Jordan Journal of Business Administration, Volume **20**, No. **2**, **2024**
DOI: https://doi.org/10.35516/jjba.v20i2.2012

Internet of Things "IoT" and the Quality of Decision-making during the Covid-19 Pandemic: A Perspective of Accounting Managers within the Jordanian Industrial Sector

Adel M. Qatawneh [1*], ***Enas M. Al-Lozi*** [2] ***and Nurah M. Al-Lozi*** [3]

ABSTRACT

The current study investigates the influence of adopting internet of things (IoT) within the field of accounting in order to enhance and support a better decision-making process during the COVID-19 pandemic. The study sheds light on this issue from the perspective of managers and leaders within the Jordanian industrial sector. Variables of IoT specifications within the accounting field were taken into consideration, including (AI and cloud computing, real-time data, streamlining accounting operations, minimizing auditing efforts and efficiency of workforce management) as independent variables, while (quality of accounting decision-making) was considered as the dependent variable. A quantitative approach was employed, through an online-uploaded questionnaire distributed to a sample of (143) accounting managers within industrial organizations in Jordan. SPSS, v. 27 was used and the results of the study proved the acceptance of the main hypothesis, stating that "IoT has the ability to present better quality of accounting decisions during the COVID-19 pandemic". The results also indicated that the variables of IoT were influential, where the variable (minimizing auditing efforts) scored a medium correlation and explained 43.3% of the variance, in comparison to the least influential variable which appeared to be AI and cloud computing with a medium correlation explaining 25.7% of the variance. The study recommended the necessity of conducting analysis of possible risks in a clear and comprehensive manner in order to highlight the prediction, evaluation and treatment of occurring problems in the future.

Keywords: Internet of things, Quality of accounting information, RFIDs, Quality of accounting decisions, COVID-19 pandemic.

1. Associate Professor of Accounting, Faculty of Business, Al-Zaytoonah University of Jordan. * Corresponding Author. a.qatawneh@zuj.edu.jo
2. Associate Professor of MIS, Faculty of Business, Al-Zaytoonah University of Jordan. enas.al-lozi@zuj.edu.jo
3. Instructor of Accounting, PhD in Accounting, Faculty of Business, The University of Jordan. n.allozi@ju.edu.jo

Received on 22/12/2021 and Accepted for Publication on 6/9/2022.

أثر تبني استراتيجية إنترنت الأشياء في مجال المحاسبة في تعزيز عملية صنع القرار في أثناء جائحة كورونا من منظور المديرين والقادة في القطاع الصناعي الأردني

عادل م. قطاونة[1]، إيناس م. اللوزي[2]، نورة م. اللوزي[3]

ملخص

تهدف الدراسة الحالية إلى الوقوف على أثر تبني استراتيجية إنترنت الأشياء (IoT) في مجال المحاسبة من أجل تعزيز ودعم عملية صنع القرار بشكل أفضل في أثناء جائحة COVID-19. وسلطت الدراسة الضوء على هذا الموضوع من منظور المديرين والقادة في القطاع الصناعي الأردني. تم أخذ متغيرات وأبعاد إنترنت الأشياء في مجال المحاسبة في الاعتبار، بما في ذلك (الذكاء الاصطناعي والحوسبة السحابية، والبيانات في الوقت الحقيقي، وتبسيط العمليات المحاسبية، وتقليل جهود التدقيق، وكفاءة إدارة القوى العاملة) كمتغيرات مستقلة، بينما اعتُبرت (جودة اتخاذ القرارات المحاسبية) المتغير التابع. تم استخدام المنهج الكمي من خلال استبيان جرى تحميله عبر الإنترنت وتوزيعه على عينة قوامها (143) مدير محاسبة داخل مؤسسات صناعية في الأردن. وتم الاعتماد على الحزمة الإحصائية للعلوم الاجتماعية SPSS بنسختها السابعة والعشرين من أجل التعامل مع البيانات الأولية التي تم جمعها. وقد أثبتت الدراسة قبول الفرضية الرئيسية التي تنص على أن "إنترنت الأشياء لديها القدرة على تقديم قرارات محاسبية ذات جودة أفضل في أثناء جائحة COVID-19". كما أشارت النتائج إلى أن متغيرات إنترنت الأشياء كانت مؤثرة، بحيث تأثرت جودة اتخاذ القرارات المحاسبية في الغالب بالمتغير (تقليل جهود التدقيق) الذي سجل ارتباطًا متوسطًا جعله يفسر 43.3% من التباين، مقارنة بالمتغير الأقل تأثيرًا الذي ظهر أنه الذكاء الاصطناعي والحوسبة السحابية بارتباط متوسط جعله يفسر 25.7% من التباين. وأوصت الدراسة بضرورة إجراء تحليل للمخاطر المحتملة بشكل واضح وشامل من أجل الإسراع في التنبؤ وتقييم ومعالجة المشاكل التي تحدث في المستقبل.

الكلمات الدالة: إنترنت الأشياء، جودة المعلومات المحاسبية، جودة القرارات المحاسبية، جائحة كورونا.

1. أستاذ المحاسبة المشارك، كلية الأعمال، جامعة الزيتونة الأردنية.
2. أستاذ نظم المعلومات الإدارية المشارك، كلية الأعمال، جامعة الزيتونة الأردنية.
3. دكتوراه في المحاسبة، كلية الأعمال، الجامعة الأردنية.

تاريخ استلام البحث 2021/12/22 وتاريخ قبوله 2022/9/6.

INTRODUCTION

The Internet of Things (IoT) affects a variety of industries around the world in a number of creative scenarios, far more than mobile devices connected to the Internet. It has opened up a world of opportunities and offered an influential dilemma of predictive analysis and decision-making, including agricultural use, energy consumption and financial planning. At the beginning, only desktop devices were connected to the Internet and played a sufficient role in changing the way how people live and industries operate. Nowadays, everything, such as hand-held devices, cell phones, watches, electricity meters, surveillance cameras, industrial-production units, air conditioners and other smart devices, are connected to this global network (Kusuma, 2020).

Kevin Ashton is considered the first to use the term Internet of Things within the era of the 1990s (Mohamed, 2019), where he referred to the idea of capturing data from various access points without having to directly access them. However, the idea did not reach its culmination until the Internet era evolved and spread to a greater extent and smart mobile devices became connected to the Internet in a smoother and faster manner (ICAEW, 2009).

Problem Formulation

According to Al-Nahar (2019), the quality of financial services and practices is highly influenced by many factors surrounding them, which include organizational environments, experiences of individuals and end-users and the used software programs dealing with finance. IoT appeared as an approach that formulates a framework of best financial practices to be built within and modified according to interconnectedness among different accounting programs, examples of which are barcode scanners, RFIDs and QR scanners, scanning and transmitting relevant information of an item, product or file to a certain cloud; a cloud that is reachable by relevant parties and decision-makers, which in turn facilitates the process of making the right decision in a real-time state and avoiding risks of taking weak decisions.

Chen et al. (2019) agreed with Al-Nahar arguing that the idea of real-time feed of data, in addition to the mutual location of data and information (on the cloud) eased the process of reaching high-quality financial reporting that is supported by error-free data and is at the same time authentic to the degree that it might not need to be verified or revised due to the right sourced and generated data obtained from computerized devices, reflecting its authenticity. Cao et al. (2019) argued that accounting profession is becoming more dependable on the Internet, as accounting nowadays is relying heavily on the IoT as an approach to get finances analyzed and completed without the need of having accountants, auditors or decision-makers connected synchronously. Cao et al. (2019) added that launching accounting practices through the IoT managed to give an easy access to financial information for decision-makers that is of high quality, enabling them to take the right decisions in the optimal way possible.

Literature Review

Concept of Internet of Things (IoT)

Xin et al. (2018) defined the Internet of Things as a network of physical objects, most of which are not originally created to connect to the Internet, such as industrial machines, air conditioners and even automobiles. Today, devices are provided with dedicated sensors and software programs that interact seamlessly with each other and along with human beings. Advances in mobile-application development have enabled users to control connected physical objects using custom applications created for individual usage. The rapid changing of web-based platforms enables social interactions around the world. The web-based platforms provide several advantages for both the business and its customers, support

consumers to go more sophisticated and enable them to use new tactics in the purchasing processes (Albors & Hervas, 2008; Bsheer et al., 2020; Al-Hashem et al., 2022).

Liu et al. (2020) defined the Internet of Things as a group (network) of devices, whether industrial or household objects, that contain sensors and smart capabilities of communicating with the Internet and expanding the scope of their communication, leading to their description as "smart devices".

Nowadays, users control everything from televisions to refrigerators through their smartphones and personal devices. The Internet of Things is already bigger than ever before and is still growing rapidly, with global research statistics indicating that the number of devices connected to the Internet will increase from 26.66 billion devices in 2019 to 75.44 billion devices worldwide by 2025.

Shi et al. (2019) stated that these devices can communicate, interact, connect to the Internet and receive commands; furthermore, they can be monitored and controlled remotely (Riley et al., 2021). Considering that China appears to be the most active region in using and applying the Internet of Things, from a Chinese point of view, the term "Internet of Things" is the synonym of the concept "Internet everywhere or Internet everything", reflecting the usage of the Internet in everything that exists around us in order to complete the required humanitarian tasks regardless of their size and nature (Nica and Stehel, 2021).

Quality of Accounting Decision-making

The concept of quality of accounting decision-making refers to the extent of matching the accounting decisions taken with achieving the required objectives and goals and therefore, it can be said that the quality of accounting decision-making represents the accounting and financial decisions that are taken based on relevant data to analyze problems and solve decision-making dilemmas (Azmi and Sri, 2020).

Abdelraheem et al. (2021) indicated that accounting decisions are very critical, as they give an overview of the entire performance of an organization in terms of the financial and accounting situation and thus, their quality is essential in order to reach the optimal results of the decisions taken, serving the organization in a way that helps it avoid risks.

As for Suzan et al. (2020), it was indicated that the quality of accounting decision-making is highly related to the main source of relevant accounting information, as false and manipulated information cannot lead to correct accounting decisions and therefore, it is necessary to define the qualitative characteristics of accounting information and indicate the quality of this information and its effect on administrative decision-making. It is also important to determine the critical factors affecting the management when making decisions, through full disclosure of accounting policies and the information provided by financial reports and statements.

Criticism of IoT within the Field of Accounting

On the other hand, previous research has criticized the Internet of Things and its use in accounting practices (Qatawneh, 2021), as it represents one of the means that can provide others a way to penetrate and tamper with accounting information, in addition to the ethical usage of the Internet of Things in accounting, where unethical use can cause damage to the accounting infrastructure, such as frauds, unauthorized usage and access and many piracy-related issues (Fan, 2019).

Development of Hypotheses

The idea of the Internet of Things has greatly contributed to simplifying and facilitating access to information through the association of objects, resources and tools on the web, thus facilitating individual access to it in order to make decisions related to its existence, such as purchase orders, sale

offers or even datasets of business-process approvals (Chen et al., 2019).

It is worth stating that the Internet of Things today has a great impact on financial resources, as the introduction of the Internet of Things in financial affairs has led to the creation of safer, smarter and more accurate results compared to the manual inputs/outputs that have been previously presented (Williams et al, 2020).

Internet of Things and Quality of Accounting Decision-making

IoT appeared to be helpful in terms of streamlining accounting information and operational data. An example of that is when a new item is being purchased, the accounting department can easily scan the barcode of this item and all its relevant descriptive information – type, price, specification and source – which can be transmitted in a real-time manner to the cloud, making it easier for interested parties to take decisions of approval or rejection (Cao et al., 2019; Rosa and Purfini, 2019).

Management, whether financial, administrative or of any other type, has no value without significant real-time data and information, where such information and data are required to be correct, accurate and free of human error (Deloitte, 2020). Through the Internet of Things, information and data have become more manageable through the actual presence of them in a real-time manner, the organization and accuracy which they enjoy as induced from computer devices in which errors are generally less and the periodic organization of expenditures and their treachery in a way that provides information clarity and accuracy for interested parties (Coatney and Poliak, 2020).

In general, the Internet of Things has affected the quality of accounting decision-making, especially in the audit aspects of accounting, as the Internet of Things ensured the organizational flow of accounting information, identifying its sources and ensuring the actual flow of data within the required time regardless of its destination and therefore, decision-making became based on the cloud link to upload expense information and billing data to the basic accounting systems**.** Chen et al. (2019) noted that this actually led to changes in the decision-making process, as the decision-makers are no longer required to be physically present in offices in order to review and audit business processes, but rather they can communicate through the cloud or any other accounting application related to the transactions and financial files and thus take the right decision regarding them.

Al-Nahar (2019) argued that in the field of auditing, the Internet of Things has exempted auditors from the need for auditing, as the book is tracked electronically through the cloud and related files, invoices and financial matters are linked to the electronic systems available in the organization, such as daily entries of data within books, data sorting, donations and other financial transactions whether external or internal (Al-Sai et al., 2020), in addition to the ability to verify them immediately and at the required time. That is, the Internet of Things saves the accountability related to pain and suffering of auditing, by identifying the source of each entry, the mechanism of accessing it, processing and analyzing it and placing optimal decision-making in a real-time manner (Deloitte, 2020).

In addition, according to Yoon (2020), the Internet of Things has contributed to changing the accounting decision-making mechanism, whereby decision-makers are able to receive all the parameters associated with accounting files through digital systems instead of the need of their physical presence in a certain place in order to collect data, cleanse it, analyze it and make decisions based on it.

On the other hand, the Internet of Things helped in making accounting decisions related to reducing expenditures, as today decision-makers are fully aware of the workflow mechanism, the periods of work employees spend, their location, the productive hours

compared to others and based on this information, decision-makers are able to make decisions to suspend work and appointments or promote them according to the data that they have access to through the Internet of Things (ICAEW, 2009)**.**

Ali et al. (2020) argued that the idea of monitoring and inventorying the stock was impossible during the pandemic period due to the conditions of continuous closures and curfews. Through the Internet of Things, decision-makers were able to follow-up the stock and control inventory and stand on its data by linking the materials within the inventory with electronic systems and uploading them to the cloud. So, they were able to track and manage the stock to ensure its safety in terms of storage conditions, temperatures and expiration dates, as the Internet of Things provided this information by linking the stock to RFID chips and smart packaging, enabling decision-makers to expand their value chain network and information at any time, which in turn enabled them to make more accurate decisions about distribution, destruction, supply, demand, ... etc.

From another perspective, Hwang et al. (2013) stated that the use of artificial intelligence (AI) and cloud computing in accounting operations has a great impact on facilitating accounting operations and managing matters of information access to the competent authorities for decision-making purposes. Ali et al. (2020) indicated that relying on the Internet of Things has proven its worth in improving accounting outputs, raising the level of information quality in accounting, following-up assets, revenues and product quality, following-up employee performance, improving administrative and accounting plans and decision-making processes, in addition to developing predictive plans and strategies of the organization based on the accounting operations that take place through the electronic cloud. In a comparative study between traditional accounting and cloud accounting, Lonesco et al. (2013) came out with that cloud-accounting operations can be moved to cloud-based electronic platforms for cost savings and this is an indicator of the role of knowledge and skills related to modern information systems in the employment process for accountants and internal auditors.

Ziegeldorf et al. (2019) on the other hand indicated that Internet of Things has shown the ability to automate processes, analyze data and give specialists the opportunity to make the right decisions, by simplifying accounting procedures and reducing the burden on accountants and auditors. It also contributes to providing auditors with audit and accounting skills as financial specialists by giving them the opportunity to learn, focus and acquire various experiences to increase the level of their financial and accounting performance to the benefit of the organization.

Based on the aforementioned problem formulation and development of hypotheses, the current study aimed at examining the influence of adopting Internet of Things (IoT) within the field of accounting in order to enhance and support a better decision-making process. The study shed light on this issue from the perspective of managers and leaders within the Jordanian industrial sector.

Going through previous studies which were used to build the research hypotheses and formulate the study tool (questionnaire), the researchers were able to extract the most common variables and highlighted their relationships with each other in the following model:

Through examining Figure (1), the following set of hypotheses was created:

Main Hypothesis

H: Internet of Things has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

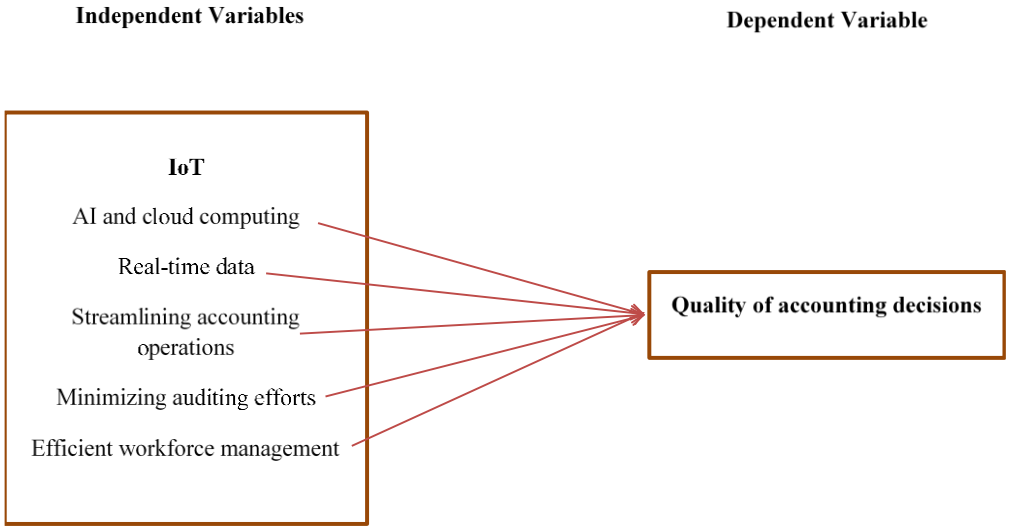

Figure (1)
Study model

Sub-hypotheses

H1: AI and cloud computing have a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

H2: Real-time data has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

H3: Streamlining accounting operations has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

H4: Minimizing auditing efforts has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

H5: Efficient workforce management has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

Based on that, the current study`s objectives can be summarized as follows:

- To identify the sensitivity of the decision-making process in the accounting field during the COVID-19 pandemic.
- To highlight how the Internet of Things can provide a better decision-making environment.

Data Collection

Methodological Approach

The current study realizes its aim through depending mainly on a quantitative approach; this approach is built on collecting numerical data through population sampling and screen processing through computer- generated programs in order to reach valid and relevant numerical results to interpret their relationships to the highlighted problem.

Study Tool

A questionnaire was constructed as the main tool of the study. The questionnaire was built and formulated through two main parts; the first part took into account the demographics of the study sample in terms of (age, gender, qualification and experience), while the other part was based on statements related to the independent and dependent variables of the study, including (AI and cloud computing, real-time data, streamlining accounting operations, minimizing auditing efforts, efficient workforce management and the quality of accounting decision). The questionnaire was built

depending on previous studies, including Ali et al. (2020), Wu et al. (2019) and Al-Nahar (2019), using a 5-scale Likert construct (1 strongly disagree, 2 disagree, 3 neutrals, 4 agree, 5 strongly agree).

Population and Sample

The population of the current study consisted of all accounting managers within the industrial sector in Jordan amounting to (200) accounting managers in different industrial organizations in Jordan. A convenient sample of (143) managers was chosen to represent the population of the study.

Application Process

Due to COVID-19 health precautions, the questionnaire was electronically uploaded and distributed to the intended sample through sending it *via* e-mail. All volunteering participants had access to information related to the study, which included its aim, application and objectives. In addition, the participants were aware of their rights through taking part in the study; such rights included the confidentiality of data, their right to be exposed to the study results, in addition to their right to withdraw from participating whenever they want without pressure. After application, the researchers were able to retrieve (143/200) properly filled questionnaires, indicating a response rate of (71.5%).

Screening and Analysis

Primary results collected from the participants were screened out and analyzed using SPSS, v. 27. Cronbach's alpha was used in order to test the consistency of the study tool. Alpha value was 0.957, which is greater than the accepted value of 0.60, reflecting the reliability of the questionnaire. Other tests employed were: descriptive analysis, multiple-and simple-regression analysis.

Analysis and Discussion

Demographic Results

Demographic characteristics of the study sample were screened out and analyzed, as shown in Table 1. It appeared that the majority of respondents were males forming (76.9%) of the total sample, given the industrial nature of the study sector which limited the percentage of females to the minimum. Also, the table indicates that the majority of respondents held an educational degree of (BA) forming (67.1%) of the total sample with an experience of (10-13) years forming (32.9%) of the total study sample.

Table 1
Descriptive statistics of the sample

Gender			
		Frequency	Percent (%)
	Male	110	76.9
	Female	33	23.1
Education			
	Diploma	14	9.8
	BA	96	67.1
	MA	27	18.9
	PhD	6	4.2
Experience			
	2-5 years	26	18.1
	6-9	45	31.5
	10-13	47	32.9
	+14	25	17.5
	Total	143	100.0

Questionnaire Analysis

In Tables (2 & 3), the attitudes of the respondents towards the statements of the questionnaire (Table 2) were calculated and showed a positive attitude from their side, given that their answers scored higher than the mean of the scale 3.00. The most positively answered statement was (All the transactions can be tracked for errors and sent to the accounting department in real time), which scored a mean of (3.86/5.00) compared to the least positively answered statement (All accounting data is shared between the members of the accounting department), which scored

a mean of (3.35/5.00). As for Table 3, there also appeared a positive attitude from the respondents towards the variables of the study, as the majority of respondents answered positively the variable of (minimize auditing efforts) scoring a mean of (3.70/5.00) compared to the variable of (real-time data) which scored the least mean of (3.36/5.00).

Table 2

Descriptive statistics of the questionnaire

	Mean	Std. Deviation
IoT		
AI and Cloud Computing		
All accounting data was reachable through the cloud.	3.68	1.254
Cloud and AI didn't need an actual presence from the accounting team.	3.57	1.225
Managers and leaders depended on uploading all data and information to the cloud.	3.58	1.116
Quarantine didn't affect accounting decisions, as all data was available all the time.	3.50	1.125
The organization is acquainted to uploading all its accounting data securely to the cloud.	3.52	1.034
Real-time Data		
All accounting data is shared between the members of the accounting department.	3.35	1.140
The data being shared was all recent and up-to-date.	3.39	1.088
Leader and manager of the accounting department were able to evaluate the data and reject it for modification in a real-time manner.	3.35	1.076
The data was shared with decision-makers in a real-time manner for instant decision-making.	3.41	1.016
There was no delay in decisions related to accounting due to quarantine and closures.	3.38	1.100
IoT helped in reaching an error-free accounting process.	3.34	1.113
Streamlining Accounting Operations		
All needed data is streamlined between leaders and managers for efficient decision-making.	3.57	1.065
Streamlined data was checked and evaluated for any possible mistakes or needs for modification.	3.51	1.074
Decision-making was built based on streamlined data that is shared among all parties.	3.59	1.218
The information was available for all interested parties regardless of their geographical places.	3.46	1.185
Due to streamlining, all accounting information would be received by the accounting professionals without any human intervention.	3.76	1.070
Minimizing Auditing Efforts		
Computer-generated processes managed to prevent any human mistakes.	3.73	1.022
All entering mistakes were able to be noted due to programs and software.	3.73	1.034
Any anomalies in the finances or detection fraud were able to be found through the software.	3.62	1.033
All the transactions can be tracked for errors and sent to the accounting department in real time.	3.86	0.969
Due to IoT, the efforts made for an audit get significantly minimized.	3.60	1.022
Efficient Workforce Management		
IoT helped accountants to track their performance, improve their processes and optimize their efficiency.	3.76	1.021
IoT makes it possible for accountants to track their efficiency during the day.	3.78	0.996
IoT devices can tell the hours when the accounting department has been the most alert and the most unproductive.	3.61	1.094
IoT is based on barcode scanning and not on manual entry, which eliminates the chances of errors.	3.71	0.903
With quarantine, the IoT helped accounting professions follow their work smoothly and efficiently.	3.60	1.089

Quality of Accounting Decision		
Making accounting decision is based on real-time data and the IoT presented that.	3.50	1.192
Making decisions is very sensitive to error-free entries.	3.59	1.050
IoT facilitated the instant reach of files and data through the quarantine.	3.35	1.109
The quality of decision-making in accounting may negatively or positively influence the whole organization.	3.39	1.120
IoT managed to preserve the quality of decision-making process in accounting to its optimum performance.	3.45	1.208

Table 3

Descriptive statistics of the variables

	Mean	Std. Deviation
AI and Cloud Computing	3.5692	0.94327
Real-time Data	3.3695	0.89253
Streamlining Accounting Operations	3.5776	0.90914
Minimizing Auditing Efforts	3.7091	0.84478
Efficient Workforce Management	3.6909	0.80517
Quality of Accounting Decision	3.4559	0.92032

Testing of Hypotheses

H: Internet of Things has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

Table 4

Testing the main hypothesis

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	0.736[a]	0.541	0.525	0.63460	
ANOVA					
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	65.100	5	13.020	32.330	0.000[b]
	Residual	55.173	137	0.403		
	Total	120.272	142			
Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	0.093	0.279		0.333	0.740
	Cloud	0.036	0.077	0.037	0.476	0.635
	Real-time	0.299	0.094	0.290	3.172	0.002
	Streamlining	-0.005	0.095	-0.005	-0.057	0.954
	Minimizing	0.380	0.096	0.349	3.973	0.000
	Efficient	0.226	0.089	0.198	2.533	0.012

By using multiple regression, it was found that F= 32.33, which was significant, since the p-value is less than 0.05, which means that "Internet of Things has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic". Also, it was found that R= 0.736, reflecting a high level of correlation, where the independent variables explained 54.1% of the variance in the dependent variable.

H1: AI and cloud computing have a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

Table 5

Testing the 1st sub-hypothesis

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	0.507[a]	0.257	0.251	0.79630	
ANOVA					
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	30.864	1	30.864	48.674	0.000[b]
	Residual	89.408	141	0.634		
	Total	120.272	142			
Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.692	0.261		6.470	0.000
	Cloud	0.494	0.071	0.507	6.977	0.000

By using linear regression, it was found that F= 48.674, which was significant, since the p-value was less than 0.05, which means that "AI and cloud computing have a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic". Also, it was found that R= 0.507, reflecting a medium level of correlation, where the independent variable explains 25.7% of the variance in the dependent variable.

H2: Real-time data has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

Table 6

Testing the 2nd sub-hypothesis

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	0.621[a]	0.386	0.382	0.72364	
ANOVA					
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	46.438	1	46.438	88.681	0.000[b]
	Residual	73.835	141	0.524		
	Total	120.272	142			

Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.297	0.237		5.470	0.000
	Real	0.641	0.068	0.621	9.417	0.000

By using linear regression, it was found that F= 88.681, which was significant, since the p-value was less than 0.05, which means that "Real-time data has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic". Also, it was found that R= 0.621, reflecting a medium level of correlation, where the independent variable explains 38.6% of the variance in the dependent variable.

H3: Streamlining accounting operations has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

Table 7
Testing the 3rd sub-hypothesis

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	0.563[a]	0.317	0.312	0.76347	
ANOVA					
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	38.086	1	38.086	65.342	0.000[b]
	Residual	82.186	141	0.583		
	Total	120.272	142			
Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.418	0.260		5.452	0.000
	Streamlining	0.570	0.070	0.563	8.083	0.000

By using linear regression, it was found that F= 65.342, which was significant, since the p-value was less than 0.05, which means that "Streamlining accounting operations has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic". Also, it was found that R= 0.563, reflecting a medium level of correlation, where the independent variable explained 31.7% of the variance in the dependent variable.

H4: Minimizing auditing efforts has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

Table 8
Testing the 4th sub-hypothesis

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	0.658[a]	0.433	0.429	0.69544	
ANOVA					
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	52.079	1	52.079	107.682	0.000[b]
	Residual	68.193	141	0.484		
	Total	120.272	142			
Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	0.797	0.263		3.033	0.003
	Minimizing	0.717	0.069	0.658	10.377	0.000

By using linear regression, it was found that F= 107.682, which was significant, since the p-value was less than 0.05, which means that "Minimizing auditing efforts has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic". Also, it was found that R= 0.658, reflecting a medium level of correlation, where the independent variable explained 43.3% of the variance in the dependent variable.

H5: Efficient workforce management has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic.

Table 9
Testing the 5th sub-hypothesis

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	0.584[a]	0.341	0.336	0.74983	
ANOVA					
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	40.996	1	40.996	72.914	0.000[b]
	Residual	79.277	141	0.562		
	Total	120.272	142			
Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	0.993	0.295		3.364	0.001
	Efficient	0.667	0.078	0.584	8.539	0.000

By using linear regression, it was found that F= 72.914, which was significant, since the p-value was less than 0.05, which means that "Efficient workforce management has a statistically significant influence on the quality of

accounting decisions during the COVID-19 pandemic". Also, it was found that R= 0.584, reflecting a medium level of correlation, where the independent variable explained 34.1% of the variance in the dependent variable.

Discussion

The current study aimed at examining how the Internet of Things managed to preserve high-quality accounting decisions during the COVID-19 pandemic and the closures and quarantine that accompanied the pandemic. For that sake, a questionnaire was employed and distributed to a sample of (143) accounting managers in the industrial sector in Jordan. SPSS, v. 27 was used to screen and analyze primary data and the study reached the following findings:

- There appeared a high level of application of IoT within the industrial sector in Jordan, as the results indicated a high awareness level of the respondents throughout the questionnaire.
- Individuals had positive attitudes towards the statements of the study, as their responses scored higher than the mean of the scale (3.00), which indicated a good and positive response to the study tool.
- The main hypothesis was accepted through SPSS analysis, where it appeared that the use of IoT managed to present high-quality accounting decisions during the pandemic closures and quarantine.
- The analysis showed a high correlation between the independent and dependent variables, as the main hypothesis was accepted and the independent variables explained 54.1% of the variance in the dependent variable.
- All IoT variables scored a medium level of correlation with the dependent variable, where the highest influential variable of IoT in the field of accounting appeared to be minimizing auditing efforts which explained 43.3% of the variance in the dependent variable.
- As for the least influential variable, it appeared that accounting operations benefited least from IoT accounting variables in terms of AI and cloud computing with accepting the hypothesis at a medium level of correlation, explaining 25.7% of the variance in the dependent variable.

The study demonstrated that with the development of low-cost manufacturing sensors and microcontrollers, industries were able to use the idea of IoT in production processes and internal processes and support related tasks. This has led to improvements in many areas, such as asset management, financial management, network and quality control, shortened delivery time and reduced equipment maintenance costs. In addition, the study demonstrated the existence of an impact on decision-making processes through the Internet of Things, as information became available in real time and without human errors, which contributed to the access of decision-makers to the required information and enabled them to focus on making sound decisions based on correct and accurate information.

From the results of the study, a general conclusion can be drawn, indicating that the Internet and remote-communication tools have a great impact on the success of many administrative operations during the period of the COVID-19 pandemic, due to the failure of working individuals to be present in the workplace and the closures associated with the spread of the pandemic. In terms of accounting, many organizations were able to manage their financial and accounting matters, approve their budgets and maintain a good level of financial performance during the pandemic period by relying on the Internet as a means of communication and decision-making. This emerged by referring to the results of the study, which demonstrated the ability of the Internet of Things to complete work remotely through the advantages and services provided by the IoT to stakeholders and employees. Consequently, the main hypothesis of the study was accepted; that is, "Internet of Things has a statistically significant influence on the quality of accounting decisions during the COVID-19 pandemic".

AI and Cloud Computing

The study proved that the idea of cloud computing formed the main container for accounting files and the accompanying ledger books, which were added, modified and uploaded to the cloud, so that decision-makers could access the cloud at any time and from any place in order to access these files to take decisions based on the content of these files. As we know, the spread of the pandemic was accompanied by the imposition of curfews and closures of organizations until the actual working hours became zero.

This result was compatible with Koot et al (2020) and Al-Nahar (2019), who stated that by relying on the electronic cloud and some artificial intelligent systems, decision-makers could view the files, share them and approve or reject them based on their presence in their reach, which facilitated the process of taking accounting management decisions based on correct and high-quality information.

Real-time Data

One of the things that made the decision-making process easier, especially in the accounting field, is the idea of applying data and receiving it in real time. That is, there is no time lag between sending the information and receiving it, which enabled decision-makers to see the current and momentary situation of the organization and accordingly take the required decisions. Cao et al. (2019) and Rosa and Purfini (2019) agreed with this idea, indicating that the principle of real time contributed greatly to avoiding many risks related to the financial situation of organizations, given that the purchases, expenditures and imports were recorded and the information was supplied to decision-makers at the same moment and with a mouse click.

Streamlining Accounting Operations

The accounting operations through the Internet of Things have become more organized and harmonious, as the software used was operating in a single, organized manner and differed from the human method in terms of avoiding errors related to the sequence of entries or their method as humans being subject to forgetting. Furthermore, Ali et al. (2020) agreed with such results adding that with the application of the Internet of Things, accounting operations and processes are streamlined and simplified, so that it is ensured that the entries are made in a correct and approved manner and without errors that would affect the way in which accounting decisions are made.

Minimizing Auditing Efforts

The Internet of Things contributed to the minimization of efforts. It also contributed to identifying areas for auditors to intervene in the financial data and information on the cloud through electronic scans of barcodes and QR codes, which formed an important matter in arranging input operations. Supplying all information through an electronic scanner, where the information related to the accounting processes is removed from the information related to buying, selling, supplying or storing, it is not obligatory for auditors to verify all the information found, except in some cases in which there is a suspicion of some kind or another in the effectiveness of the program or the correctness of its entries. This was agreed upon by Yoon (2020).

Efficient Workforce Management

On the other hand, the study showed that organizations do not need to operate the entire workforce, as they can rely on the least possible number of employees in order to complete the accounting work, due to the lack of need for the Internet of Things and electronic accounting applications to operate the workforce at full capacity. This also contributed to reducing expenditures, setting accounting priorities and reducing the number of individuals who access the cloud or electronic accounting applications, which means reducing the level of human intervention; i.e., reducing human

errors as much as possible. Ali et al. (2020) agreed with the results of the study, noting that the lack of need for accounting applications and the Internet of Things for a lot of manpower is a positive thing, especially in exceptional circumstances, such as the COVID-19 pandemic.

Conclusions and Recommendations

The Internet of Things has given financial analysts and decision-makers faster and easier access to metrics that enable faster decision-making. A network of devices interconnected across platforms, such as enterprise resource planning and accounting, provides a broader picture, gives new insights and helps better forecast**.** This helps financial leaders in various industries reduce the risks involved in cash movements and increase profit margins. The association of the Internet of Things with making quality accounting decisions contributed to managing financial matters from a distance without the need for decision-makers to be present in order to sense the flow of products or accounting costs to build a high-quality accounting decision. The study proved that the combination of the Internet of Things and accounting practices has the ability to provide strong incentives in order for the accounting decision to be more robust and of higher quality through permanent exposure to individuals, assets and risks, thus increasing the possibility of anticipating the future performance of the organization and making better decisions based on it.

Based on the above analysis and discussion, the current study generalized that Internet of Things can provide full support and adopt successful accounting operations by relying on remote management, as the Internet of Things has transformed data sources into a common language among accounting decision-makers, so that costs, revenues, expenditures and inventories become comparable and unified at various administrative levels depending on the completeness, accuracy and control of the previously entered accounting data.

Although the Internet of Things has greatly contributed to maintaining the level and quality of financial decisions, the current study recommends conducting further investigations on possible risks in a clear and comprehensive manner in order to facilitate the prediction, evaluation and treatment of current and futuristic problems.

REFERENCES

Abdelraheem, A., Hussaien, A., Mohammed, M., & Elbokhari, Y. 2021. The Effect of Information Technology on the Quality of Accounting Information. ***Accounting***, 7 (1): 191-196.

Al-Hashem A., Al-Laham M., & Almasri A. 2022. E-Personalization and E-Customization Model for Enhancing E-Customer Satisfaction in the Case of Covid-19: Empirical Evidence from Banking Sector in Jordan. ***Jordan Journal of Business Administration***, 18 (2): 263-276.

Ali, S.A., Ansari, M., & Alam, M. 2020. Resource Management Techniques for Cloud-based IoT Environment. In: ***Internet of Things (IoT)***, 63-87. Springer, Cham.

Al-Nahar, D. 2019. ***The Impact of Internet of Things (IoT) on Financial Services Quality: Field Study on Jordanian Commercial Banks***. MA Thesis, Middle East University, Amman, Jordan

Al-Sai, Z.A., Abdullah, R., & Husin, M. H. 2020. Critical Success Factors for Big Data: A Systematic Literature Review. ***IEEE Access***, 8: 118940-118956.

Azmi, F., & Sri, M. 2020. Factors That Affect Accounting Information System Success and Its Implications on Accounting Information Quality. ***SIMILARITY***.

Cao, P.M., Wu, Y., Banerjee, S.S., Azoff, J., Withers, A., Kalbarczyk, Z.T., & Iyer, R. K. 2019. {CAUDIT}:

Continuous Auditing of {SSH} Servers to Mitigate Brute-force Attacks. In: ***16th {USENIX} Symposium on Networked Systems` Design and Implementation ({NSDI} 19)***, 667-682.

Chen, T., Barbarossa, S., Wang, X., Giannakis, G.B., & Zhang, Z.L. 2019. Learning and Management for Internet of Things: Accounting for Adaptivity and Scalability. ***Proceedings of the IEEE***, 107 (4): 778-796.

Coatney, K., & Poliak, M. 2020. Cognitive Decision-making Algorithms, Internet of Things Smart Devices and Sustainable Organizational Performance in Industry 4.0-based Manufacturing Systems. ***Journal of Self-governance and Management Economics***, 8 (4): 9-18.

Deloitte. 2020. ***Can IoT Enable Continuous Auditing***? Available at: chrome-extension://oemmndcbldboiebfnladdacbdfmadadm/https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/audit/ca-can-iot-enable-continuous auditing-en-AODA.pdf. Accessed on 15th March 2021.

Fan, H. 2019. Theoretical Basis and System Establishment of China Food Safety Intelligent Supervision from the Perspective of Internet of Things. ***IEEE Access***, 7: 71686-71695.

Hwang, K., Dongarra, J., & Fox, G. C. 2013. ***Distributed and Cloud Computing: From Parallel Processing to the Internet of Things***. Morgan Kaufmann.

ICAEW. 2009. ***The IoT and Accounting: Evidence from China***. ICAEW Thought Leadership Business and Management Faculty. Available at: chrome-extension://oemmndcbldboiebfnladdacbdfmadadm/https://www.icaew com/-/media/corporate/files/technical/business-and-financial-management/internet-of-things-and-accounting. ashx. Accessed on 15th March 2021.

Ionescu, B., Ionescu, I., Bendovschi, A., & Tudoran, L. 2013. Traditional Accounting *vs.* Cloud Accounting. In: ***Proceedings of the 8th International Conference Accounting and Management Information Systems***, 106-125. ISI-Proceedings.

Koot, M., Mes, M. R., & Iacob, M.E. 2021. A Systematic Literature Review of Supply-chain Decision-making Supported by the Internet of Things and Big-data Analytics. ***Computers & Industrial Engineering***, 154: 107076.

Kusuma, M. 2020. ***Internet of Things in Energy Management for Cost Efficiency: Evidence from the Food-manufacturing Industry***. Doctoral Dissertation, UNIVERSITAS AIRLANGGA.

Liu, J., Li, Y., Lu, Y., Fu, X., & Yan, S. 2020. Research on the Influence Factors of Ubiquitous Power Internet of Things for Promoting Consumption of Wind Power Based on Fuzzy G1-ISM in China**.** ***International Journal of Electrical Power & Energy Systems***, 121: 106124.

Mohamed, K. S. 2019. The Era of Internet of Things: Towards a Smart World. In: ***The Era of Internet of Things***,1-19. Springer, Cham.

Nica, E., & Stehel, V. 2021. Internet of Things Sensing Networks, Artificial Intelligence-based Decision-making Algorithms and Real-time Process Monitoring in Sustainable Industry- 4.0**.** ***Journal of Self-governance and Management Economics***, 9 (3): 35-47.

Qatawneh, Adel. 2021. ***An Assessment of the Impact of IT on Accounting Information Systems***. PhD Thesis, Cardiff Met University, Wales, UK.

Riley, C., Vrbka, J., & Rowland, Z. 2021. Internet of Things-enabled Sustainability, Big-data-driven Decision-making Processes and Digitized Mass Production in Industry- 4.0-based Manufacturing Systems. ***J. Self-gov. Manag. Econ.***, 9: 42-52.

Rosa, D., & Purfini, A. P. 2019, November. Analysis of Effect Quality of Accounting Information Systems to Support Company Performance. In: ***IOP Conference Series: Materials Science and Engineering***, 662 (3): 032015. IOP Publishing.

Shi, X., An, X., Zhao, Q., Liu, H., Xia, L., Sun, X., & Guo, Y. 2019. State-of-the-art Internet of Things in Protected Agriculture. ***Sensors***, 19 (8): 1833.

Suzan, L., Sudrajat, J., & Daud, Z. M. 2020. Accounting Information Systems As a Critical Success Factor for Increased Quality of Accounting Information. ***Revista ESPACIOS***, 41 (15).

Weshah, S. 2021. Adopting Modern IT Systems Is Vital in Employing Accountants and Internal Auditors (Educational Perspective): A Case Study in Jordan Cement Company-Lafarge. ***Jordan Journal of Business Administration***, 17(4): 555-565.

Williams, A., Suler, P., & Vrbka, J. 2020. Business Process Optimization, Cognitive Decision-making Algorithms and Artificial Intelligence Data-driven Internet of Things Systems in Sustainable Smart Manufacturing. ***Journal of Self-governance and Management Economics***, 8 (4): 39-48.

Wu, J., Xiong, F., & Li, C. 2019. Application of Internet of Things and Blockchain Technologies to Improve Accounting Information Quality. ***IEEE Access***, 7: 100090-100098.

Xin, A., Yiheng, L., Yawen, T., & Zhengde, B. 2018, May. The Typical Application of Internet of Things in China in the Future: The Smart Home. In: ***2018 International Conference on Electronics Technology (ICET)***, 361-364. IEEE.

Yoon, S. 2020. A Study on the Transformation of Accounting Based on New Technologies: Evidence from Korea. ***Sustainability***, 12 (20): 8669.

Ziegeldorf, J.H., Morchon, O.G., & Wehrle, K. 2014. Privacy in the Internet of Things: Threats and Challenges. ***Security and Communication Networks***, 7 (12): 2728-2742.