

IT Audit Literature: A Future-Looking Research Agenda

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Abstract

Information Technology Auditing is a growing field of research necessitating more attention. This comprehensive literature review examines the aspects of IT Auditing, with special attention to IT auditing in the banking sector collected. Articles and research studies found were sorted into three different focuses (type, structure, and learning), and the research was compared to like articles within the assigned group. Our findings demonstrate significant gaps of knowledge 1) within the types of auditing outside of internal, 2) within the current standards and guidelines used within an IT audit, and 3) in case studies focusing within the structures and how it works within organizations of various sizes. Our conclusions demonstrate that although the general discussion of auditing has a fair amount of documentation, more in-depth literature within IT auditing is lacking and that a focus within the missing categories would advance the field.

Keywords: Information Technology Audit, Literature Review, Academic Research, Auditing

1. INTRODUCTION

Within any organization, risks must be checked with the guidelines prepared for the sector it operates in (Brazel, 2008). To stay current with guidelines and laws, auditors go through risks within their designated field and report on what is compliant and what needs to be reconsidered. Information Technology (IT) auditing focuses within the specific data, data organizing structures and the risks surrounding the data and systems an organization's data and systems using

standards and processes set by other organizations and boards like ISACA, IIA, and PCAOB.

By definition, an audit is an inspection of an institution from someone either internal or external (PwC, 2015). Traditional audits have focused on the financial side of organizations, but they have only been growing in demand for IT applications. Auditing is a critical process within an information security cycle that completes one full cycle prior to the next risk assessment. By

conducting an audit on an IT system, the organization will be able to understand the strengths and weaknesses within their own system based on government standards, frameworks, and their own policies and procedures. Without audits on these crucial systems, items could have either too little focus or too much on both the financial and security aspects. As of 2017, the auditing field for technology has been growing at a steady pace – however, the research within the field has been lacking.

In the research division, it has been shown that newer fields of study require facts and papers from other fields, not necessarily related to the central topic to build upon the established knowledge base (Baskerville, 2002). Due to this phenomenon, the IT field has been gathering data from other topics of research. IT Auditing is reflecting this trend (Baskerville, 2002). The IT Auditing subfield is currently gathering data from the general auditing field of research, as well as from accounting research with a few technology-based research findings. This is reflected within the current literature review.

Auditing has been around as a concept for a long time but the way auditing has taken today has been recently formed (Byrnes, 2012). Due to the nature of being a newer subject, the topics are broad and wide, with pinpoint items in general auditing. When narrowing the scope to IT auditing research, the numbers of papers are at a staggeringly low level.

Currently, within the auditing space, several organizations and guidelines help contribute to the auditing field as a whole. The American Institute of Certified Public Accountants (AICPA) is one of the many organizations that were created to establish standards for the auditors and accountants to use for their reporting and findings (Yang, 2004). Other standards that are currently being used range from business standards like NIST or COBIT, to auditing standards like the previously mentioned PCAOB or ISACA. A majority of the documentation within the IT auditing field consists of white papers published to the standards' websites or other general articles that majority of auditors have access to.

Technology has been a topic and a concept that was first slow to catch on, but as time passed – the more it has been integrated into life today. Just like the slow steady pace to a rapid quick change, auditing has been following a similar pattern not only in practice, but in research as

well. Both technology and auditing have finally been identified as an aspect to look under the most recent decades, looking at paper publishing dates.

This paper will examine the findings of literature within the IT auditing field. Currently available findings will be from two different databases of reference and divide the findings into items that are clearly-stated and ones that need further research.

2. LITERATURE REVIEW

In this literature review, there were two major databases that were examined; EbscoHost and ProQuest, with the prior one having the most documentation. From these two databases, a total of 13 different journals were used and referenced. The top three major journals referenced were Internal Auditor, Auditing: A Journal of Practice and Theory, and The Journal of Information Systems. Items within the databases were first researched with the broadest terms possible to observe the findings within the first layer of searching. Terms included "information technology audit*," "it audit*," and other alterations of audit or auditing. Search term limiters, which both databases provided, were able to sort by subject, full text, type of article, and date published. Journals that appeared multiple times within the search (i.e. the ones found and sited above) were taken into further consideration and were adequately searched. In total, there are 47 scholarly articles listed and sited within this literature review. Appendix A lists the journals found, what database they are from, and how many papers it contributed to the literature review.

The literature was placed into three different groups depending on the general topic flow of the articles. The concepts are displayed in Appendix B and show how many journals were placed into each category. The focuses were: Types of Audit, Structures of Audit, and Learning from Audit.

Types of Audit

When defining types of audit for this section, the reviewer was looking for the proper topics and points that better explain the different sections of auditing that could take place. This could be broad from topics on internal auditing (Coderre, 2015; Glover & Romney, 1998; Jackson, 2012; Majdalawieh & Zaghoul, 2009; Mar, 2014; Singh, Best, Bojilov, & Blunt, 2014) to external (Malaescu & Sutton, 2015) to outsourcing (Pyzik, 2012). This could also further define what these types of audits need to comply, without

discussing the structures of the guides they use, which would be within Structures of Audit.

Most of the papers gathered focus on internal auditing, which specifically feature auditors that work for a single business or organization and have an insider's look and a general knowledge of the systems and protections at hand. Each paper on internal auditing had their own approach. However, when looked at as a whole, several unified points surfaced for this type of audit. For example, it was said that internal auditors not only need the hard skills of knowing how technology functions within the system, but benefit from soft skills, too, such as how to communicate with other employees and supervisors (Donathan, 2012). Though the hard skills have also been a focus within several other articles, due to the newness of IT audits, not many auditors know about these topics (Coderre, 2015; Majdalawieh & Zaghoul, 2009; Mar, 2014). These papers also discuss the necessity of looking into the strategies established, adjusting them if needed, and the importance of communications (Donathan, 2012; Mar, 2014).

Interestingly, one of the findings on the amount of focus on continuous auditing was found within three different articles. This type is new, comparatively and these papers focus on the usefulness of continuously auditing a system or organization (Malaescu & Sutton, 2015; Pei, Chan, & Kogan, 2016; Singh, Best, Bojilov, & Blunt, 2014). "Continuous audit is defined as 'a method used to perform control and risk assessments automatically on a more frequent basis'" (Malaescu & Sutton, 2015). This is an attention-grabbing concept since it functions much like a traditional audit. These papers take a look at the established frameworks of auditing (Pei, Chan, & Kogan, 2016), how other auditors can benefit from a proper continuous audit (Malaescu & Sutton, 2015), or compare how the current applications hold up to each other (Singh, Best, Bojilov, & Blunt, 2014).

Additionally, the absence of information for external (outsourced auditing specifically) was especially surprising. These types of auditing are genuine ways for organizations to audit their systems. Some businesses are too small or do not have enough funds to have auditors within the internal structure, so outsourcing is a viable option (Pyzik, 2012). External auditing is an essential part of many organizations in order to stay compliant with laws and guidelines set for their sector. Through external audits, a business can get an outsider's view on the system setup within and generate a report on how it complies

with many established standards and policies (Malaescu & Sutton, 2015).

Structures of Audit

When defining structures of audit for this section, the reviewer looked for topics that heavily discussed the organizations that manage the different guidelines for auditors to use. Examples of these included the U.S. Sarbanes-Oxley Act of 2002 (Baker, 2010; Graham & Bedard, 2013; Lurie, 2004; Pyzik & Mar, 2012; Whitney, 2005) to SAS (Brazel, 2008; Rezaee & Reinstein, 1998; Yang & Guan, 2004), and GAIT (Hill, 2011). There are many types of guidelines at an auditor's disposal, but some are weighted differently in certain organizations more than others. There can also be discussions within here on how to build a guideline or to improve the current ones.

One of the most noted types of structures for auditing is the U.S. Sarbanes-Oxley Act of 2002. There were five papers within this focus that talked about it in-depth or mentioned it to get their point across. Specifically, the Sarbanes-Oxley Act (SOX) "holds senior management... accountable for accurate reporting and requires that they validate both the financial statement and the way it's prepared" (Lurie, 2004). Most often, this is targeted at CIOs and CFOs of businesses and organizations, which usually requires the internal auditors to deliver the correct information to them. Most of these articles go over the basics of what SOX is, as well as pointing out the strengths and weaknesses of the act that auditors need to look out for. For example, Graham and Bedard's article focuses on Section 404 of SOX, pointing out that the more a company is comfortable with IT integration, the more positive the testing and remediation processes are (Graham & Bedard, 2013). Some papers even focus on what other members of an organization would need to know about SOX (Lurie, 2004).

An item that was predicated to surface more, but was only found once was COBIT, mentioned within Audit Methodology for IT Governance by Mirela Gheorghe. COBIT, or Control Objectives for Business and Related Technology, is a "well recognized framework for IT governance and auditing accounting IT systems" (Gheorghe, 2010). More so, this type of framework provides auditors with a guide as they look through and plan, write, and deliver the audit. This is interesting, considering how infrequent any type of framework, from COBIT to NIST, was found within the literature. In fact, there was no mentions of NIST, ISO, AICPA, or other

frameworks auditors can use to structure their audits.

Learning from Audit

When defining learning from audit for this section, the reviewer searched topics that focused more on learning from the different processes and techniques within auditing. Items from how knowledgeable the auditors are (Braun, 2014; Curtis, Jenkins, Bedard, & Deis, 2009; Davidson, Desai, & Gerard, 2013; Dzurainin & Mălăescu, 2016; McKee & Greenstein, 2003; Smith, 2008; Swanson, 2008; Vasarhelyi et al., 1984; Westhausen, 2016) to basic summaries on the topics at hand (Coronado, 2014a, 2014b; Moreno et al., 2003) and the different scenarios that were documented, revealing areas that need improvement in the audit process (Abu-Musa, 2010; Al-Laith, 2012; Gilmore-Allen, 2015; Hallinan, 2008; Wongpinunwatana & Panchoo, 2014). Each of these topics focuses on showing the knowledge gap or how to fill it for in-coming auditors and veterans alike.

Many of the articles found fell within the subcategory of what types of risks are out there for IT systems and what an auditor can do to address them. They mainly focus on how auditors usually do not have a large technical background and deliver some information on how an auditor can improve and work through that lack of knowledge (Braun, 2014; McKee & Greenstein, 2003; Westhausen, 2016). Some papers specifically define the categories of information for IT; even classifying what type of knowledge should be known by what users (Smith, 2008). Most recommend some form of training utilizing the technology or programs the auditor will use, so then they would not only know what to look for, but also how to use the tools around them effectively (Braun, 2014; McKee & Greenstein, 2003; Westhausen, 2016).

While there were a small selection of articles that were able to present good examples of scenarios, the absence of real-life analysis within the community of auditing was shocking: a type of paper that observes one or multiple types of like-organizations. Something that researchers can look for would be how auditing is within banking, more specifically within small community banks. However, the literature did not demonstrate any knowledge within that area of expertise. A small sample of papers examined how the auditing process works within organizations and the effectiveness of the strategies used. One article that was similar was Investigating Adequacy of Security Controls in Saudi banking Sector: and Empirical Study by Ahmad A. Abu-Musa, who

looked into the Saudi banking sector and what kind of controls their computerized accounting information systems had in place, as well as how adequate they were. It was found that most banks within that sector were adequate based on the multitude of questions that were asked to the individuals within the study (Abu-Musa, 2010).

3. ANALYSIS

It has been shown that there are areas of academic research that are lacking within the IT auditing field. From this research, it can conclude that there are several points about internal audits and auditors, general understanding of the field, and a small selection of studies; however, these are not the only aspects of auditing that one can examine. While there are an array of topics that can derive from IT auditing alone, this section will branch into three different, yet broader topics based on the different categorizations of research used: awareness and understanding of external auditing, research and documentation of the current and future frameworks, and conducting various case studies in different fields of interest.

Extending to External

The topic of internal auditing has been covered many times, yet other forms of auditing have not. A majority of institutions that conduct internal audits also have external auditors that come either bi-yearly or yearly to conduct an official report. During internal audits, the auditors typically look at the areas assigned to them, while an external auditor get a full scope of the IT system and the policies surrounding it. While it is good for internal audits to be a core topic of research (Mar, 2014) or diving into more topics and the future of internal audits (Jackson, 2012; Mar, 2016), attention to external audits is critically needed within the research field.

In the field of academic research, the focus on internal audits is more extensive than one might originally have thought going into researching the topic. Mirroring the advancements and topics that have been covered internally can also be applied for external audit research. Articles and papers on the basics (Donathan, 2012; Ibrahim, 2014), to detailed papers focusing on the positives and negatives about a specific audit can also be applied to other audit types.

One that did this well was Irina Malaescu's and Steve Sutton's research paper on having external auditors use internal audit papers to implement more of a continuous audit within the company (Malaescu, 2015). While it focused more on the benefit of using internal audit papers and findings

to assist external auditors, it is the bridge that was needed within this research field to research not only internal audits, but external as well.

What makes a good external auditor? What qualities separate internal auditors and external auditors? How can an auditor who has done internal audits prepare for one externally? While both types have a similar foundation of procedures, processes, and strategies to format reports, internal audits typically on one or a few aspects of the full IT system; an external audit must focus on the entire system. Internal audits are designed for companies to assess where they are with their own policies and be able to make any necessary corrections prior to the external auditor's assessment. They know their own system and the smaller, more detailed aspects of security.

Depending on the system external auditors are will be reviewing and reporting on, external auditors must be able to adapt quickly. They do not have as deep of an understanding of the system as the internal auditors of that organization, so a different set of skills are needed in order to properly audit against frameworks or government-based laws and regulations, depending on the industry.

Research could focus more on the collaboration between internal and external. If strengthened, the ability to bring a fast yet accurate report on the full system of the organization is much more likely. It can also lead to more research of the fundamentals of external audits, the differences between the different auditing types, and how different it is to work with internal auditors compared to auditors that were outsourced for internal needs. Even expanding it all into its own separate journal could be a possibility, since there is an *Internal Auditor* journal already established.

Expanding on Frameworks

General documentation on the different frameworks are out there, they are just located under a non-academic branch. Frameworks like NIST, ISO, and COBIT can all be found under their respective websites through a general web search. Unfortunately, the original concept of researching just journals and databases that are academically sound felt short and they were surprisingly absent for this form of research.

If others specific restrictions have adhered to these, a larger portion of the written audit community has been overlooked. While other documents could be brought in, after the initial

review did not consider these whitepapers or documents found outside of the databases as part of the literature review. First and foremost, the use of documents outside of the academic umbrella needs to be looked at in a different light. While researching the IT auditing field, it's imperative to consider a white paper, framework specifications, or government data if applicable. If this research is accepted already, it needs to be known on a larger scale, rather than by haphazard word of mouth.

However, even that is not enough for these frameworks. Lack of documentation on testing and implementing the frameworks as intended is also an issue. Most concepts have academic studies that have been tested to determine if it works, needs improvement, or if something else that already exists fulfills the same concept. There are case studies on how different businesses can use audits to their benefit depending on the size and scope, but the frameworks themselves have yet to have this type of academic observation.

Why is this aspect covered in this framework and not the other? Why does this framework state specific items for each level of business size, and are they really necessary? Could an auditor easily determine how to comply to the framework with how it is written and implemented? What about a general business user, or starting auditor? Can parts be cut down or edited to everyone's benefit? Does another framework implement this better than the other? These are a few of the many questions that should be considered concerning academic IT auditing research topics.

Methodologies (Havelka, 1998; Gheorghe, 2010), audit software (Henderson III, 2016) and smaller known compliances (Lurie, 2004; Pyzik, 2012) have been looked into in the past, but like stated above, it can be expanded into its own structured subcategory within the IT auditing topic by also examining the frameworks that auditors use daily. Considering frameworks used, the outside compliances, governed law and regulations, and other methodologies found within, its easy to see how many branches of research can develop from and benefit the auditing community. Strengthening the existing frameworks for various business sizes, confirming if there are obstacles in the way, and putting up methods for auditors to consider prior to starting their next report.

Conducting Case Studies

Papers found within the third category of 'Learning from Audits' had a strong foundation on what audits are (Dzuranin, 2016), the benefits of auditing (Braun, 2014), and how the learning process can develop within the research field (McKee, 2003). However, a major point that is missing is case studies. After utilizing several documents during this literature review, only one case study emerged, which was referenced in the Literature Review section. It was surprising to find very few of these types of studies were conducted within the research found. Because this is lacking currently, does not mean it cannot be considered as a valid research option in the future.

What cases can be considered? Previous suggestions points to frameworks and external audits as possible fields of research. Both can benefit with the analysis of case studies to possibly verify the findings found through general research. External audits can be examined based on the type of business that is being audited - small, medium, or large - and integrated with framework studies to find strengths and weaknesses of the organization. These findings can also lead to looking into frameworks that benefit internal, external, and outsourced auditors. Does one framework suit the needs of all auditors? In what, how and capacity? This is just one of the many paths to take with frameworks and external instances of case studies.

Another area of study is to focus on the type of institution that is being audited. Financial infrastructures such as banks and federal credit unions need to be audited differently than a health institution like a hospital. There are varying laws and regulations that govern both of those sectors. Is there a framework that benefits one institution more than another? Or, does the one framework provide what both sectors need? Banking and healthcare are not the only fields that can benefit from an audit, however. General businesses that heavily depend on digital infrastructures could find value in initiating the information security cycle, from risk assessment to audit. Examples of these companies are ones that contain databases and processes to businesses that use virtual machines and remote desktop to perform daily tasks.

While several types of studies work in the academic field of auditing, case studies need the most attention. They can be used to effectively verify the processes and reporting styles the field has been adapting and utilizing for the past

several decades are truly the best way to complete an audit. By diving deeper into the three weak points within the academic field, the field outside of academia can also improve.

4. CONCLUSION

IT auditing is a critical part within any business and has evolved to a point where it is needed to be implemented in all sectors. This also increases the demand on finding additional researchers to look and actively verify the information that is being shown within the auditing field, as well as to others that observe the field. While documents published outside of a scholarly setting are abundant in numbers, within journals, it is difficult to find any journals that are solely-focused on the auditing field in general; even more so when looking at it from an IT perspective.

After reviewing the current literature, it is vital for the auditing community to expand the types of documents within the field, not only for the lifespan of auditing as a topic, but for the benefit of students and other researchers looking for scholarly documents for their respective purposes. Currently, looking within the scholarly community, the view point of auditing is limited and generally from an internal perspective - not looking into any current guidelines being used and also with no real observations of these practices within case studies. With using articles from other, non-scholarly sources, the amount of productivity and information will increase gradually. Previously, the information technology field of research was at this point (in the early stages) and was able to gain its own standing over time. If IT auditing follows the same path, within five to 10 years, more research papers about the topic will be within journals and more researchers and people who use this information will reach out and apply the findings within their own situations and institutions.

5. REFERENCES

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Appendix A: Number of Papers per Journal

Journal Name	Source	Number of Papers
Auditing: A Journal of Practice and Theory	EbscoHost	4
Bank Accounting and Finance	EbscoHost	2
The CPA Journal	ProQuest	3
Informatica Economica	ProQuest	1
Internal Auditor	EbscoHost	16
International Journal of Management and Information Systems	ProQuest	1
International Management Review	ProQuest	1
Journal of Accountancy	EbscoHost	1
Journal of Accounting, Business & Management	EbscoHost	1
Journal of Information Privacy & Security	ProQuest	2
Journal of Information Systems	EbscoHost	11
Managerial Auditing Journal	ProQuest	3
Scitech Lawyer	ProQuest	1

Appendix B: Number of Papers per Journal Within Each Topic of Interest

Name of Journal	Types of Audit	Structures of Audit	Learning from Audit
Auditing: A Journal of Practice and Theory	0	2	2
Bank Accounting and Finance	0	2	0
The CPA Journal	0	2	1
Informatica Economica	0	1	0
Internal Auditor	8	3	5
International Journal of Management and Information Systems	0	0	1
International Management Review	0	0	1
Journal of Accountancy	0	1	0
Journal of Accounting, Business & Management	0	0	1
Journal of Information Privacy & Security	0	0	2
Journal of Information Systems	3	5	3
Managerial Auditing Journal	1	2	0
Scitech Lawyer	0	0	1
Total Within Groups	12	18	17