed to build digital accounting in Algeria and, on the other hand, to attract foreign investment.
- The Algerian environment should consider improving the strength of the internet to meet the demands of financial integration between accounting systems and other financial systems (bank, taxes, and so on).

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## Annexes

## i. ALL VARIABLES

## Récapitulatif de traitement des observations

		N	%
Observations	Valide	86	100.0
	Exclu <sup>a</sup>	0	.0
	Total	86	100.0

a. Suppression par liste basée sur toutes les variables de la procédure.

## ii. stability coefficient

## Statistiques de fiabilité

Alpha de Cronbach	Nombre d'éléments
.863	16

## iii. Test T

## Statistiques sur échantillon uniques

	N	Moyenne	Ecart type	Moyenne erreur standard
First axis	86	3.6686	.83441	.08998
Second axis	86	4.2267	.65712	.07086
Third axis	86	4.0698	.56445	.06087
Fourth axis	86	3.6134	.41596	.04485

## Test sur échantillon unique

	Valeur de test = 3					
	t	ddl	Sig. (bilatéral)	Différence moyenne	Intervalle de confiance de la différence à 95 %	
					Inférieur	Supérieur
First axis	7.431	85	.000	.66860	.4897	.8475
Second axis	17.312	85	.000	1.22674	1.0859	1.3676
Third axis	17.576	85	.000	1.06977	.9487	1.1908
Fourth axis	13.675	85	.000	.61337	.5242	.7026