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# CHANGES IN THE PROFESSIONAL PROFILE OF AUDITORS IN THE LIGHT OF BLOCKCHAIN TECHNOLOGY

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**ABSTRACT**

*Blockchain is a shared ledger technology. In other words, blockchain technology is a shared and immutable notebook. This technology is used to record transactions, track assets and build trust. All transactions are stored encrypted by all stakeholders in the blockchain network. Auditing of these transactions is the domain of the auditors. The dynamics of auditing are changing with the developing technology. As a reflection of blockchain technology, professional profiles of auditors are also changing. The purpose of this study is to discuss the change in professional profiles of auditors in the light of blockchain technology.*

**Keywords:** *Blockchain Technology, Accounting, Auditing, Auditor.*

**Jel Codes:** *M40, M41, M42.*

In this study, research was conducted on blockchain technology, audit and auditors. First, a literature review was conducted. Then, information about blockchain technology and blockchain control was given. Finally, the effect of blockchain technology on auditors was discussed and changes in profession profiles are discussed.

## 1. INTRODUCTION

All transactions performed in the blockchain are recorded by everyone on the network. Anyone on the blockchain network can view actions taken. However, during the transactions performed on the system, the identity of the person doing the transaction is hidden from those who can view the transaction. With this feature, blockchain technology enables to verify transactions without any brokerage house.

Auditing is an accounting branch developed to reach an opinion about the accuracy of accounting documents, data and information. Data is obtained as a result of the operations performed with blockchain technology, too. Along with the developing technology, the dynamics of auditing are changing as well. Auditors performing the auditing profession are affected by this change. In particular, the approach to audit evidence has changed. In this case, auditors face many threats and opportunities. Considering the changing auditor and client's relationship, the effects of blockchain technology on auditor profession become more of an issue.

## 2. LITERATURE REVIEW

Blockchain technology has been the subject of many articles in the national and international context. Some articles in the field of Social Science are given below in alphabetical order.

In his study, Demirhan (2019) examined blockchain technology as a new approach in tax auditing. As a result of his research, he has reached that the blockchain will be highly effective in tax auditing in the future. Demirhan concluded that blockchain would take an active role in the tax collection and the fight against black economy.

In their study, Doğan & Ertugay (2019) discussed blockchain and applications in the field of accounting. As a result, they stated that the financial data to be generated through blockchain will provide significant benefits to both businesses and other financial report users.

In his study, Şat (2019) examined blockchain's potential impact on public administration. As a result, Şat argued that the organizations should equip themselves with new visions, and they should train public administrators and civil servants who would create public value.

In their study, Şen & Alnıaçık (2019) investigated the effects of blockchain technology on management processes. As a result, the expectations of the business world and the managetment area regarding blockchain technology have been determined.

In their study, Şen & Ergin (2019) investigated the rise of cryptocurrencies, the blockchain network and bitcoin. As a result, they argued that even if there are no cryptocurrencies and bitcoin, blockchain has a wide range of uses.

In her study, Tekin Bilbil (2019) examined local governments and blockchain technology. Tekin Bilbil also proposed a governance design / strategy at the same time. As a result, her study revealed that there is the lack of information regarding blockchain technology in local administrations.

In their study, Uğur, Güler, Yıldırım, & Kurubacak (2018) examined the use of blockchain and strategic decision model for transhumanist learners in open and distance learning environments. As a result, they have demonstrated the importance of the strategical decision model in ensuring sustainability.

In his study, Yıldırım (2018) examined the relationship between blockchain technology and the potential of blockchain technology in literature. As a result, Yıldırım expressed the importance of spreading the potential of blockchain technology to all areas.

## 3. BLOCKCHAIN TECHNOLOGY AND AUDITING

This section contains information about the definition and audit of the blockchain. It also includes the qualification of audit evidence, which plays an important role in blockchain auditing. Finally, the threats and opportunities of blockchain control are included.

### 3.1. Definition of Blockchain

Blockchain, which holds the power of changing and reshaping the accounting profession, is a technology that records, processes and stores financial transactions (Liu, Wu, & Xu, 2019, s. A19). Blockchain technology gives management professionals and auditors access to secure information in a real time (Smith, 2018, s. 131). Blockchain technology performs transactions within a work discipline.

The blockchain working principle has five main characteristics. These are request, notification, verification, insertion and distribution. It all starts with the request of a user to add a transaction to the blockchain. This transaction is broadcast to all users via notification. The transactions are verified by users in the verification step. It is then bundled into blocks. The bundled blocks are added to the blockchain and become permanent. Finally, an updated copy of the blockchain is received by those on the network (Mahbod & Hinton, 2019, s. 23).

Blockchain records are tamper-resistant thanks to the deployed cryptographic mechanisms. These code-protected records are irreversible. The hash of the record contains the digital signature of the user. Therefore, the originator of the recording can be determined (Rozario & Thomas, 2019, s. 24). Blockchain technology has different usage areas.

An encrypted message is created by an individual who wants to transfer funds in the blockchain system. This message contains information about the recipient's network address. The validity of the message posted to the entire network is examined by other members. The message posted in the network compares to the latest balance recorded in the sender's blockchain by other members. Execution of the process depends on the verification of the message. After the message is verified, a new block is added to the end of the blockchain. This block contains the transaction (Liu, Wu, & Xu, 2019, s. A20).

### 3.2. Auditing the Blockchain

There is uniformity in the blockchain. With uniformity, audit preparation activities and manual data extraction are eliminated (Mahbod & Hinton, 2019, s. 26).

Auditors ensure data reliability by designing and implementing audit tasks. The auditor obtains sufficient and appropriate evidence to determine whether there are material misstatements. (Appelbaum & Nehmer, 2017, s. 6).

Reliable evidence is evidence that can be trusted and verified by the auditor. The audit team that collects and evaluates sufficient audit evidence arrives at an opinion. All the information on which the audit opinion is based by the auditor is evidence of audit. Evidence is obtained from both external and internal sources (Appelbaum & Nehmer, 2017, s. 6).

Confirmations are an inseparable part of traditional auditing. This routine will not be needed for the information stored and examined on the blockchain (Smith, 2018, s. 128). The cleaning and classification of information that is secured and verified according to blockchain technology is automated (Smith, 2018, s. 132). However bugs or embedded codes can compromise the integrity of the data. Auditors want to evaluate the client's procedures to determine this situation. Oracles are a third-party information source. They should be properly linked (logically) to smart contracts.

Auditors should evaluate the physical control of Internet of Things devices. (Sheldon, 2019, s. A21).

In case the initial entry or source of the chain is suspicious, the auditor will need to physically validate the originating event. This physical validate takes place through verification, observation and recalculations-reperformance (Appelbaum & Nehmer, 2017, s. 13). Notable items can be manually investigated by the auditor. In records that require further investigation, a follow-up smart audit procedure can be pre-programmed (Rozario & Thomas, 2019, s. 25).

### 3.3. Audit Evidence in Auditing Blockchain

Audit evidence is obtained and stored from a variety of sources. Auditors overcome the obligation to combine both financial and non-financial information with blockchain. Audit evidence is taken from the client's blockchain by the auditor. This information is sent to the hash of smart audit procedures. Finally, the predefined audit test is performed by the smart audit procedure (Rozario & Thomas, 2019, s. 31).

The transaction data from Blockchain is high-quality audit evidence. Because it is confirmed that the transactions take place once. If the auditor wants to confirm accounts, they only need to get the relevant transaction data from the blockchain. They then perform analytical procedures (Wang & Kogan, 2018, s. 4). If block of transactions is completed and added to the end of the blockchain, it cannot be reversed. Thanks to cryptography and decentralization features, the auditor is provided with a tamper-resistant audit trail. These features help improve the integrity of internal and external data (Rozario & Thomas, 2019, s. 23). With the increase in the number of entities that adopt blockchain, the information to be obtained from the blockchain will become efficient (Mahbod & Hinton, 2019, s. 26).

Schemes that guarantee data privacy are recommended. These schemes, managed by a trusted third-party auditor, have the ability to centralization. The downside of centralization is that it reduces the security of the auditing protocol. Instead, a scheme supporting decentralized auditing is proposed (Fan, Bao, Liu, Vasilakos, & Shi, 2019, s. 7).

Evidence provided by a continuous real-time audit frees the auditor from the observation task. Auditors only need to observe the timestamp of transactions added to the block. They can also observe whether the lengths of blocks increase over time (Appelbaum & Nehmer, 2017, s. 9). Nevertheless, auditors who will develop procedures to obtain audit data directly should consider the risks. At the top of these risks is the risk that the information may be inaccurate due to error or fraud (Mahbod & Hinton, 2019, s. 26).

### 3.4. Threats and Opportunities in Auditing Blockchain

There are some threats and opportunities in blockchain auditing. A high degree of transparency is achieved as a result of digitization. So, auditors can encounter clients' resistance (Tiberius & Hirth, 2019, s. 5). Control of the blockchain of peer nodes operating on the same cloud can be attempted to be taken control or rewritten by fraudsters. The auditor should consider this added risk (Appelbaum & Nehmer, 2017, s. 11).

Changes in the world of technology happen quickly. With the blockchain technology, customer risks also change. The ability to respond to these changes and risks is considered an opportunity for auditors (Rozario & Thomas, 2019, s. 21). The routines of audits and their close proximity to real time will provide auditors with opportunities. Focusing on risky and complex transactions can be counted from these opportunities (Mahbod & Hinton, 2019, s. 26).

Confirmations, inventory counting, and data analysis are among the audit components. Confirmations before the blockchain were random. Confirmations after blockchain technology have become 100% and real-time. While inventory counting is done manually in the pre-blockchain, it is carried out continuously in the post-blockchain. Finally, data analysis is addressed. While sampling methodology is used in pre-blockchain, continuous and for 100% of information are used in post-blockchain (Smith, 2018, s. 128).

Using blockchain technology in business processes reduces the audit workload. It gives auditors a chance to focus on other operations (Karahan & Tüfekci, 2019, s. 67). Ethereum is an operating system built on a neutral, open access infrastructure, stating that it is not controlled by any company or person (Ethereum, 2020). Ethereum has a consensus feature. Therefore, the auditing process is more secure and transparent than the traditional auditing protocol (Fan, Bao, Liu, Vasilakos, & Shi, 2019, s. 7).

Decentralization, immutability, and accountability are the most important features of blockchain. Due to the decentralization, fraud on the blockchain is unlikely to occur. Immutability is achieved by the

cryptographic mechanism being employed. Accountability is achieved by verifying the source of the transaction performed with the digital signature of the user by the auditor (Rozario & Thomas, 2019, s. 23). Although blockchain technology removes the need for current auditors, it can create new opportunities for the audit profession (Uçma Uysal & Kurt, 2018, s. 478).

## 4. CHANGES IN THE PROFESSIONAL PROFILE OF AUDITORS

This section discusses the effects of blockchain technology on the audit profession. Changing auditor and customer relationships are also included in this section. Finally, the phenomenon of blockchain controllers as a concept is discussed.

### 4.1. Effects of Blockchain Technology on Auditing Profession

People who carry out audit work and turn this function into a profession are called auditors. Auditors are examined in three parts in accounting audit application. These are external auditors, internal auditors and public auditors (Usul, 2015, s. 25). Since external auditors and internal auditors are the subject of this study, they will be examined in detail.

If we look at the technological developments, it is seen that the accounting profession is in the middle of a transformation (Smith, 2018, s. 118). Auditors can be more innovative and efficient with blockchain (Mar, 2018, s. 17). Intelligent audit procedures provide auditors with the opportunity to improve audit quality while automating audit tasks (Rozario & Thomas, 2019, s. 26).

The high level of trust in the information obtained from blockchain technology is due to the fact that each transaction performed with this technology becomes as notarized on the level of authenticity. Auditors have an important and fundamental role. Auditors should determine the authenticity of the first transaction with the object under consideration. All subsequent transactions will be considered to be accomplished and reliable (Melnychenko & Hartinger, 2017, s. 33).

Blockchain technology affects the audit profession and therefore the auditors. The effects of blockchain technology on the audit profession can be examined from the perspective of internal auditors and external auditors.

### 4.2. Internal Auditors

The focus of traditional accounting information systems is to increase security. This security covers the collection and reporting of financial information. The problem of not obtaining information on time is frequently mentioned by internal auditors, or in other words, information is not available on time. A large amount of energy is spent by internal accounting to verify and clear the data (Smith, 2018, s. 121).

New risks and opportunities brought by blockchain technologies are the main points that internal auditors should focus on. Blockchain technology sets business objectives. As with any new technology, internal auditors should evaluate internal and external risks towards these business objectives. Internal auditors should examine whether appropriate measures are taken, such as timelines and staff, to reduce their clients' risks. Blockchain technology has its own security measures. However, internal auditors should test the system. Millions of transactions are written simultaneously in the blockchain. In the meantime, fast and timely acquisition of data should be handled by internal auditors. Availability risks should not be ignored since the design stage. The security of authorizations granted to users in terms of confidentiality risks should be tested (Mar, 2018, s. 17).

Internal auditors are expected to be open to blockchain technology. They must understand the opportunities and threats that this new technology will bring. Auditors should be prepared for future destructive changes (Karahan & Tüfekci, 2019, s. 70). Internal audit professionals will want to take advantage of new methods and tools. Because they will need to verify the structure and viability of blockchain networks. They will also need to assess the appropriateness and effectiveness of risk mitigation efforts associated with blockchain transactions (Kloch & Little, 2019, s. 5).

### 4.3. External Auditors

The trusted third-party auditor is empowered by the public auditing authorizes to audit external data (Fan, Bao, Liu, Vasilakos, & Shi, 2019, s. 1). The auditors act independently in the client's blockchain. They can access all the internal and external blockchain information that belongs to the client. The auditor is a node on the client's blockchain. In this way, they can extract information about the audit and execute smart audit procedures autonomously (Rozario & Thomas, 2019, s. 29). The possibilities of the external audit

blockchain can be listed as follows: improving the quality of the audit and minimizing the difference in expectations among stakeholders (Rozario & Thomas, 2019, s. 21).

The auditing protocol is another important issue in the audit process of blockchain technologies. Decentralized auditing protocol becomes more reasonable due to the difficulty of finding an honest organization (Fan, Bao, Liu, Vasilakos, & Shi, 2019, s. 2).

External auditors face problems with data cleanliness and availability. It is one of the problems facing external auditors to not present the information in a convenient timeframe for the annual audit process. Lack of audit efficiency occurs as a result of all these problems. At the same time, lack of audit efficiency results from lag and lack of availability (Smith, 2018, s. 122).

### 4.4. Changing Auditor and Client Relations

Regardless of whether they pay for the audit service, shareholders, lenders, financial analysts and other stakeholders can be regarded as auditors' actual clients (Tiberius & Hirth, 2019, s. 4).

Evolving blockchain technologies create an ecosystem. Proactive audits are advantageous in this ecosystem. Because the auditor has the ability to view and extract reliable information from the client's blockchain (Rozario & Thomas, 2019, s. 27).

Block chain is an evolving technology. There is a balance between a proven and mature technology solution and early blockchain adopter. In other words, blockchain is not the solution for every scenario. This situation should be reminded to the clients by the auditors (Sheldon, 2019, s. A27).

The gap between information provided by auditors to investors and users of financial statements and the information they need needs to be explored (Rozario & Thomas, 2019, s. 23). Against the expectation gap, auditors should apply rigor when evaluating executives' statements about future risks (Tiberius & Hirth, 2019, s. 4).

### 4.5. New Type of Auditors: Blockchain Auditors Concept (The Future of Auditors: Blockchain Auditors)

Auditors affect the systems of the audited institutions. As the needs of the business world change rapidly, auditors will have to be aware of and adopt blockchain technology (Mahbod & Hinton, 2019, s. 27). With the blockchain technology, the profile of the auditors will change. The potential effects of blockchain on the profession will be realized in two ways: forward looking and become more IT oriented (Brender, Gauthier, Morin, & Salihi, 2019, s. 35).

It will be possible for auditors to focus more on issues that require judgment through digitalization (Tiberius & Hirth, 2019, s. 9). Audit process and auditors will change depending on the developments in blockchain technology. The data is embedded in the blockchain. Auditors will have the ability to export this data. They will also be able to understand this exported data. With the blockchain technology, the need for auditors in confirmation and verification will decrease. This will make it easier for auditors to focus on high-level duties (Smith, 2018, s. 134).

Blockchain technology has brought transparency to the audit profession with an immutable ledger and real-time audit potential (Sheldon, 2019, s. A15). The adequacy of cryptography arrangements used to hide the database on the network has gained importance in the control of blockchain technology (Mar, 2018, s. 18). Auditors must be competent to supervise technological developments.

Although the data in the blockchain is protected from tamper-proof, it is vulnerable to risks while outside the blockchain. Auditors and clients should work together to transfer data out of the blockchain. It should determine together that the data transfer will be realized in the most controlled and most convenient way (Sheldon, 2019, s. A20).

According to the research from Germany, the auditors predict that the annual audit will progress towards a continuous audit approach. According to experts, new technology will not replace auditors. They believe that the new technology will provide them with more relief and support (Tiberius & Hirth, 2019, s. 1).

Auditors will test the controls on the evidence. They will perform these tests to determine their authenticity and reliability (European Court of Auditors, 2020, s. 47). Even if the audit process becomes more continuous, auditors will need to apply professional judgment when examining other judgments made by management. Auditors will need to evaluate and test internal controls in automated areas (CPA & AICPA, 2017, s. 11). Some tests and tasks do not require specific technical skills. These will disappear in favor of analysis that requires expertise and experience

(Brender & Gauthier, Impacts of blockchain on the auditing profession, 2018, s. 30).

When the blockchain is applied, the auditor will have more time to focus on high-level problems (ICAEW, 2018, s. 6). Auditors will be able to discover and visualize deviations that deserve closer scrutiny (European Court of Auditors, 2020, s. 69). The focus of the auditors will be to validity the digital representation of physical assets and codification of contracts in conjunction with accounting standards (EY, 2017, s. 4).

With the widespread use of blockchain, auditors should provide more complex assurance services. They will need to make progress to support future digital transformations (Psaila, 2017, s. 3). With the use of blockchain, auditors who can access their clients' data in real time will analyze the data. In this way, the level of assurance and the quality of the audit will increase (Brender & Gauthier, Impacts of blockchain on the auditing profession, 2018, s. 30). The auditor who receives the data from the blockchain should evaluate whether the data is reliable. At the same time, auditors should consider audit procedures on management's estimates. They will need to perform audit procedures on management's estimates (CPA & AICPA, 2017, s. 10). In addition, against the risk of fraud, auditors will need to determine whether internal controls operate effectively (Psaila, 2017, s. 3). According to the findings in the report of the European Court of Auditors, auditors will need to be more adaptable to change in future (European Court of Auditors, 2020, s. 24).

According to the study conducted by Brender, Gauthier, Morin, & Salihi, auditors think that the audit activity will change in the med-term. They predicted that today's financial auditors will replace auditors with specific IT skills such as programming. Some even mentioned IT engineer auditors while others mentioned blockchain auditors whose function will be to certify blockchain (Brender, Gauthier, Morin, & Salihi, 2019, s. 15).

When adopting blockchain technology, auditors will be able to use their professional judgment with more analytical methods. The levels of independence and professional judiciary will become even more important (Jackson, 2018, s. 34). Auditors will apply to blockchain technology to test the whole population of transactions within the period under observation. Thus, sample-based substantive test days are expected to be challenged (Psaila, 2017, s. 1). Auditors can develop software using the blockchain. In this way, more than one organization can be continuously audited (Mahbod & Hinton, 2019, s. 26).

## 5. CONCLUSION

Blockchain is seen as an important part of a huge wave of digital revolution. This wave of digital revolution also affects the audit process and auditors. Considering the effects of blockchain technology on auditing and auditors, the phenomenon of change is outstanding. Based on this change, changing professional profiles of auditors are discussed in the light of blockchain technology.

As a result of the researches, it can be interpreted that the audit profession has changed, especially in the stage of collecting evidence and performing the audit. Thanks to blockchain, every transaction is recorded by everyone on the blockchain network and this data cannot be changed. This is also important for audit evidence. Auditors acting independently on the client's blockchain can access client's internal and external blockchain information. Auditors who obtain the evidence take this into account when evaluating the audit evidence. According to the audit evidence obtained in traditional ways, the data in blockchain is more reliable and transparent. However, although they are shared with everyone on the blockchain network, clients may not be willing to share this data with auditors.

While performing the audit and in the relations with the clients, the auditors encounter differences compared to the traditional system. With the developing and changing technology, the professional profiles of the auditors are also changing. This may create a new competence area and title opportunity for the auditors. With this approach, auditors can be called blockchain auditors. As a result, these auditors, who will have an interdisciplinary understanding, are expected to have competence in both auditing and technology.

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