The Extent of Big Data Analysis by External Auditors: A Study of Practices and Prospects in Palestine

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ABSTRACT

This research mainly aimed at recognizing the extent of big data analysis by external auditors. Semi- structured interviews were conducted with 18 external auditors to answer the research question. Utilizing computerized analysis of text, we applied a coding procedure to the scripts using the NVivo Programme. Our findings showed the availability of big data and big data analysis usage by external auditors in Palestine. The results also revealed a series of auditing procedures in order to improve external auditing techniques, which leads to a high-quality audit process. This research is crucial for auditing firms by providing insights into their mechanisms used by auditing firms to identify the most important strategies that help in achieving a competitive audit quality. From both academic and professional perspectives, these results aim to instruct business colleges and auditing institutions to develop techniques for external auditors, in order to apply big data analysis.

Keywords: Big Data Analysis, External Auditors, Technological Auditing.

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INTRODUCTION

International Standards of Auditing (ISA) in section 11 of ISA 200 stipulate that a financial auditor's goal is to achieve assurance that the financial statements of an examined business does not contain any significant misrepresentation (International Auditing and Assurance Standards Board [IAASB], 2009a). Expertise of IT controls and systems is required by ISA 315 (subpoints A53 to A56) for the auditors (IAASB, 2009c). But total independence is not required of the external auditors. IAASB (2009b) notes that ISA 220 permits the auditors to enlist Information Systems (IS) for auditors having specific auditing knowledge as part of the audit work group, and ISA 620 permits the auditor to seek technical guidance from an IT specialist (IAASB, 2009d).

Although it might seem fairly clear that technology could enhance audit results, there are several considerations why this could not be. First, while technology might increase audit quality, the firm may decide to decrease internal audit expenditures or external audit fees instead of expanding the audit scope with the gained effectiveness (Eulerich et al., 2022). This would result in a decline of the general quality of audits. Second, in order for auditors to be competent, they not only need to invest in cutting-edge equipment but also have staff who are proficient in its use. Due to the large demand and remuneration for people having abilities in technology in other fields, the accounting profession today is confronted with major hurdles in hiring those capabilities (Christ et al., 2021; Eulerich et al., 2022; Maksymov et al., 2021).

Big data describes a kind of data, while the field of data analysis includes instruments designed to produce massive data sensation (Arnaboldi et al., 2017; Gartner, 2012). We use the acronym BDA (Big Data Analytics) to show the relationship among the two ideas and to infer whether the audit techniques under study in this research are related to the ones that explore large data. The professional audit industry has acknowledged the potential influence of BDA as a significant milestone in execution of audits on a global scale (IAASB, 2016). Accordingly, the Association of Chartered Certified Accountants (ACCA) commented on big data for auditing as, every one of the factors including the volume of generated data which is obtainable to businesses, the substitution of paper documents using IT

documentation, reports, cloud storage, and rising consumer requirements for real-time information, which could have an influence on the process of auditing separately, but big data delivers every one of these factors together at once (ACCA, 2015). As a result, major global audit companies, especially the Big Four auditing companies, have indeed issued comments further about the advancement of BDA techniques to transition and understand the context of the enormous data stores presently accessible to both inside and outside stakeholders (EY, 2014; IAASB, 2014b; KPMG, 2014b) and have also invested a sizable sum of money in initiatives intended to improve the new technology (Brown-Liburd et al., 2015; Cao et al., 2015).

Although the auditor must work on a suitable analysis of reliable information from specific accounts, and afterwards determine the gap between these perceptions and the documented numbers, the guidelines do not clearly specify the kinds of analytical techniques that need to be picked by auditors to satisfy legal standards (AS 2305, PCAOB, 2016). Therefore, at the initial review as well as the final review phases, the standards mandate those analytical processes be carried out in response to evidence gathering (Daroca and Holder, 1985), whereas the preference among which analytical approaches to employ refers to auditor discretion.

From 1958, the audit academic world has engaged in several debates and discussions over the opacity of this feature of public audits (AICPA, 1958). The rise of big data as well as the digitization of commercial disclosures have intensified these discussions (Vasarhelyi et al., 2015). The extent and variety of analytical techniques accessible for the participation are demonstrated by these debates and arguments in scholarly articles. Thus, it makes sense to look into this substantial body of scientific audit research in order to get knowledge about a wider use of analysis. Because formal authority for such choice rests mostly with external auditors, particularly the focus is on their perspective (ISA 610, 2013). This explorative research was done in Palestine, surrounded by the motivations that the audit report of the external auditor is stipulated in a number of organizations specially the international relief projects and Palestine Exchange These entities are frequently require a third-party auditing. Moreover, Palestine is considered as developing economy where the big four, international, and local audit firms exist in the market.

This article corresponds to the research issue, What is the extent of availability of big data and big data analysis usage by external auditors?. External auditors of the audit firms are the particular research configuration that was taken into consideration. Semi- structured interviews with 18 professional auditors from thirteen audit companies in Palestine were conducted to answer the research questions. Using manual and automated coding, these interviews were analyzed to determine how much the external auditor relied on internal audit and the role of big data analysis. The research findings comprised the extent of availability of big data and big data analysis usage by the external auditors.

Auditors' approaches to work affect their assessments and their perception of the findings of analytical methods. Additionally, auditors' operating styles intersected involving their prior experiences involving big data analysis. Inconsistent with expectations, auditor position slightly influences judgments. The study contributes further by giving an insight into the mechanisms of auditing firms to identify the most important strategies that help in achieving competitive advantage. These results aim to instruct auditing academic and professional institutions in developing techniques for the audit process, and enhance the external auditor's skills. This paper provides appropriate information for the decision-making process.

The remainder of the article is organized as follows. Section 2 examines the body of knowledge on the audit and BDA. The research technique is then presented in Section 3. Then, Section 4 presents the findings of the interviewers' conspicuous and common perceptions of the research problem as "general statements", and finally, Section 5 sets out the summary and conclusions of this research.

LITERATURE REVIEW

Big Data Analysis in the Auditing Profession

Audit data analytics is known as evaluating, modeling, and visualizing data that underlies or is associated with the topic of an audit in order to find trends, spot abnormalities, and derive other important information. This data analysis is done in order to prepare or carry out audits (AICPA,

2017). Consequently, the rise of big data presents both opportunities and difficulties for the fields of social investigation, accountancy, and audits, which are seen to be inherently loaded with data. Warren et al. (2015) predicted that big data, as well as the underlying technological contradictions of big data plus reporting and disclosure, will have significant ramifications for accountancy ecosystems throughout all meanings as fresh data types become available (Al-Htaybat and Alberti-Alhtaybat, 2017), with brand-new metrics for evaluation based on big data (Arnaboldi et al., 2017). Although auditors prefer working with organized financial information, the amount and complexity of commercial organizations now necessitate much faster and comprehensive data and analysis of semi or unstructured big data both from inside and outside sources. Big data can be envisioned in external auditing as a supplementary source of information that directly influences how well an audit is performed and how much is understood about surroundings of the client.

Professionals pay close attention to increasing the quantity of technology employed in audit duties (Hood, 2018; PwC, 2018). Unfortunately, we are still largely unaware of the way these technological developments affect the efficiency and efficacy of audit procedures as they relate to observable results. The way professionals view technology varies. Professionals who believe technology will have a positive effect on audit work results are optimistic. As illustrated by Braun et al. (2017), auditors have successfully adopted sustained analytical operations and have begun to recognize the value an analysis, can offer to their tasks and the entire organization.

There are at least two examples in which auditors use big data for the first time. First, auditors may embrace big data as completely as their customers, due to the fact that auditors must maintain contact with their clients in terms of technology and because they see themselves reaping the same gains of big data use as their customers. The second, less promising scene depends on actual events evidence that illustrates auditors have been dilatory to implement technology and that, consequently, a same outcome would be achieved with big data (Alles Michael G, 2015).

As stated by Ernst and Young Reporting (2015), data analytics, emerging technologies, and access to detailed industry knowledge can all

combine to help auditors better understand the market, identify risks and problems, and provide additional insights. In addition, rather than using sampling methods, the opportunity to evaluate and analyze whole sets of data would help the audit gain more confidence. From a technological standpoint, big data analysis' influence on actual audit procedures is critical, as is its ability to provide a way to improve audit efficiency by assisting auditors in detecting misstatements of material and reporting them to the appropriate parties (Defond and Zhang, 2014).

Also, Kaya and Akbulut (2018), found that while the essence of auditing and financial statements remains unchanged, conventional methods of capturing, gathering, and examining auditing information have incubated. Gamagea (2016) concluded that big data would have an effect on auditing professional's potential roles. In auditing, big data analysis offers a lot of chances for auditor's activities, such as: bankruptcy evaluation, management fraud, risk evaluation for audit engagements, and detection of major financial statement inaccuracies (Cao et al., 2015).

The Guidelines of Audit Standards Regarding BDA

As it is true for other professions, technological change has advantages and disadvantages for the accounting industry. It has the power to undermine and replace traditional talents while also promoting the growth of fresh talents (Alles Michael G, 2015). Throughout the following five to ten years, big data will create new opportunities for accountants and financial professionals to contribute to organizations in an increasingly strategic, innovative, and positive way (ACCA and IMA, 2013).

Although a lot of accountants are just beginning to use big data and sophisticated analytics in their work, there are still enormous prospects to be exploited. Meanwhile, big data analysis according to the Institute of Chartered Accountants in England and Wales (ICAEW, 2019), focuses on predicting future results and embedding predictive models in business operations.

Alles (2015) contends that auditors must be compliant with their clients' activities in order to preserve credibility. However, there is a case to be made for auditors using big data only after clients have agreed to it

which is found in Number 80 of the Statement of Auditing Standards (SAS 80). According to auditing principles (e.g., AS 5; SAS 65, ISA 610), the task of an internal auditing assignment could impact the external auditor's work in one of the following ways: (1) when evaluating control risk, (2) when investing customer's internal control system, and (3) when performing qualified examining (Gramling and Vandervelde, 2006; Schneider, 2009).

The External Audits

The regulations require that audits be conducted. The primary effect of audit seems to be an impartial assessment of a company's management claims, which must adhere to a set of regulations and standards established by an outside certifying agency (Merhout and Havelka, 2008). External audit analytics is known as the use of diverse analytical techniques, tools, and approaches to simplify the conversion of data into external audit proof and ultimately into audit judgments. While external auditors review firm financial information, external audit analysis may be seen as a unique sub-part of the larger field of business analysis (Appelbaum et al., 2018).

Throughout auditing a client's financial statements, external auditors often rely on other professional opinions (e.g., lawyers, actuaries, appraisers, and computer specialists) as of client's internal auditor's International Standard on Auditing (ISA) 315, as well as the client's internal auditors. Dependence on internal audit's work saves the client money and time; typically, auditors can depend on the work of internal audit only if they can determine the integrity, objectivity, and accuracy of such internal audit staff; reliance on the work of internal audit affects the audit nature, scope, and timing of the external auditor's audit procedures ISA (610).

Finally, there is deficit in the scientific research about big data analysis, and the available research concentrate on the impact of big data analysis on auditing (Brown-Liburd et al., 2015; Cao et al., 2015; Salijeni et al., 2019). From a practical standpoint, there is insufficient empirical evidence about the big data analysis issue (Salijeni et al., 2019). Therefore, more studies are required to take advantage of this novel phenomenon. The study's motivation comes from the issues listed in general.

The services sector is the highest in terms of contribution to Gross Domestic Product (GDP), with a rate of 64% (PCBS, 2020). The services activities increased by 4% in 2021 (PCBS, 2021), and grew by 2.9% in 2022. Whereas, the value added of services activities will increase by 5.5% in 2023 compared to 2022 (PCBS, 2022). This comes at the expense of the contribution of intermediate productive services which include audits, whose contribution does not exceed 15%, and this means that the audit plays an important part. It is clear that the Palestinian economy, in its main aspect, is considered a service economy. Therefore, further studies are needed to better find out about the availability of big data and its analysis in the external audit located in Palestine – Gaza Strip where there are a lot of circumstances such as: siege, closure, unemployment, and deteriorating political and economic conditions, in order to investigate the extent of BDA by external auditors.

RESEARCH METHODOLOGY

Research Approach

This was qualitative research (Birkinshaw, et al. 2011) utilizing the Constructivist Grounded Theory. Qualitative research is a method of enquiry aiming to get an in-depth analysis of social phenomena in their natural surroundings and setting (Klenke et al., 2016). Grounded theory approaches are a set of systematic but elastic principles for gathering and evaluating qualitative data in order to develop hypotheses that are 'grounded' in the evidence. Instead of formal regulations, the guidelines provide a set of basic ideas and cognitive techniques (Charmaz, 2006). The information was gathered via interviewing or observing various audit practitioners for the study as set out in (Saunders et al., 2016). The research respondents and the researcher created a relationship which allowed the researcher to learn more and explain unclear circumstances. The full interview protocol is shown in the appendix.

The researcher approached the data without any preconceived notions and focused on identifying patterns and language indicators during the interviews. The researcher's interpretation of the data was guided by an interpretivism philosophy, considering how respondents' experiences and

opinions may influence the information they provide. The understanding of social facts is shaped by personal expertise, perspectives, beliefs, attitudes, as well as cultural and social influences (Saunders et al., 2016). The researcher acted as an interpreter and disseminator of information from the interviews, extracting meaning from the participants' comments (Kandeh and Alsahli, 2020).

Sampling

In qualitative research, participants are chosen amongst individuals that can best answer the research questions and improve understanding of the phenomenon under study. The subjects sampled must be able to inform important aspects and perspectives related to the phenomenon being studied (Sargeant, 2012).

Accordingly, in qualitative research, the sample size is not broadly predetermined. The number of participants according to the examination of one hundred papers is that researchers should schedule no more than 30 interviews (Thomson, 2011). This study tried to select an equal number of participants from each auditor classification. The sample size is sufficient when additional interviews or focus groups do not result in identification of new concepts, an end point called data saturation as in (Sargeant, 2012).

The size of the sample for saturation varies from five and twenty-four interviews. In research with a homogeneous study participant that was designed to validate study results and where saturation was desired in broad categories, the smallest sample size for saturation was five interviews (Constantinou et al., 2017). Those research parameters could indicate why saturation was reached after five interviews, using size of the sample of twenty–forty (Hagaman and Wutich, 2017), and twenty-four (Hennink et al., 2017). Saturation was attempted in the content of coding, even codes less relevant to the study issue.

Snowball sampling, is also known as voluntary sampling. It is a volunteer-based sampling program, as the name implies. Respondents will volunteer to participate in the study. It is frequently used when targeting the right group is challenging. The most difficult aspect of snowball sampling

is making its first engagement (Saunders et al., 2016). The researcher next requests the contact information to indicate individuals who might be interested in participating in the study. The individuals will therefore choose whether or not to engage in the research (Bryman and Bell, 2011).

In light of the foregoing debate, and after considering all of the benefits and drawbacks of every sampling approach, this research opted for snowball sampling with some priority to the respondents from the big four, because they are considered as the leaders of the audit industry. In this study, both theoretical sampling by the researcher and also snowball sampling was regarded as the best choice (Aurini et al., 2016; Saunders et al., 2016). This technique is used to identify people with enough, pertinent data (Saunders et al., 2016). There is no predefined number of participants; when more sources are located, the number of people grows (Saunders et al., 2016). For auditors, the end and start of every year time is considered a busy time, because of the financial year officially signals the start of audit period, and auditors have tight deadlines to meet in order to provide the reports to the appropriate stakeholders before the deadline. So, it is recommended to gather the data interviews outside of this period.

All participants were carefully selected from the available population of auditors in the Gaza Strip, who had 10 years or more experience in external auditing and were classified as "executive director - executive audit manager - in charge partner - principal audit supervisor - general partner manager - professional services manager - managing partner - audit manager - senior auditor - partner auditor - auditor". These participants were experts in business practices, assurance services, auditing, advisory and consulting services, as a result, the experts consulted were able to include not only theoretical and moral views, but also realistic explanations.

According to Malterud et al. (2016), a qualitative research sample must be based on the strength of the data derived rather than the sample size. Marshall et al. (2013), furthermore, claimed that cultural influences, the topic of investigation, and geographical considerations all affect sample size in a qualitative approach. Malterud et al. (2016) and Marshall et al. (2013), on the other hand, proposed that in qualitative research, interviews must attain saturation, which happened in this study as there were no new ideas or observations.

Data Validity and Reliability

Researchers conducting interviews are compelled to specify their conceptual constructions and the scope of the observables in a precise and unambiguous manner in order to demonstrate reliability and validity. The scope of conceptions used by the survey researcher is clearly defined, theoretically sound, and quantifiable (Lillis and Mundy, 2005). Validation of data and study conclusions is obtained with procedures such as triangulation, participant observation, and external audit (Creswell, 2014). This research, on the other hand, used relatively standardized data collection to enhance reliability, whereas the research across a similar industry of audit firms ought to enhance external validity. Otherwise, many resources of evidence and the related patterns are matched to enhance internal validity (Bruns and McKinnon, 1993). Additionally, the data triangulation approach is used to ensure not just the validity of its conclusions, but also the fulfillment of data saturation (Denzin, 2012). There are a few broad criteria and conceptions that scholars agree on when it comes to data saturation: zero additional data, topics, codes, and the capacity to duplicate the research (Guest et al., 2006). Triangulation entails the use of various external ways to acquire and analyze data (Denzin, 2009).

Research Analysis

Thematic Coding

Due to the theme of each remark, the researchers classified each of the 9 statements in the 18 transcripts. The statement's subject and the interview procedure question that went along with it were used to determine the theme. Despite the fact that the transcripts covered a variety of topics, this study focused on three linked topics: "The extent of availability of big data and big data analysis usage by external auditors".

Manual categorization and coding

This research utilized a tripartite coding method, which creates codes, conceptions, and classifications while also producing memoranda, to continuously compare the data (Creswell, 2014; Glaser, 2017). During the conduct of this research, about 8 memoranda were concurrently prepared to present situations from the fieldwork, to explain the development of grounded theory, and to define the given diverse responses throughout

interviews (Strauss and Corbin, 2008; Creswell and Poth, 2017). Then, a solo investigator turned these assertions into spontaneous claims by hand-coding them (Glaser, 1992; Sutton et al., 2011). Spontaneous responses covered subjects that are relevant to all respondents. According to Lillis (1999), a singular coder is preferable to several coders for such an exploratory investigation. It's also "obviously less vital to engage in this kind of validation". Every transcript was reviewed within the open coding process in terms of phrases and words that expressed distinct ideas, or codes (Charmaz, 2006; Creswell, 2014). During this procedure, the researcher was able to decipher 9 codes from the voluminous comments made by the respondents in the interview discussions. As a result, these codes were evaluated and categorized according to their commonality using axial coding, therefore 9 abstracted notions were ultimately produced (Charmaz, 2006; Strauss and Corbin, 2008).

Expanding with computerized coding

Lastly, as shown in NVivo rotational Figure 1, the researcher arranged such conceptions around the research's fundamental phenomena throughout the procedure of selective coding to produce one aspect (theme) of the entire studied data. What Strauss and Corbin (2008) referred to as a plotline defines "what occurs" in the fundamental phenomenon under investigation created from the development of these classifications and their interconnections. Consequently, these groups were determined according to the research objective "The extent of availability of big data and big data analysis usage by external auditors". As a result, the researcher ultimately arrived at the saturation point (Creswell, 2014).
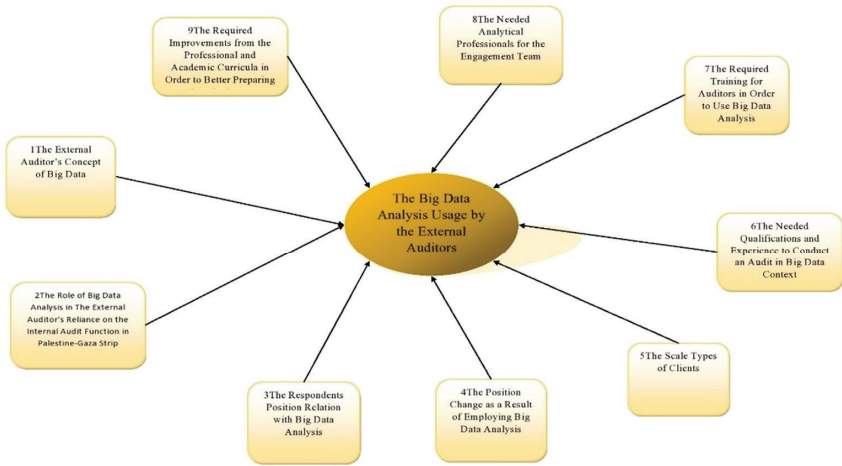
**Figure 1: Research Categories and Concepts Source:
Produced of the research's data**

Along with coding by hand, a comprehensive audit chain was kept from answers throughout the transcriptions to the relevant emerging statements which condensed and expressed the statements.

RESULTS

Research Participants

In order to achieve unanimity and specificity regarding what transpired throughout the interview, and as indicated in Table 1, all transcript papers were saved individually and had identifiable titles that included the time, date, and length of the interview. We coded the participants as P1-P18 in order to enhance confidentiality and anonymity.

Table 1: Participant Interview Details

Participant	Position	Audit Firm and classification	Years of Experience	Interview Date	Medium	Duration
P1	Executive Director	Talal Abu Ghazalah "international"	24	25/04/2022	Face to face	01:04:00
P2	Auditor	Mutair-Alami Audit "Local"	28	09/05/2022	Telephone	01:05:59
P3	Senior Auditor	Ernst & Young "Big Four"	16	10/05/2022	Telephone	01:02:00
P4	Managing Partner	Russell Bedford "international"	18	12/05/2022	Face to face	01:20:31
P5	In Charge Partner	Baker Tele "international"	24	12/05/2022	Face to face	00:41:37
P6	Principal Audit Supervisor	Deloitte & Touche "Big Four"	13	14/05/2022	Face to face	01:13:10
P7	Executive Audit Manager	Mazars "international"	25	14/05/2022	Telephone	01:00:25
P8	Auditor	Talal Abu Ghazalah "international"	14	18/05/2022	Telephone	00:58:11
P9	Auditor	Alshamel Audit "Local"	12	18/05/2022	Telephone	00:50:55
P10	General Partner Manager	Deloitte & Touche "Big Four"	42	19/05/2022	Face to face	01:37:16
P11	Auditor	Alrahma Audit "Local"	10	23/05/2022	Face to face	00:59:25
P12	Professional Services Manager	Almezan Audit "Local"	17	23/05/2022	Face to face	01:08:58
P13	Audit Manager	PwC "Big Four"	25	23/05/2022	Telephone	00:57:15
P14	Auditor	Alrebat Audit "Local"	20	25/05/2022	Telephone	01:08:57
P15	Audit Manager	Tayser Alsayegh Partners "Local"	41	26/05/2022	Face to face	00:42:46
P16	Audit Manager	Ernst & Young "Big Four"	18	27/05/2022	Telephone	00:52:29
P17	Audit Manager	Almutamayez "Local"	25	29/05/2022	Face to face	01:21:43
P18	Partner Auditor	Kreston "international"	12	31/05/2022	Face to face	01:13:17

The study's final sample included a mix of people with diverse levels of experience, knowledge, and competence. Eighteen auditors were interviewed from 25th of April until 31st of May in the year 2022. All levels of auditors were represented among the attendees. And they used big data analysis technologies in their day-to-day auditing tasks. Moreover, the chosen sample included auditors who worked in the big four audit firms, which meant that they audited large clients, which necessitates the usage of

big data analysis in order to provide effective audit reports. The majority of the participants stated that they audited both listed or larger enterprises, and medium to small organizations in the main cities in the Palestine - Gaza Strip.

Research Findings

This study produced several important discoveries relating to, various concerns around the research, from the ongoing comparative analysis of primary data drawn from the interviews. An illustration of coded sentences displayed as structured data is shown in Table 2 (Lillis, 1999). Whereas, NVivo extended the manual coding to machine coded statements which is provided in Table 2. The researchers arranged such conceptions around the research's fundamental phenomena throughout the procedure of selective coding to produce one theme of the entire studied data (Strauss and Corbin, 2008). These concerns comprised the extent of availability of big data and big data analysis usage by external auditors in the Palestine - Gaza Strip.

Table 2: Research Outline Thematic Elicitation

Research Title	Denomination	Conceptions
The Extent of Big Data Analysis by the External Auditors	The availability extent of big data and big data analysis usage by the external auditors.	a) The external auditor's concept of big data (BD). b) The role of big data analysis (BDA) in the external auditor's reliance on the internal audit function in Palestine-Gaza Strip. c) The respondents position relation with BDA. d) The position change as a result of employing big data analysis. e) The scale types of clients. f) The needed qualifications and experience to conduct an audit in BD context. g) The required training for auditors in order to use BDA. h) The needed analytical professionals for the engagement team. i) The required improvements from the professional and academic curricula in order to better preparing auditors in the future.

Source: Produced of the research's data

The results indicated how each popular phrase ranks in relation to the framework's many components, the popular statement itself, and the relative strength of agreement for the popular argument among all interviewees. Both manual and automatically coded items were included in these findings.

Each popular declaration is addressed in the subsequent discussion to gain an understanding of the statements. The degree of agreement or opinion is given as a percentage of participants stating the popular argument belong to all participants, and the comment's categorization and ranking acceptability (for instance, all respondents) are indicated. Instances of responses indicating the interviewee by auditing firm and position as shown in Table 1 were used to demonstrate the answers.

The Extent of Availability of Big Data and BDA Usage by External Auditors in the Palestine - Gaza Strip

BDA usage by the external auditors was revealed to be available in the Palestine- Gaza Strip with more intensity in the PEX indexed, international, holding companies and big four audit firms (De Santis and D'Onza, 2021) due to large economic scale and high volume of transactions, and it appears to be growing gradually. The people and auditors of the State have financial awareness, believed that the firms have grown recently because of local and international developments.

Furthermore, noting for example the P17 concept of big data "It is the large sized data, often for large and monopolistic institutions, and it has its own processing and analysis that is completely different from the normal data of small enterprises, and it needs special control and distribution of powers and users to obtain accurate and detailed results that can be benefited from and to ensure that the data is not tampered with". Moreover, big data conception was derived from the respondents as, the huge mass of financial and non-financial information, which is found in the big institutions, such as banks and insurance companies through programs which they analyze and extract information. Thus, preparing a plan for audits and recognizing the extent of risks depends on the efforts of external auditors.

These results agree with Miller, et al., (2012); Russom, (2013); Sicular, 2013; AICPA, (2014); ICAEW, (2014); Liu and Vasarhelyi, (2014); Alles Michael G, (2015); Cao et al., (2015); John et. al., (2015); Ernst and Young Reporting, (2015); Vasarhelyi et al., (2015); Yoon et al., (2015); Zhang et al., (2015); PCBS, (2017); ICAEW, (2019); and Salijeni et al. (2019). This recognition was later confirmed by almost all respondents in the interview sessions.

Accordingly, this study realized that there is a role for BDA, for the external auditor to rely on the internal audit function if the internal audit proficiency uses BDA in their function (Popa and Păun Năstase, 2018) for example as P5 mentioned "There is a role represented by the implementation of electronic audit programs through the data provided by the company, which has already been reviewed by the internal auditor", especially in the big four (De Santis and D'Onza, 2021), in Palestine-Gaza Strip, and this is because big data analysis saves time and efforts (Yudowati and Alamsyah, 2018; Kend and Nguyen, 2020), also gives new and accurate detailed insights (Liu and Vasarhelyi, 2014; Ernst and Young Reporting, 2015; John et. al., 2015; Zhang, 2021). In contrast, two participants P7 and P13 denied the existence of this role because the integrity, loyalty and credibility of the internal audit is questionable because it is a part of the institution and is affiliated with its management. There is no role and it is not a condition because the concept of internal audit is very limited in the Gaza Strip, and therefore there is less reliance on its function.

On the other hand, one of the procedures of the international auditing standards that the auditor must perform is the relation between the auditor's position with BDA as, the data analytical procedures to facilitate and assist the external audit work (Payne, 2013; Gantz, 2014; Liu and Vasarhelyi, 2014; John et. al., 2015; Vasarhelyi et al. 2015; IAASB, 2016; Alles and Gray, 2015; Xu et al., 2020). Although, P3 declared the relationship as complementary "It is true that there is an integrative relationship where I'm as a senior auditor perform analytical procedures using BDA, with the aim of displaying the results in a way that is as detailed as possible and with extreme accuracy".

Otherwise, six participants P7, P13, P14, P16, P17 and P18 declared that there was no change in their position, the rest of the respondents said that, the auditor's position would change as a result of employing BDA due to creating new highlights which need processing and decisions and this result agrees with Liu et al., (2020), and Zhang, (2021).

Moreover, the client's scale types were large, medium, and small as agreed by the majority of the respondents.

According to P1, P2, P7, P9, P11, P13, P14, and P18, they divided the needed qualifications and experience into professional and academic qualifications, similarly P3, P5, and P12 added the training part to the previous responses. The study discovered that the needed qualifications and experience to conduct auditing in the big data context are, professional internationally known auditing certificates such as CPA, ACCA, IACPA, PCPA, experience in the financial and auditing field using technologically big data (ICAEW, 2014; Liu and Vasarhelyi, 2014; John et. al., 2015). and academic qualifications were represented by university degrees from bachelor's, master's, and doctorate in the field related to auditing and statistics, specifically accounting, and these needed qualifications and experience seems to be not differed a lot from the traditional audit, except for the technological aspects and these results agree with Earley, (2015), and Vasarhelyi et al. (2015).

P5 talked about "familiarity with financial analysis, knowledge and awareness of the most important statistical methods and the ability to use computers and specific programs with good accounting knowledge". Surprisingly, based on this research outcomes the required training for auditors, in order to use BDA because it's still limited in the Palestine-Gaza Strip, is: computer programs specialized in auditing which are available in the market, especially the commonly used and traded ones, in order to match paper data with computerized accounting programs (Payne, 2013), and practical training and special workshops using big data analysis for auditing and in the field of audit expertise. These results partially agree with ICAEW, (2014).

Simultaneously, there is a need of adding professionals to the engagement team for big data analysis usage, and this result agrees partially with (Cao et al., 2015), and totally with (Alaklabi, 2017; Krieger et al., 2021). Otherwise, P3, P4, P10, P11, and P16 commented not in favor of adding professionals. Finally, the required improvements from the professional and academic curricula, in order to better prepare auditors in the future are, academic throughout the university education, and professional aspect due to the daily developments generally in the audit profession and BDA (Liu and Vasarhelyi, 2014; Alles Michael G, 2015; Earley, 2015; John et. al., 2015; Vasarhelyi et al. 2015). However, the opinion of P13, seemed to be much different because he required the improvements from the auditor himself,

explaining as "the professional and academic curricula generally give the minimum level to auditors which enables them to perform the labor market tasks, and it is difficult to give them more than that, but the auditor must constantly develop his skills to keep pace with the labor market needs".

According to the observations, this research attributed the prior appeals to the lack of BDA professional training programs (ICT, 2014; Abdullah and Al Hinai, 2018; Al Muzain, 2019; Abu Suhaiban, 2020), functional education, scarce cooperation between the professional audit bodies with universities and audit firms, this result agrees with (Dagilienė and Klovienė, 2019).

DISCUSSION

For the accomplishment of the highest success in the extent of usage of BDA in the external audit process, this study indicated that the following developmental consecutive phases of directing the external auditors should be accurately followed when the external auditing process starts: The relation between the auditor's position with BDA as, the data analytical procedures facilitate and assist the external audit work, which is considered as one of the international auditing standard procedures that the auditor must perform. Also, preserve experience in the financial and auditing field using technology and big data. After that, mix the financial academic qualifications with statistics, to enhance the analytical skills. On the other hand, maintain training for auditors about the computer programs specialized in auditing which are available in the market, especially the commonly used and traded ones, in order to match paper data with computerized accounting programs in order to use BDA. Adding professionals if needed to the engagement team in order to benefit from BDA usage. Finally, support the cooperation between the professional audit bodies with universities and audit firms.

CONCLUSIONS

In conclusion, this study attempted to know the extent of usage of BDA by external auditors, in order to improve the auditing process. In a medium size and occupied country like Palestine, this study appears to be extremely

limited because it was limited to the Gaza Strip alone. For about three decades time external auditing has been institutionalized and syndicated in the Gaza Strip, which has numerous auditing firms, and the study's conclusions are much more pertinent, and their extrapolation will be quite plausible.

Lack of the prior studies about auditing and BDA in general, especially in the Palestine, Gaza Strip, and the limited economic size which influence the auditing activities, are another study drawback that was unavoidable because the research topic was considered as a new issue.

Additionally, the variation between the audit firm's types and sizes in the shadow of scarce cooperation between academic and professional institutions, led to the reduction of BDA to be common between all external auditors and let them with a generally humble point of view about the big data analysis, except the external auditors from big four audit companies because, the big four are considered as the trend leaders of the audit industry in the world, particularly as they have a number of research about most of the research subjects.

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APPENDIX INTERVIEW INDEX

1. How does the external auditor conceptualize and institutionalize big data?

2. Is there any role for BDA in the external auditor's reliance on the internal audit function in the Palestine-Gaza Strip?

3. What is your position in this organization, and how does it relate to BDA?

4. Does your position change as a result of employing BDA, or do you expect it to change?

5. What scale types of clients do you do audits for?

6. What qualifications and experience are needed to conduct an audit in a big data context?

7. Which type of training would auditors require in order to use BDA?

8. Do you believe that the engagement team needs more analytical professionals?

9. What improvements do you believe the professional and academic curricula should make in order to better prepare auditors in the future?