# Digital maturity of auditing companies in the Republic of Croatia

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**Abstract** The subject of the research is to determine the level of digital maturity of audit companies in the Republic of Croatia. Given the importance of monitoring and implementing digital trends in business, it is essential to determine the current position of companies on their digital transformation path. In assessing the current position of the company, digital maturity models with predefined dimensions are used. In connection with this, a research question arises: which phases of digital maturity can be identified in audit companies in the Republic of Croatia? A review of the literature defines the maturity model and methodology for assessing and determining the level of maturity. The impact of certain dimensions of the model is examined through an online questionnaire sent to audit firms' 206 e-mail addresses. A total of 45 correctly completed questionnaires were returned. The analysis of the collected data identified four dimensions of maturity, and it was found that most of the analyzed companies are at a high third level of digital maturity. This leads to the conclusion that audit firms' digital maturity in the Republic of Croatia is at a high level, which is contrary to previous research, which points out that despite the awareness of the need to digitize operations, audit firms do not take steps in this direction.

**Keywords:** digital transformation, maturity model, auditing, audit, digital technologies

## 1 Introduction

The development of digital technologies has started the digital revolution and encouraged companies to use the technology in improving their business. Improving business through the use of digital technologies represents the digital transformation that has become necessary in order to maintain and gain market competitiveness. Digital transformation implies a fundamental transformation of the entire business using new technologies based on the

Internet with the aim of influencing society as a whole. (Schallmo, Williams, & Boardman, 2017) It is a long journey that begins the moment a company starts thinking about introducing digital technologies into its business and lasts until the moment of their full integration. (europa.eu, 2020) Essentially various transformations encompasses business systems that include changes in current ways of thinking and doing business and technical changes in the form of digitization and/or automation. Digital transformation requires a wellthought-out digital strategy with clearly set goals that require the involvement of all employees in the company. It is necessary to emphasize that an effective and high-quality digital strategy does not refer only to the application of new technologies, but also to the reconstruction of the entire business in order to use the information gathered by new technologies. For this reason, a coordinated reorganization is needed within the company that would enable digital transformation to create added value. (Henriette, Feki, & Boughzala, 2015) For successful digital transformation, it is necessary for managers to understand the current "as is" situation within the company in order to be able to develop a strategy to achieve the so-called "to be" conditions, i.e., to transform and improve business with the help of digital technology. To identify the current situation, digital maturity models are used, which estimate the phase of the digital maturity of a company according to predefined dimensions. (Kruljac & Knežević, 2019) (Berghaus & Back, 2016) Measuring and assessing a company's digital maturity is a frequent topic of scientific papers, which is evident from a large number of models developed for measuring the digital maturity of companies of all sizes and sectors.

A review of the literature revealed a lack of research into the digital maturity of audit firms. According to Dai and Vasarhelyia, improving business with the help of digital technologies is off the radar of audit firms. The authors state that audit firms consider the digital transformation to be promising but, at the same time, limiting due to

several factors. (Dai & Vasarhelyi, 2016) In order to identify the digital maturity of audit firms in the Republic of Croatia, a survey was conducted. "Which phases of digital maturity can be identified in audit companies in the Republic of Croatia?" was the formed research question.

To answer the formed research question, a model for assessing digital maturity was created using dimensions taken from several existing digital maturity models. (Gill, VanBoskirk, Evans, Nail, & Cause, 2016) (Kane, Palmer, Phillips, Kiron, & Buckley, Achieving Digital Maturity, 2017) (Shahiduzzaman, 2017) (Berghaus & Back, 2016) The method of determining maturity levels was taken from the research of the digitalization maturity model for small and medium enterprises by Blatz and others. (Blatz, Bulander, & Dietel, 2018)

After an overview of the relevant literature at the beginning of the paper, the methodology and the results are presented in the paper structure as followed. The conclusion appears in the last part of the article.

### 2 Literature review

With the advancement of digital technologies, the process of digital transformation starts in numerous companies that begin to think about how to integrate new technologies into their business to improve business processes and increase companies' value. (Berghaus & Back, 2016) (Liu, , Chen, & Chou, Spremić defines digital 2011) business transformation as the application of digital technology and digital resources in order to generate new sources of income and / or create new ways of doing business, i.e., new business models. (Mario, Spremić, 2017)

The word "transformation" suggests that these are fundamental changes within the organization that are influenced by the digital age in which society currently finds itself. Shallmo explains how digital transformation implies a fundamental transformation of the entire business using new Internet-based technologies with the goal of influencing society in general. (Schallmo, Williams, & Boardman, 2017) In fact, the goal is to use digital technologies to transform business processes and improve interaction and collaboration with business partners. (Berman, 2012)

Digital transformation is far more than just integrating new technologies into business. For a successful digital transformation, it is necessary to use all the possibilities that this integration enables. (Kane, Palmer, Phillips, & Kiron, Is Your Business Ready for a Digital Future?, 2015) That means creating added value by improving business processes and thus improving the quality of service provided to customers while taking into account employees, processes that are improved, and the

functions themselves to achieve appropriate competitive advantage. (Kane, Palmer, Phillips, & Kiron, 2015) (Teichert, 2019) Rothmann and Koch point out that digitalization can contribute to creating an entirely new business model or reshaping an existing one. (Rothmann & Koch, 2014)

It is evident that digital technologies will bring impressive changes in the next few years. It will be necessary for companies to adapt and improve their businesses not only to maintain a competitive position in the market but also to ensure their very survival. Adaptation in the form of digital transformation is already visible today, but the adjustment to digital trends and thus, the implementation of digital transformation is not going at the same speed in all sectors.

Dai and Vasarhelyi point out that despite the widespread use of digitalization, the acceptance of new technologies and their integration into business is finding it difficult to find its place in the audit profession. (Dai & Vasarhelyi, 2016) According to their research, ubiquitous digitalization and more advanced business, with the help of digital technologies, are off the radar of audit firms. They find it very promising but, at the same time, limiting due to several factors. One of the factors is the lack of standardization of accounting programs. As auditors audit the financial statements of a large number of companies, each of which uses different accounting programs, it is challenging to automate audit procedures. The lack of adequate skills of the auditors themselves is also cited as a limiting factor. Digital transformation involves people, and a successful one requires employees to have enough IT skills to support the transformation itself. The limiting factor for the digital transformation of audit processes is as well the so-called "problem of the black box," i.e., the problem of explaining how the algorithm makes decisions, and that would be problematic in the audit process, due to the need for the auditor to justify a particular decision. (Auditors,

Digital maturity describes the level of the digital transformation of a company and thus describes how much and what a company has done so far in terms of managing digital transformation. (Berghaus & Back, 2016) That is, it describes a company's progress in transforming its business using digital technology in a digital environment to achieve and maintain market competitiveness. (Teichert, 2019) (Chanias & Hess, 2016) Chanias and Hess emphasize that digital maturity goes beyond just improving business processes using various technological solutions and information technology, but it also includes monitoring progress in the digital transformation of enterprises by management. (Chanias & Hess, 2016) The level of digital maturity is not constant but is influenced by technological changes and therefore needs to be reassessed and measured. (Shahiduzzaman, 2017)

In measuring digital maturity, digital maturity models are used, which, in addition to assessing the state of the company itself, also observe its relationship with the competition and enable the management of progress towards higher stages of maturity. The main task of the maturity model is to describe the stage of maturation and to measure the current position on the maturation path. Digital maturity models are applied to the overall business of an enterprise or to a single function, and consist of several dimensions and criteria whose task is to describe the area of activity and stages of maturity that indicates the path of evolution towards enterprise maturity. (Berghaus & Back, 2016) (Kruljac & Knežević, 2019)

The digital maturity model is a descriptive type of model whose primary goal is to determine the current state of the enterprise, i.e., the existing digital transformation level, by describing what the enterprise has done so far in terms of transformation efforts. Using the maturity model, the company has the opportunity to assess its current position on the path of digital transformation according to predefined dimensions. Clearly defined dimensions and criteria describe the field of action and measures on the path to maturity, with each dimension being a specific, measurable and independent component that reflects the main, fundamental and different aspects of digital maturity and describes the field of action (Blatz, Bulander, & Dietel, 2018) (Teichert, 2019) (Berghous & Back, 2016)

# 3 Methodology

In order to answer the research question, a survey was conducted using a survey questionnaire using a modified maturity model. The dimensions of the model are taken from previous research and consist of culture, organization, information technology, strategy, and transformation management. (Table 1) (Gill, VanBoskirk, Evans, Nail, & Cause, 2016) (Kane, Palmer, Phillips, Kiron, & Buckley,

Achieving Digital Maturity, 2017) (Shahiduzzaman, 2017) (Berghaus & Back, 2016)

The cultural dimension represents the company's attitude towards digital technologies and, thus, the digital transformation, which includes encouraging employees to use them. (Berghaus & Back, 2016) (Blatz, Bulander, & Dietel, 2018) The organization implies a clear structure of support within the company in the digital transformation of business. For digitalization to be successful, a clear division of roles and responsibilities within the company is needed. Information technology implies adequate infrastructure, while strategy means recognizing the importance and need for digitalization of business within the company. Transformation management implies the definition and division of roles for the management of the set digitization strategy. (Berghaus & Back, 2016) (Blatz, Bulander, & Dietel, 2018)

The dimensions of the maturity model are presented in the form of an online questionnaire created in the Google Forms application. The questionnaire was sent in April-May 2020 to the email addresses of audit firms via the Mailchimp application. A total of 206 audit companies are registered in the Republic of Croatia, and their e-mail addresses are publicly available on the website of the Croatian Chamber of Auditors. (Chamber, 2020) Respondents were asked to express an attitude toward the presented statements using a 5-point Likert scale where 1 signified completely disagree and 5 agree completely. The questionnaire also contained questions related to the size of the company, the county, and the number of employees in the company. The questionnaire was sent on two occasions, and a total of 45 completed survey questionnaires were returned.

Table 1. below shows the dimensions of the digital maturity model, along with the corresponding claims. In order to confirm the homogeneity of the statements within each individual dimension, the internal reliability of the dimension was tested using the Cronbach's alpha coefficient. All factors are as seen in Table 1 within acceptable limits, i.e., above the recommended value of 0.7 (Field, 2013)

 Table 1. Maturity level dimensions

Item	Source	α
CULTURE		
By using digital solutions (digitization), my company gains a competitive advantage.	(Gill, VanBoskirk, Evans, Nail, & Cause, 2016)	0,925
The management in my company supports the digital strategy of the company.	(Gill, VanBoskirk, Evans, Nail, & Cause, 2016) (Kane, Palmer, Phillips, Kiron, & Buckley, Achieving Digital Maturity, 2017)	
My company invests in the digital education of its employees.	(Shahiduzzaman, 2017)	
The digital vision of my company communicates clearly to employees and clients.	(Gill, VanBoskirk, Evans, Nail, & Cause, 2016)	
My company constantly implements innovations in business regardless of possible risks.	(Gill, VanBoskirk, Evans, Nail, & Cause, 2016)	
In my company, employees use available digital solutions to solve their tasks.	(Berghaus & Back, 2016)	
When hiring new employees, their digital skills are an important selection criterion.	(Berghaus & Back, 2016)	
Employees are familiar with the available digital solutions in the company and use them voluntarily.	(Berghaus & Back, 2016)	
To carry out the digital transformation of business, employees have adequate knowledge and competencies.	(Shahiduzzaman 2017)	
My company is ready to modify existing business processes (the way something is done) if the digital transformation requires it.	(Berghaus & Back, 2016)	
Employees are motivated to try new digital solutions despite a possible failure.	(Berghaus & Back, 2016) (Kane, Palmer, Phillips, Kiron, & Buckley, Achieving Digital Maturity, 2017)	
Errors and knowledge gained from failed projects related to the digitalization of business processes are communicated and discussed at meetings.	(Berghaus & Back, 2016)	
ORGANIZATION		
In my company, digital transformation (informatization) refers to the entire business, not just the digitization of individual business operations.	(Berghaus & Back, 2016) (Shahiduzzaman, 2017)	0,912
The business strategy of the company is to develop new skills that enable the management of digital transformation.	(Berghaus & Back, 2016)	_
My company monitors the development of new technologies and business models that are relevant and applicable to our business.	(Berghaus & Back, 2016)	
In my company, adequate funds are provided for the digitalization of business processes.	(Gill, VanBoskirk, Evans, Nail, & Cause, 2016) (Shahiduzzaman, 2017)	
There are a sufficient number of employees in my company with appropriate digital / IT skills.	(Gill, VanBoskirk, Evans, Nail, & Cause, 2016) (Kane, Palmer, Phillips, Kiron, & Buckley, Achieving Digital Maturity, 2017)	
My company uses digital solutions to exchange information between employees and customers.	(Berghaus & Back, 2016)	
In my company, communication via video conferencing and screen sharing is common in internal and external communication (e.g., Lync, Skype, etc.).	(Berghaus & Back, 2016)	-
In my company, innovative solutions and opportunities for their implementation in business are presented at meetings and conferences with the aim of spreading knowledge.	(Berghaus & Back, 2016)	
In my company, employees are allowed to work from home.	(Berghaus & Back, 2016)	1
In my company, there are professionals who deal with digital topics that communicate with other employees.	(Berghaus & Back, 2016)	
My company has experience with mobile work (work from home, from the field, etc.).	(Berghaus & Back, 2016)	

INFORMATION TECHNOLOGY		
My company's IT infrastructure is regularly checked for digital	(Berghaus & Back, 2016)	0,945
requirements and updated as needed.	(= 1-8 11 = 11, = 1 = 1)	0,510
My company has a clear strategy for the procurement and	(Berghaus & Back, 2016)	
application of key digital technologies in business.	(Bergmans et Buen, 2010)	
In my company, the budget for investing in new technologies is	(Gill, VanBoskirk, Evans, Nail, & Cause,	
flexible and allows for adjustment and changing priorities.	2016)	
Marketing and technological resources work together in the direction	(Gill, VanBoskirk, Evans, Nail, & Cause,	
of the planned implementation of new technologies in business.	2016)	
In my company, there is a flexible and collaborative approach to	(Gill, VanBoskirk, Evans, Nail, & Cause,	
technology development.	2016)	
We exchange data with clients digitally, e.g., interactions via Cloud	(Shahiduzzaman, 2017)	
APIs.	(Shamduzzaman, 2017)	
My company uses various digital tools (e.g., communication tools,	(Gill, VanBoskirk, Evans, Nail, & Cause,	
social media management, time and task management tools, etc.) to	2016)	
encourage employee innovation, mobility, and collaboration.	/	
The implementation of new technologies in business is based on the	(Gill, VanBoskirk, Evans, Nail, & Cause,	
suggestions and needs of clients.	2016)	
Digital and mobile channels, as well as social media platforms, are	(Berghaus & Back, 2016)	
consistently integrated into the business.	(Berghaus & Back, 2010)	
Digital and mobile channels, as well as social media platforms, are	(Berghaus & Back, 2016)	
consistently integrated into our marketing communication.	(Berghaus & Back, 2010)	
In my company, there are appropriate defense mechanisms	(Shahiduzzaman, 2017)	
(applications, tools, etc.) against possible cyber attacks.	(Shamauzzaman, 2017)	
STRATEGY		
The competition sees us as drivers of digital innovation.	(Berghaus & Back, 2016)	0,943
My company has a clearly set digital transformation strategy.	(Shahiduzzaman, 2017)	
Digital business is very important in our business strategy and is	(Berghaus & Back, 2016)	
widely communicated.	(Berghaus & Back, 2010)	
Digital projects are frequent and are promoted with high priority	(Berghaus & Back, 2016)	
within the company.		
Digital transformation is an important project in my company.	(Berghaus & Back, 2016)	
All employees participate and support the digital vision of the	(Shahiduzzaman, 2017)	
company.	(======================================	
TRANSFORMATION MANAGEMENT		
There is a developed plan for digital business transformation in my	(Berghaus & Back, 2016)	0,933
company		,
In my company, roles, responsibilities, and decision-making	(Berghaus & Back, 2016)	
processes for digital transformation are defined.		
Management recognizes the importance of digital business and	(Shahiduzzaman, 2017)	
provides adequate resources.		
Operational management recognizes the importance of digital	(Berghaus & Back, 2016)	
business and greatly encourages the implementation of digital	( 1 8 11 , 1 ,	
projects.		
Performance indicators related to the operational objectives of	(Berghaus & Back, 2016)	7
digital business are defined in decisions on management objectives.		
The goals of digital transformation are measurably defined and	(Berghaus & Back, 2016)	7
periodically checked and revised.	( - 6, ,	
Previously introduced digital initiatives in my company have created	(Shahiduzzaman, 2017)	7
added value (revenue).	, ,	

# 3.1 Calculation of maturity levels

The method of determining the level of digital maturity is taken from the research of Blatz and others who, in their research, propose a model of

digital maturity for small and medium enterprises. (Blatz, Bulander, & Dietel, 2018) According to data for 2018, out of the total number of registered audit companies in the Republic of Croatia, only two are medium-sized, while the rest are small companies.

Therefore, this method of determining maturity is suitable for this research. (Fina, 2020)

The statements within each dimension were evaluated on a Likert scale from 1 to 5, with 1 being 0 points and 5 being 4 points. After evaluating each statement within a dimension, the arithmetic means of each dimension shows which dimension is the most developed and which has the lowest rating in terms of the degree of digital maturity. Table 2 shows the calculated importance of each dimension relative to the other dimension.

**Table 2.** Weighing of the dimensions

Dimension	Weight
Culture	23%
Organization	21%
Information Technology	20%
Strategy	18%
Transformation Management	19%

After calculating each individual dimension's importance, the total maturity was determined by the weighted arithmetic mean. By summing the arithmetic mean of each individual dimension multiplied by the importance of the dimension itself. The obtained values identified three levels of maturity shown in Table 3. and started to determine each company's maturity.

**Table 3.** Maturity Level (*Blatz, Bulander, & Dietel, 2018*)

Level	Description	Points/Digital Maturity (dM)
Level 1	The impact of digitization and digital technologies on the company itself and its business is minimal. The need for digitalization of business has been recognized, but no steps have been taken yet. There is a lack of management support and motivation for using new technologies and solutions.	> 0
Level 2	Certain steps have been formed towards the digitalization of business. The use of digital solutions is promoted. There are indications of a digital strategy, but the roles, goals, and models for measuring them are not clearly defined.	> 2
Level 3	The goals within the digital strategy are clearly set and are regularly checked and revised. The company has appropriate information infrastructure and proper management that takes care of the digitalization of business.	> 3

# 4 Results

The research results showed that out of a total of 45 analyzed companies, 23 of them are at the 2nd level of digital maturity, 15 of them at the 3rd level, while seven companies are at the 1st level of digital maturity. (Figure 1.)

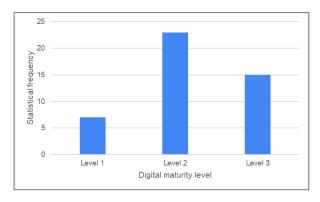
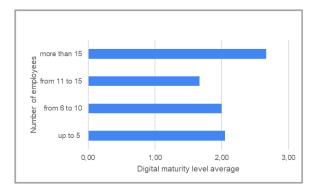


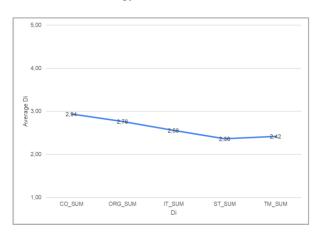
Figure 1. Results of maturity level, n = 45

Observing the level of digital maturity in relation to the number of employees in the company, it is evident that the companies with the largest number of employees are at the highest level of maturity. (Figure 2.)



**Figure 2.** Level of digital maturity in relation to the number of employees, n=45

The average values obtained for each of the dimensions shown in Figure 3 indicate that the dimensions of culture and organization are mostly implemented in enterprises, while transformation management is in the last place. The same is confirmed by looking at the highest average value of each individual activity within the dimensions. (Tables 4. and 5.) Thus, the activities with the highest value refer to activities from the dimension of culture and organization. In contrast, those with the lowest average refer to activities related to digital transformation management and digital transformation strategy.



**Figure 3**. Average result from each dimension, n =45

**Table 4.** Activities with highest average, n=45

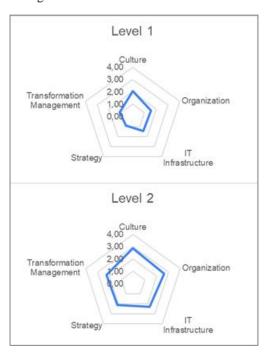
Activity		Average
2.11. ORG	My company has experience with mobile work (work from home, from the field, etc.).	3,4444
1.2. CO	The management in my company supports the digital strategy of the company.	3,4222
2.6. ORG	My company uses digital solutions to exchange information between employees and customers.	3,1778
1.8. CO	Employees are familiar with the available digital solutions in the company and use them voluntarily.	3,1556
1.3. CO	My company invests in the digital education of its employees.	3,1111
1.10. CO	My company is ready to modify existing business processes (the way something is done) if the digital transformation requires it.	3,1111
1.1.CO	By using digital solutions (digitization), my company gains a competitive advantage.	3,0444
2.9. ORG	In my company, employees are allowed to work from home.	3,0222

**Table 5.** Activities with the lowest average, n=45

A ativit-		Arramaca
Activity	T = -	Average
1.5. CO	My company constantly implements innovations in business regardless of possible risks.	2,2667
4.2. ST	My company has a clearly set digital transformation strategy.	2,2444
5.6. TM	The goals of digital transformation are measurably defined and periodically checked and revised.	2,2444
5.2. TM	In my company, roles, responsibilities, and decision-making processes for digital transformation are defined.	2,2222
5.1. TM	There is a developed plan for digital business transformation in my company.	2,1778
2.10. ORG	In my company, there are professionals who deal with digital topics that communicate with other employees.	1,8222
4.1. ST	The competition sees us as drivers of digital innovation	1,8222

For the purpose of describing each individual dimension, the samples obtained on the basis of the

analyzed responses are presented, which are shown below (Figure 4.). The first level of digital maturity is characterized by inadequate development of all dimensions, especially strategy dimensions and transformation management. The most developed dimension at the first level is the cultural dimension. The second level of maturity is characterized by growth in all dimensions, but it is evident that the dimension of strategy and transformation management is not accompanied by the same growth as the dimension of culture, organization, and information infrastructure. At the 3rd level of digital maturity and at the last level, it is evident that all four dimensions are at the highest level, including the dimension of strategy and transformation management.



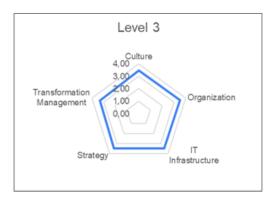


Figure 4. Answering pattern types

## **5 Conclusion**

The paper aimed to conduct research in order to answer the formulated research question of which stages of digital maturity can be identified in audit companies in the Republic of Croatia. The dimensions and activities of the digital maturity model are taken from previous research. (Berghaus & Back, 2016) (Shahiduzzaman, 2017) (Gill, VanBoskirk, Evans, Nail, & Cause, 2016) (Kane, Palmer, Phillips, Kiron, & Buckley, Achieving Digital Maturity, 2017) The model used includes five dimensions: the dimension of culture, organization, information technology, strategy, and transformation management. The methodology of Blatz et al. was used to determine levels of digital maturity. (Blatz, Bulander, & Dietel, 2018) Out of 206 registered in the Republic of Croatia, forty-five audit firms were surveyed, and three levels of digital maturity were identified by using a questionnaire.

The results of the research show that as many as 51% of the analyzed companies are at the 2nd level of digital maturity, while 16% of companies are at the first level. At level 3, there are 15 analyzed audit firms, i.e., 33.3%. The research also shows that companies with the largest number of employees are also at the highest level of maturity, so companies with 15 or more employees have reached the highest level of maturity. But it cannot be argued that the number of employees affects the level of maturity for the reason that firms with 11 to 15 employees have achieved a lower level of maturity than firms with fewer employees.

In order to determine the extent to which a particular dimension characterizes a particular level of maturity, response patterns are presented. It has been shown that what distinguishes Level 3 maturity from Levels 1 and 2 is the development of strategy and transformation management dimensions. These dimensions relate to the existence of a clear digital transformation management strategy with defined and measurable goals. The same can be seen from the activities that proved to be the least represented in the analyzed companies (Table 5), while the activities that are within the dimensions of culture and organization are highlighted as activities with the highest values (Table 4). In that sense, the activity that refers to the possibility of working from home, the so-called mobile work. It is important to emphasize that the research was conducted in March and May 2020 during the COVID 19 pandemic, which could have had an impact on the overall results of the research. Due to the pandemic, it has become necessary to use digital technology so that business can continue to some extent. Thus, for example, it was necessary to provide employees with conditions to work from home in order to prevent the infection and further spread the pandemic, mandatory training seminars were moved to webinars and the like. All of the above has certainly

had an impact on raising the awareness of auditors themselves, as well as audit firms, about digital technologies and the opportunities they provide.

The results obtained from the research clearly indicate that audit firms are very aware of the digital transformation and that they have largely applied it in their business. The results contradict the claims of Dai & Vasarhelyi, who believe that audit firms lag behind other firms in the field of digital transformation. (Dai & Vasarhelyi, 2016)

The digital maturity of a company is not constant and changes over time under the influence of various factors. Therefore, research in the future should definitely be repeated to see if there are any changes. Also, the following research should apply the interview method in order to remove the questionability of the credibility of completing the survey questionnaire and expanding the sample.

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