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
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Accounting Profession in Iraq in light of Industry 4.0

Challenges and Benefits

Sherzad Ramadhan ¹, Aridah Mamoun Walid ², Hasan Alkoutaini ³, Fareeba Ahmed ⁴, Hariwan Khorsheed ⁵, and Amar Aldulaimi ⁶ 

¹ Ph.D. Bucharest University of Economics Studies (ASE), Romania

² Ph.D. Bucharest University of Economics Studies (ASE), Romania

³ Ph.D. Candidate Bucharest University of Economics Studies (ASE), Romania

⁴ Msc. Bucharest University of Economics Studies (ASE), Romania

⁵ Msc. Bucharest University of Economics Studies (ASE), Romania

⁶ Msc. Bucharest University of Economics Studies (ASE), Romania

Abstract. *This study explores the challenges and advantages of adopting Industry 4.0 technology in Iraq's accounting profession. The research used questionnaires to gather data from accountants in various industries. The findings suggest that Iraqi accountants are not adequately prepared for Industry 4.0. The study identifies key challenges including digital integration, technical difficulties, lack of skills, cybersecurity concerns, limited budgets, and regulatory constraints. However, there are also potential benefits such as improved efficiency, expanded services, accurate reporting, real-time data analysis, collaboration, increased accessibility, and simplified auditing*

Keywords: Accounting profession, Industry 4.0, challenges, benefits, digital technologies

JEL Codes: M410

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1. Introduction

Accounting, like any other profession, plays an important part in propelling the country's economic growth in Iraq. With the introduction of Industry 4.0, which entails the integration of digital technologies, automation, and data sharing across industries, it is critical for the accounting profession in Iraq to adapt and harness new technologies in order to meet the increasing needs of the contemporary corporate environment.

⁺ HASAN ALKOUTAINI. Tel.: + (40736017145).

E-mail address: (alkoutainihasan13@stud.ase.ro).



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Industry 4.0, often known as the fourth industrial revolution, ushers in disruptive developments that reshape how firms' function and handle information. (Rosário & Dias, 2022) Industry 4.0 brings major breakthroughs in the accounting profession, including as artificial intelligence (AI), robotic process automation (RPA), cloud computing, big data analytics, and blockchain technology. (Onyshchenko, Shevchuk, Shara, Koval, & Demchuk, 2022). These technology advancements have the potential to improve the accounting profession's efficiency, accuracy, and decision-making processes. (Gonçalves, da Silva, & Ferreira, 2022)

The accounting profession in Iraq has always depended significantly on traditional procedures, with a heavy focus on manual record-keeping and paper-based processes. However, the government is becoming more aware of the need to embrace digital transformation and conform with global accounting standards.

The adoption of Industry 4.0 technology gives a once-in-a-lifetime chance for Iraq's accounting profession to jump into a more sophisticated and efficient age. (Razali, Jusoh, Abu Talib, & Awang, 2022). In order to fully leverage the advancements brought about by Industry 4.0, it is crucial to gain a comprehensive understanding of the specific challenges accountants encounter in the Iraqi context, as well as the advantages that arise from the adoption of Industry 4.0 technology. Hence, the objective of this study is to assess the current state of the accounting profession and the accounting environment in Iraq within the framework of Industry 4.0. It aims to identify the obstacles faced by accountants when utilizing Industry 4.0 technologies and explore the potential benefits that can be derived from their integration.

1.1. Problem Statement

In Iraq, the accounting profession has traditionally relied on manual record-keeping and paper-based operations. However, with the advent of Industry 4.0 and its transformative technological advancements, it is crucial to acknowledge the challenges and advantages faced by Iraqi accountants as they transition from traditional methods to embrace Industry 4.0 technologies.

This research article aims to gain a comprehensive understanding of the current state of the accounting profession in Iraq concerning the adoption of Industry 4.0 technologies. It seeks to identify the challenges encountered during this transition and explore the potential benefits that arise from integrating Industry 4.0 technology into Iraq's accounting operations.

Following are the research questions that will be addressed:

1. What is the current state of the accounting profession and the accounting environment in Iraq in light of Industry 4.0?
2. What are the challenges that Iraqi accountants confronting while using Industry 4.0 technologies?
3. What are the potential benefits of using Industry 4.0 technology into Iraqi accounting practices?



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This study will give significant insights into the particular environment of the accounting profession in Iraq and throw light on the challenges and benefits posed by Industry 4.0 by addressing these research issues.

1.2. Research Objectives

The research objectives of this study are as follows:

1. Assess the current state of technology adoption and readiness for Industry 4.0 in the accounting profession in Iraq.
2. Identify and analyze the specific challenges faced by accountants in Iraq when adopting Industry 4.0 technologies.
3. Identify and evaluate the potential benefits that can be derived from integrating Industry 4.0 technologies into accounting practices in Iraq.

2. Historical Background of Accounting Profession in Iraq

Various historical periods, from ancient Mesopotamia to the legacy of British colonialism, have left their mark on the accounting practice in Iraq.

Accounting in Iraq has been around since at least 4500 B.C. (Keister, 1963), with its roots in the country's ancient Mesopotamian civilisation. This early accounting system evolved as a result of the economic activities and trade that were carried out in the area at the time.

Iraqi accounting has evolved throughout time, influenced by traditions from a variety of countries. These include the British, the Russians, and the Egyptians. (Al Najjar, 2009). During the 19th century, the double-entry system became the most common method used to keep track of monetary transactions and records. (Lee, 1977). Iraq fell under British administration (Dawisha, 2005).

After independence, Iraq established an accounting structure. The business law framework was based on the Law of 1951, which fused Islamic law with European legal principles. (Majid, 2001).

In 1997, the government established two laws governing businesses: Companies Law No. 21 and No. 22. Private businesses were managed by the control and audit of designated auditors, while government businesses were supervised by the Board of Supreme Audit. (Iraq, 2019).

The government formed the Accounting Uniformity System Committee in the 1970s to standardize government accounting, and in 1982, the Unified Accounting System (UAS) became mandatory for business and industry. (Al Najjar, 2009).

By virtue of a presidential decree in 1988, the Iraqi Board of Accounting and Auditing Standards (IBAAS) was established as the pioneering semi-private organization responsible for setting accounting



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standards in Iraq. The IBAAS releases accounting and auditing standards that are aligned with the International Accounting Standards (IASs).

When the United States and its allies took control of Iraq in 2003, the country was already struggling under the weight of war devastation and economic sanctions. Currency changes, reductions in import tariffs, and tax reforms were among the market liberalization measures enacted by the Coalition Provisional Authority (CPA) to entice international investors. (Frei, 2004). Foreign investors were given the same rights as local ones under the modified Companies Law that was published in April 2004 with the exception of the natural resources industry. Modifications made thereafter opened the oil industry to foreign investment (Foote, Block, Crane, & Gray, 2004). In addition to the other economic reforms and capital market revival measures taken in April 2004, the Interim Law on Securities Markets was established. (CPA, 2004).

Over time, accounting in Iraq has developed to include not just international norms, but also Islamic law, European legal notions, and even certain local customs. Reforms have been implemented to adapt to changing economic conditions and encourage international investment.

2.1. The Present Accounting Practise in Iraq in the Context of Industry 4.0.

All aspects of the accounting industry in Iraq are governed by a set of laws, rules, and professional standards that together provide a comprehensive legal and regulatory framework. Accounting in the nation is governed by this framework, which lays out the standards and rules that must be followed.

The legal and regulatory framework in Iraq includes statutes such as the Companies Law and rules issued by the Iraqi Board of Accounting and Auditing Standards (IBAAS), which provide direction for the accounting profession in Iraq. These statutes define the specific accounting obligations for various categories of businesses, including financial reporting, auditing, and disclosure requirements. (Board, 2022).

Iraq boasts several organizations that actively contribute to the flourishing accounting industry. Notably, the Iraqi Union of Accountants and Auditors (IUAA) and the Iraqi Association of Certified Public Accountants (IACPA) are instrumental in fostering the development of accountants. These organizations offer essential aid, establish ethical standards, and provide valuable guidance to professionals in the field. Moreover, they play a pivotal role in supporting ongoing professional growth by offering programs and certifications, including the prestigious certified public accountant (CPA) designation through the IACPA.

In Iraq, aspiring accountants often enroll in university to get a degree in accounting or a closely related field. Accountants may expand their professional skills by obtaining additional certifications from the IACPA and participating in continuing professional development initiatives. Accountants who want to keep up with the newest trends and advances in the industry must commit to lifelong learning. (Board, 2022)



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Accounting professionals in Iraq are responsible for a variety of activities relating to financial management, reporting, and compliance. Accountants are engaged in tasks such as accounting, financial statement preparation, financial data analysis, and auditing. They are essential in ensuring that all parties involved have access to trustworthy financial data. Auditors in the profession conduct independent audits to assure the accuracy and conformity of financial accounts. (Hasson , khilkhal, & AL-Hamzawi, 2021).

Despite difficulties associated with limited resources, capacity, and infrastructure, the accounting profession in Iraq is increasingly adopting technology. Accounting software, cloud computing, and data analytics tools are utilized to expedite accounting processes, increase efficiency, and improve financial reporting. These technology innovations assist automate operations and give significant insights based on data gathered from financial institutions. (Wahhab,, Abdulhussein, & Al-Shammari, 2020)

2.2. Industry 4.0 and Its Impact on the Accounting Profession Globally

The rapid global expansion and widespread adoption of Industry 4.0 technology have exerted a profound influence on the accounting profession. This transformative wave initiated by Industry 4.0 has permeated numerous sectors, including the field of accounting. Traditional accounting practices are undergoing significant transformations as cutting-edge digital technologies such as automation, robotics, and big data analytics are integrated into the profession.

Furthermore, Industry 4.0 technologies have improved accountants' data analytics skills. Accountants can now evaluate massive volumes of data fast and effectively thanks to new analytics techniques such as artificial intelligence (AI) and machine learning. This gives them the ability to get deeper insights and make proactive choices. (Javaid, Haleem, Singh, Suman, & Gonzalez , 2022).

However, the incorporation of Industry 4.0 technology brings cybersecurity issues to the accounting profession. Interconnected systems raise the possibility of cyber-attacks, forcing accountants to handle data privacy issues, guard against breaches, and maintain regulatory compliance. (Haapamäki & Sihvonen, 2019).

Due to the increasing mechanization of the accounting industry, accountants are being relegated to consulting positions instead of doing basic activities. Accountants are able to concentrate more on financial planning, risk management, and strategic decision support when they have more time on their hands. This benefits the businesses they work for by allowing them to get useful insights. (Andreassen, 2020).

To stay relevant in the age of Industry 4.0, accountants must engage in continual learning and skill development. To adapt to the changing industrial environment, professionals must have skills in new technologies, data analytics, and cybersecurity. (Gonçalves, da Silva, & Ferreira, 2022).



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Accountants must collaborate closely with IT specialists to enable successful deployment of new technologies, strong data governance, and smooth system integration in the age of Industry 4.0. (Onyshchenko, Shevchuk, Shara, Koval, & Demchuk, 2022).

Through automated data gathering and analysis, Industry 4.0 also enables real-time financial reporting. This allows stakeholders to quickly obtain correct financial information, which improves decision-making processes. (PwC, 2016).

Blockchain and distributed ledger technology (DLT) have the potential to transform accounting processes. These innovations improve transparency, permit auditability, and lessen the potential for fraud. They may help to speed up operations like audits, supply chain management, and financial transactions. (Han, Shiwakoti, Jarvis, Mordi, & Botchie, 2023).

Industry 4.0 also alters the accounting workforce by increasing the need for individuals trained in both accounting and information technology. To succeed in the profession in the future, accountants will need to acquire new skills and gain knowledge in areas like as data analytics, automation, and process optimization. (Gonçalves, da Silva, & Ferreira, 2022).

Finally, Industry 4.0 has had an impact on the way accountants are trained by highlighting the need of technological proficiency. In order to better equip the next generation of accountants for the digital age, schools are beginning to include data analytics, artificial intelligence, and automation into their accounting courses. (Karcioğlu & Binici, 2023).

Overall, Industry 4.0 has had a significant global impact on the accounting profession, introducing automation, improved analytics, cybersecurity challenges, shifting roles, continuous learning, collaboration with IT professionals, real-time reporting, blockchain adoption, reshaping the workforce, and transforming accounting education. These consequences emphasize the need of accountants adapting to and embracing technology changes in order to succeed in the digital era.

2.3. Industry 4.0: Challenges and Benefits for Accounting Profession

The accounting profession faces numerous challenges as a result of Industry 4.0, but it also enjoys a number of benefits. Accounting professionals have substantial challenges in adapting to new accounting software, cloud computing, data analytics tools, and automation technologies, which necessitates the acquisition of new skills and expertise. (Gulin, Hladika, & Valenta, 2019). However, as Industry 4.0 technologies simplify accounting procedures, eliminate human labor, and raise operational efficiency, this challenge results in increased efficiency. Accountants may use automation and artificial intelligence to automate repetitive processes and concentrate on higher-value activities. (Coman , et al., 2022).



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In order to keep up with the altering demands of the industry, skill upgrading is a further challenge. Successfully navigating the digital world will need accountants in Iraq to have expertise in data analysis, information security, and risk management. (Kroon, do Céu Alves , & Martins , 2021). On the bright side, since it creates so much data all at once, Industry 4.0 makes it possible to do better data analytics. Using sophisticated analytics technologies that spot patterns, trends, and anomalies, accountants may learn more about their clients' financial performance, risk management, and strategic decision-making. (Bose, Dey, & Bhattacharjee, 2022).

Technology integration into accounting procedures raises the danger of cyberattacks and data breaches, creating a cybersecurity concern. In light of these threats, it is imperative that accountants in Iraq take all necessary precautions to protect their clients' private financial data. Nonetheless, accountants may have immediate access to financial data thanks to the real-time reporting capabilities made possible by Industry 4.0. This improves decision-making processes, permits quicker and more accurate reporting, and enables quick reactions to financial problems. (Gehem, Usanov, Frinking, & Rademaker, 2015).

In addition, the development of Industry 4.0 raises new ethical concerns about the protection of sensitive information and the appropriate use of cutting-edge technology. While embracing digital revolution in their profession, accountants are required to handle these ethical challenges. On the plus side, Industry 4.0 encourages collaboration among accounting experts. Accounting professionals can cooperate and communicate successfully in scattered locations thanks to cloud-based platforms and remote working capabilities. (Gonçalves, da Silva, & Ferreira, 2022)2022).

Overall, the advantages of increased efficiency, improved data analytics, real-time reporting, and collaborative work outweigh the challenges of technological adoption, skill upgrading, cybersecurity risks, and ethical implications that the accounting profession faces in light of Industry 4.0. Accountants can adapt and succeed in the evolving digital world by properly tackling these barriers and capitalizing on the opportunities.

3. Methodology

This research used a mixed-methods approach, integrating qualitative and quantitative methodologies. It aims to provide an in-depth understanding of the accounting profession's challenges and benefits in the context of Industry 4.0 in Iraq. The quantitative method provides for data collection and analysis to achieve generalizable findings, while the qualitative approach allows for in-depth examination of the challenges and benefits. (Queirós, Faria, & Almeida, 2017).

Questionnaires were employed as the primary data collection method for this inquiry based on five Likert Scale. The questionnaires were designed to gather data from a sample of accountants in Iraq, documenting the challenges that accountants faced while integrating Industry 4.0 technology and the benefits that they experienced. The questionnaires were sent online in order to properly collect data.



To ensure that Iraqi organizations of all sizes are sufficiently represented, a random stratified sampling approach was adopted. In Iraq, the categorization was based on the private, public, and non-profit sectors. The sample size was chosen using applicable statistical processes to give adequate statistical power for data analysis.

The questionnaires data were examined using descriptive analytical methods. To summarize and describe the data, descriptive statistics such as mean, standard deviation, and frequency distribution were used. The results of the survey questions were calculated, the means and standard deviations of the responses were determined, and conclusions were drawn based on the data. Using these descriptive analytical methodologies, we may acquire a general picture of the challenges as well as potential benefits faced by accountants to utilize Industry 4.0 technologies.

In addition to the study strategy and methods, the researchers did a literature review to provide a theoretical foundation for the inquiry and offer credibility to our interpretation of the findings.

In general, this strategy centered on utilizing questionnaires and descriptive analytic tools to identify the benefits as well as the challenges that Iraq's accounting profession faced in the context of industry 4.0.

4. Findings and Discussion

The study findings offer insight on the problems and rewards that the accounting profession in Iraq faces in the context of Industry 4.0. This section analyzes and discusses these challenges, revealing respondents' experiences and views.

Table 1: Demographic Details:

Demographic	Profile	No. of Responds	Percentage %
Gender	Male	196	86%
	Female	32	14%
Group Age	18-24	1	4%
	25-34	84	36.8 %
	35-44	99	43.4 %
	45-54	35	15.4 %
	55 and above	9	3.9 %
Level of Education	High school or below	1	4 %
	Bachelor's Degree	187	82 %
	Master's Degree	31	13.6 %
	Doctorate Degree	9	3.9 %



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Types of Sectors	Public Sector	96	42.1 %
	Private Sector	107	46.9 %
	Non-Profit Sector	21	9.2 %
	Self-employed	4	1.8 %
Years of Experience in Accounting Profession	Less than 5 years	28	12.3 %
	5-10 Years	132	57.9 %
	11-15 Years	47	20.6 %
	16-20 Years	13	5.7 %
	More than 20 Years	8	3.5 %
Respondent's Region	Duhok	15	6.6 %
	Erbil	25	11 %
	Baghdad	34	14.9 %
	Basra	13	5.7 %
	Mosul	10	4.4 %
	Anbar	8	3.5 %
	Dhi Qar	10	4.4 %
	Al-Qadisiyyah	9	3.9 %
	Diyala	10	4.4 %
	Halabja	7	3.1 %
	Karbala	6	2.6 %
	Kirkuk	12	5.3 %
	Maysan	8	3.5 %
	Muthanna	8	3.5 %
	Najaf	12	5.3 %
	Salah Al-Din	12	5.3 %
	Sulaymaniyah	12	5.3 %
	Wasit	12	5.3 %
	Babil	5	2.2 %
	Membership of Professional Organization	Yes	161
No		67	29.4 %
Job Title	Accountant	123	53.9 %
	Financial Analyst	8	3.5 %
	Auditor	50	21.9 %
	Financial Manager	32	14 %
	Other	15	6.6 %
Familiar with concept industry 4.0	Yes, very familiar	103	45.2 %



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	Yes, somewhat familiar	88	38.6 %
	No, not familiar	37	16.2 %
Training or Professional Development Related to Industry 4.0	Yes	68	29.8 %
	No	160	70.2 %

Source: Authors. (2023)

The data in table:1 provides vital insights into the demographic profile and characteristics of the respondents. The questionnaire revealed a large gender variation, with men accounting for 86% of the sample and females accounting for just 14%.

In terms of age categories, the highest number of respondents (43.4%) were between the ages of 35 and 44, showing a large number of mid-career professionals. The 25-34 age group came in second, representing 36.8% of all responses. The youngest age group (18-24) had the lowest participation percentage, at 4%.

The majority of respondents (82%) had a Bachelor's degree, suggesting a well-educated population. Furthermore, 13.6% had a Master's degree, and 3.9% held a Doctorate degree. Only a tiny percentage (4%) of respondents had a high school degree or less, indicating the importance of higher education among the accounting professionals questioned.

The study included respondents from a variety of industries, with the private sector resulting in rankings (46.9%), followed by the public sector (42.1%). The non-profit sector had a lesser proportion (9.2%), while self-employed people made up 1.8% of the respondents. This distribution demonstrates that the accounting profession has a varied variety of job sectors.

In terms of experience, the majority of respondents (57.9%) reported having 5-10 years of experience, showing a strong mid-level presence, with those with less than 5 years of experience accounting for 12.3% and those with 11-15 years of experience accounting for 20.6%. Respondents with 16-20 years of experience made up a lesser fraction of the sample, at 5.7% and 3.5%, respectively. This reveals a wide range of competence among the experts questioned.

Within the studied population, respondents came from a variety of areas. Baghdad had the biggest presence (14.9%), followed by Erbil (11%), and Duhok (6.6%). Other areas had variable amounts of representation, demonstrating a dispersion throughout the nation and presenting a fuller picture of the accounting profession in different locations.

In terms of professional affiliations, 70.6% of respondents indicated they were members of a professional group, showing a strong interest in professional networking and participation. In contrast,



29.4% were not members of any such group. This highlights the importance of professional affiliations and the potential advantages that come with them.

The most frequent job title indicated by respondents was "Accountant," which accounted for 53.9% of the sample. Other notable occupations were "Auditor" (21.9%) and "Financial Manager" (14%). A lesser proportion of respondents claimed employment titles such as "Financial Analyst" (3.5%) or "Other" (6.6%). This distribution highlights the many positions within the accounting profession included in the study.

In terms of knowledge with Industry 4.0, a significant number of respondents (45.2%) indicated that they were "Very familiar," while 38.6% indicated that they were "Somewhat familiar." However, 16.2% indicated they were "Not familiar" with Industry 4.0, indicating a significant knowledge and awareness gap among the experts questioned. This shows that there is a greater need for education and knowledge sharing about the influence of Industry 4.0 on the accounting profession.

Finally, only 29.8% of respondents reported having received Industry 4.0 training or professional development, while the majority (70.2%) had not. This conclusion shows that greater educational opportunities and upskilling activities may be required to provide accounting professionals with the information and skills required to manage the challenges and possibilities offered by Industry 4.0.

Table 2: Descriptive Statistics of Industry 4.0 Challenges for Iraqi Accountants

Descriptive Statistics						
Challenges	N	Minimum	Maximum	Mean	Std. Deviation	Rank
Iraqi Accountants and Industry 4.0 Readiness	228	1	5	2.50	1.431	15
Iraqi Accountants: Role Transformed by Industry 4.0	228	1	5	3.44	1.284	9
Aligned Education for Iraqi Accountants	228	1	5	3.61	1.311	3
Challenges of Digital Integration in Iraqi Accounting	228	1	5	3.57	1.028	5
Iraqi Accountants' Technological Struggles	228	1	5	3.44	1.095	9
Skills Gap: Training for Iraqi Accountants	228	1	5	3.69	1.042	1
Digital Infrastructure Barrier for Iraqi Accountants	228	1	5	3.37	1.125	12
Cybersecurity Concerns for Iraqi	228	1	5	3.68	1.122	2



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Accountants						
Financial Challenges for Iraqi Accounting Firms	228	1	5	3.54	1.116	6
Adaptation Challenges Iraqi Accountants	228	1	5	3.49	1.128	7
Regulatory Gaps: Iraqi Accountants and Industry 4.0	228	1	5	3.56	1.138	4
Awareness Gap Hinders Iraqi Accountants	228	1	5	3.56	1.154	4
Process Overhaul: Iraqi Accountants and Technology	228	1	5	3.58	1.052	3
Skills Shortage: Iraqi Accountants	228	1	5	3.51	1.120	6
Change Resistance: Iraqi Accountants and Industry 4.0	228	1	5	3.62	1.040	8
Valid N	228					

Source: Authors. (2023)

- **Iraqi Accountants and Industry 4.0 Readiness:** A mean score of 2.50 indicates that Iraqi accountants are seen to be unprepared for the changes brought about by Industry 4.0. The unusually large standard deviation of 1.431 shows a substantial amount of disagreement among respondents, suggesting differing perspectives on accountants' preparation in Iraq.
- **Iraqi Accountants Role Transformed by Industry 4.0:** With a mean score of 3.44, respondents largely agree that the function of Iraqi accountants has experienced significant alteration as a result of Industry 4.0's fast technical improvements. The standard deviation of 1.284 indicates that accountants' level of job transition varies.
- **Aligned Education for Iraqi Accountants:** Respondents believe that Iraq's school curriculum appropriately covers the skills and knowledge expected of accountants in the industry 4.0 age. The mean score of 3.61 suggests that respondents agreed on a pretty high degree. However, the standard deviation of 1.311 indicates some variation in assessments of education's conformity with Industry 4.0 standards.
- **Challenges of Digital Integration in Iraqi Accounting:** As evidenced by the mean score of 3.57, integrating digital technology into accounting operations in Iraq offers problems. The



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comparatively low standard deviation of 1.028 indicates that respondents are more in agreement on the problems experienced throughout the digital integration process.

- **Iraqi Accountants' Technological Struggles:** As seen by the mean score of 3.44, accountants in Iraq are struggling to keep up with the speed of technological disruptions brought by Industry 4.0. The standard deviation of 1.095 indicates some variance in the degree to which accountants struggle with technology.
- **Skills Gap: Training for Iraqi Accountants:** As evidenced by the mean score of 3.69, the absence of training and development options for Iraqi accountants to obtain the requisite skills for Industry 4.0 is a serious concern. The comparatively low standard deviation of 1.042 indicates that respondents are more in agreement on the skills gap.
- **Digital Infrastructure Barrier for Iraqi Accountants:** As evidenced by the mean score of 3.37, the availability of inexpensive and dependable digital infrastructure is seen as a major hurdle for Iraqi accountants. The standard deviation of 1.125 indicates that there is some diversity in views of the size of the digital infrastructure barrier.
- **Cybersecurity Iraqi Accountants' Concerns:** Respondents express serious worries about the cybersecurity dangers linked with the accounting profession's digitization. The mean score of 3.68 suggests that respondents agreed on a reasonably high degree. The standard deviation of 1.122 indicates that the amount of cybersecurity issues raised varies.
- **Financial Challenges for Iraqi Accounting Firms:** Implementing Industry 4.0 technology necessitates substantial financial expenditures, providing a difficulty for Iraqi accounting businesses. Respondents' agreement on the financial problems involved is reflected in the mean score of 3.54. The standard deviation of 1.116 indicates that opinions of the degree of financial issues vary.
- **Adaptation Challenges Iraqi Accountants:** The fast technological developments in Industry 4.0 make it difficult for Iraqi accountants to keep informed and relevant, as seen by the mean score of 3.49. The standard deviation of 1.128 indicates that the level of adaptation issues experienced by accountants in Iraq varies.
- **Regulatory Gaps: Iraqi Accountants and Industry 4.0:** Respondents felt that the regulatory framework in Iraq does not effectively meet the accounting profession's problems brought by



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Industry 4.0. The average score of 3.56 shows a moderate degree of agreement. The standard deviation of 1.138 indicates that there is some diversity in views of the number of regulatory loopholes.

- **Awareness Gap Hinders Iraqi Accountants:** Industry 4.0 implementation in Iraq is hampered by a lack of knowledge and understanding among accounting experts. The respondents' agreement on the awareness gap is reflected in the mean score of 3.56. The standard deviation of 1.154 indicates some variation in perceptions of awareness and knowledge.
- **Process Overhaul: Iraqi Accountants and Technology:** As evidenced by the mean score of 3.58, integrating new technology into accounting procedures in Iraq necessitates major adjustments to current processes and systems. The comparatively low standard deviation of 1.052 indicates that respondents are more in agreement on the need for process redesign.
- **Skills Shortage: Iraqi Accountants:** Respondents identify the difficulty of a skills scarcity among Iraqi accountants with experience in both accounting and technology. The mean score of 3.51 suggests that respondents agreed. The standard deviation of 1.120 indicates that there is some diversity in opinions of the degree of the skills shortage.
- **Change Resistance: Iraqi Accountants and Industry 4.0:** Change resistance among Iraqi accountants impedes the profession's effective adoption of Industry 4.0 technology. The mean score of 3.62 represents respondents' agreement that change resistance exists. The standard deviation of 1.040 indicates that there is significantly less variety in judgments of the extent of change resistance.

Table 3: Descriptive Statistics of Industry 4.0 Benefits for Iraqi Accountants

Descriptive Statistics						
Benefits	N	Minimum	Maximum	Mean	Std. Deviation	Rank
Efficiency Improvement	228	1	5	2.98	1.142	5
Expanded Service Scope	228	1	5	3.33	1.029	9
Enhanced Accuracy of Financial Reporting	228	1	5	3.39	1.138	6
Real-time Financial Data Analysis	228	1	5	3.33	1.083	9



Facilitated Collaboration and Communication	228	1	5	3.32	1.126	10
Improved Accessibility of Accounting Information	228	1	5	3.32	1.204	10
Enhanced Presentation of Financial Information	228	1	5	3.29	1.215	14
Streamlined Auditing Process	228	1	5	3.34	1.167	8
Increased Scalability and Flexibility	228	1	5	3.50	1.124	4
Reduced Risk of Errors and Fraud	228	1	5	3.37	1.201	7
Better Compliance with Accounting Standards and Regulations	228	1	5	3.52	1.072	3
Improved Transparency and Security	228	1	5	3.21	1.216	15
Focus on Strategic and Analytical Activities	228	1	5	3.55	1.038	2
New Career Opportunities and Roles	228	1	5	3.60	1.076	1
Cost-effectiveness	228	1	5	3.49	1.105	5
Valid N	228					

Source: Authors. (2023)

According to a review of respondents' assessments, the use of Industry 4.0 and digital technology in the accounting profession in Iraq has demonstrated potential results.

- **Improved Efficiency:** Adoption of digital technologies resulted in a moderate degree of agreement (mean rating of 2.98) among respondents, showing that these technologies have increased the efficiency of accounting procedures. However, there is some variety in replies, indicating varied perspectives on the magnitude of efficiency gains (standard deviation of 1.142).
- **Expanded Service Scope:** Respondents largely agreed (mean rating of 3.33) that Industry 4.0 has broadened the range of services available to accountants in Iraq. In comparison to the efficiency increase component, there is less diversity in replies (standard deviation of 1.029), suggesting a better degree of agreement.
- **Enhanced Financial Reporting Accuracy:** The usage of automation and Artificial Intelligence (AI) in Iraq's accounting profession obtained a better degree of agreement (mean rating of 3.39), indicating that these technologies have improved financial reporting accuracy. However, there is considerable response variability (standard deviation of 1.138).



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- **Real-time Financial Data Analysis:** Respondents agreed (mean rating of 3.33) on the advantages of Industry 4.0 technologies that enable real-time financial data analysis. The standard deviation of 1.083 suggests a considerable amount of response variability.
- **Facilitated collaboration and Communication:** With a reasonable degree of agreement (mean rating of 3.32), the integration of digital tools and platforms has facilitated cooperation and communication among accountants in Iraq. There is, however, considerable variation in replies (standard deviation of 1.126).
- **Improved Accounting Information Accessibility:** According to respondents, Industry 4.0 has enhanced accounting information accessibility for stakeholders in Iraq (mean rating of 3.32). The standard deviation of 1.204, on the other hand, indicates a somewhat significant degree of diversity in the replies, showing diverse perspectives on the level of accessibility improvements.
- **Improved Financial Information Presentation:** The usage of advanced analytics and data visualization tools earned a moderate degree of agreement (mean rating of 3.29), indicating that these technologies have improved financial information presentation. The standard deviation of 1.215 implies that answers are somewhat variable.
- **Streamlined Auditing Process:** With a mean grade of 3.34, sector 4.0 technologies have expedited the auditing process in Iraq's accounting sector. There is, however, some variation in replies (standard deviation of 1.167).
- **Increased Scalability and Flexibility:** According to respondents (mean rating of 3.50), the availability of cloud computing solutions in Iraq has boosted the scalability and flexibility of accounting processes. Responses had a moderate amount of variability (standard deviation of 1.124).
- **Reduced the Risk of Errors and Fraud:** The implementation of automated financial management systems has resulted in a moderate degree of agreement (mean rating of 3.37) among respondents, implying a lower risk of errors and fraud. The standard deviation of 1.201 suggests that answers vary.
- **Better Compliance with Accounting Standards and Regulations:** Respondents agreed (mean grade of 3.52) that Industry 4.0 technologies had improved compliance with accounting standards and regulations in Iraq. Responses had a moderate amount of variability (standard deviation of 1.072).
- **Improved Transparency and Security:** The use of blockchain technology in the accounting profession in Iraq earned a moderate degree of agreement (mean rating of 3.21), suggesting that it has increased transparency and security. However, response variability is rather considerable (standard deviation of 1.216).
- **Increased concentrate on Strategic and Analytical Activities:** Respondents agreed more strongly (mean rating of 3.55) that the automation of mundane work via Industry 4.0 has enabled Iraqi accountants to concentrate more on strategic and analytical activities. The replies vary little (standard deviation of 1.038).
- **New career opportunities and positions:** According to respondents (mean rating of 3.60), Industry 4.0 has created new job chances and positions for accountants in Iraq. Responses had a moderate amount of variability (standard deviation of 1.076).



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- **Cost-effectiveness:** Industry 4.0 improvements have made accounting services more cost-effective for enterprises in Iraq, with respondents agreeing more strongly (mean rating of 3.49). The standard deviation of 1.105 indicates that answers vary somewhat.

Finally, the data analysis shows that the use of Industry 4.0 and digital technology provides multiple benefits to the accounting profession in Iraq. However, responses vary, reflecting individual ideas and experiences, which may offer challenges to equitably applying new technology. Overall, by embracing these technological improvements and tackling the challenges that arise, the accounting profession in Iraq may position itself for sustained success in the digital age.

5. Conclusion

The findings of the questionnaire provided light on the challenges and benefits that the accounting profession in Iraq faces in the context of Industry 4.0. The results show that the profession is unprepared to adapt to the changes brought about by Industry 4.0, and there are substantial challenges in integrating digital technologies, keeping up with technological disruptions, and offering accounting training opportunities. However, there are some promising benefits to adopting Industry 4.0 technologies, such as increased efficiency, expanded service scope, improved financial reporting accuracy, real-time data analysis, facilitated collaboration, improved accessibility of accounting information, streamlined auditing processes, increased scalability and flexibility, reduced risk of errors and fraud, better compliance with regulations, improved transparency and security. To fully reap the benefits of Industry 4.0 technology, the accounting profession in Iraq must overcome the stated issues.

The following suggestions are made based on the questionnaire results:

- **Enhance Education and Training:** Invest in comprehensive and up-to-date education and training programs to provide accountants with the essential skills and information to manage Industry 4.0's problems and possibilities. Collaboration with educational institutions and professional organizations may help to guarantee that the accounting curriculum is up to date with the needs of the digital age.
- **Strengthen Digital Infrastructure:** Focus on creating and updating Iraq's digital infrastructure to create a strong basis for the adoption and integration of Industry 4.0 technology in accounting procedures. This entails providing inexpensive and dependable internet connection as well as access to required gear and software.
- **Address Security Concerns:** Given the widespread concern about digitalization's security dangers, it is critical to prioritize data security and privacy safeguards. Create strong cybersecurity policies and keep them up to date to secure sensitive financial information from any attackers.
- **Increase Awareness and comprehension:** Through workshops, seminars, and awareness campaigns, increase knowledge and comprehension of Industry 4.0 among accounting professionals in Iraq. Raising knowledge about the potential advantages of new technology and how to overcome problems may lead to higher acceptance and adoption.



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- **Collaboration with Regulatory agencies:** Work with regulatory agencies to examine and improve current legislation in order to better handle the problems of Industry 4.0. Regulatory frameworks must be modified to accommodate technology advances and to provide an environment conducive to the application of digital technologies in accounting procedures.
- **Promote Continuous Learning:** Encourage accountants to pursue continuous learning and professional development opportunities in order to remain current and relevant in the rapidly changing digital world. Offering training programs and incentives for upskilling and reskilling might be part of this.
- **Facilitate Technology Implementation:** Offer financial support and incentives to Iraqi accounting businesses to assist them in overcoming the financial burden of integrating Industry 4.0 technology. Collaboration with technology suppliers and the provision of subsidized technology solutions may also help to speed up the integration process.
- **Foster an Innovation Culture:** Foster an innovation culture inside accounting companies and organizations by encouraging staff to experiment with and embrace new technology. This may help to create a more welcoming atmosphere for Industry 4.0 solutions.

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