

**An Exploratory Study of Digital Disruption in the  
Accounting Profession Through the Lens of  
Disruptive Innovation Theory**

By

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(Doctor of Philosophy)

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## Declaration Page

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I certify that the research described in this dissertation has not already been submitted for any other degree.

I certify that to the best of my knowledge all sources used and any help received in the preparation of this dissertation have been acknowledged.

Signature: Tianyuan Feng

## Acknowledgement

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# ABSTRACT

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Digital Disruption is a term frequently used to describe the changes enabled by ICTs that will fundamentally transform the existing value proposition and business model across all industrial sectors, including professional services (Christensen et al., 2018; Vesti et al., 2017). For the accounting profession, digital disruption is a phenomenon shaping the breadth and depth of accounting services. It has generated extensive discussion as to whether it poses a threat or opportunity to the future role of professionals within the business domain. Despite its current and future impact on practitioner and firm alike, there has been scant academic research on disruptive innovation within an accounting context.

This thesis examines the extent to which Information and Communication Technologies (ICTs), and accounting software in particular, has digitally disrupted the accounting profession and professionals. This thesis seeks to address the deficiency and advance our understanding of Digital Disruption through the lens of disruptive innovation theory across three studies. Chapter 2 (Study 1) conducts a systematic literature review of prior studies on how ICTs impact the role of accounting professionals and professionalism and then evaluates the potential for Disruptive Innovation Theory to provide a lens by which to assess the impact of ICTs on the accounting profession. Results indicate that prior literature have identified “*changes*” in the employment role of accounting professionals from one of core technical accounting skills to a greater focus on IT knowledge and soft skills. However, research has proceeded without an underlying theoretical framework and Disruptive Innovation Theory can provide a basis upon which to understand digital disruption within the professional services market. Chapter 3 (Study 2) explores whether ICTs can be viewed as disruptive innovation to the accounting profession and to what extent, accounting professionals have identified and coped with digital disruption in their daily practice. Semi-structured interviews with 13 senior managers/CEO/CFO of firms, professional bodies and public sector organizations, who occupy key decision-making positions with respect to ICT strategy across firms, finds that disruption has yet to fully materialize, but that accounting professionals have learnt

to collaborate with ICTs as tools to achieve high value services and adapt different strategies to enhance their capability to innovate. Chapter 4 (Study 3) examines the case of Xero Ltd, a New Zealand domiciled public accounting software company which has recently embedded AI technology into its cloud-based accounting software. The study explores its potential disruptiveness to accounting services within the SME market, and finds two waves of disruption. One being cloud-based accounting software that has become embedded within the mainstream accounting software market across the SME sector, and an emerging second wave involving the application of machine learning and artificial intelligence in accounting software.

Whilst studies have been undertaken on the impact of technological changes on accounting practice, this thesis enriches accounting literature by focusing on its impact on the accounting profession and professionalism. Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003), allows this study to develop an understanding of 1) the disruptive potential of ICTs in the accounting profession, and 2) the extent to which accounting professionals have recognized the disruptive nature of ICTs in their offering and deliverance of professional services.

This thesis concludes that from a theoretical perspective, ICTs have still not fully disrupted the accounting domain, but that disruption is ongoing as developments including artificial intelligence and machine learning continue to emerge as factors that have the potential to further shape accountants' future responsibilities, skills and knowledge. Although often seen as a catchphrase to describe the technological challenges accounting professionals face in their daily work, a majority are still unaware that 'digital disruption' is not technology itself, but is instead what technology itself empowers, that being the commoditization of expert knowledge and access to it at a significantly lower price. However, accounting professionals hold advantages that ICTs do not, including social capital and notions of "trust" built upon human interaction between professionals and their clients; and a more synthesized, integrated and creative way of thinking that is difficult to replicate through AI (due to its current stage of technological advancement). Therefore, this thesis argues that whilst the accounting profession has experienced digital disruption to date through automation, its effects have largely been managed, and that its ability to cause further

disruption is to a large degree dependent upon whether professionals fail to be both critical and creative thinkers, strategic in focus, and empathetic and adaptive toward the needs of customers.

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# **1. Introduction**

## **1.1 Overview**

Over the past decade, technological advances have dramatically transformed professional services, and the accounting profession has been without exception. The term “disruption” is frequently used by media and more broadly colloquially to describe this transformative change. The disruption phenomenon has affected all of the professions (Susskind & Susskind, 2015), and accounting has been identified as one of the most vulnerable professions to disruption (Frey & Osborne, 2017; World Economic Forum, 2018). Whilst extensive research has been conducted in the legal and medical professions into this digital disruption phenomenon, accounting research has been scant. To redress this deficiency, this thesis focuses on the topic of digital disruption within the accounting profession and aims to explore two main issues: 1) whether accounting practitioners have recognized the impact of digital disruption in their role in business and; 2) to what extent Information and Communication Technologies (ICTs) have disrupted the relationship between accounting professionals and their clients. Furthermore, this study, uses Xero Ltd, a cloud-based accounting software company, as a case study to investigate the disruption by cloud computing and artificial intelligence (AI) on the role of accounting professionals within the Australian SME sector.

The history of technological effects in accounting domain dates to the invention of adding machines and counting frames, from the early Sumerian (Mesopotamia) and Suanpan (Chinese) abacus to the more recent arithmetic and programmable digital calculators. Whilst accounting itself is a relatively recent term, associated with the development of the profession itself, ‘bookkeepers’ and practitioners used these tools to improve information accuracy when measuring and documenting financial

information in the form of paper records (Pepe, 2011). Toward the end of the 20<sup>th</sup> century, with the appearance of computers and the associated software programs, accounting was seen as one of the earliest business functions to adopt these technologies as a basis for information and communication collaboration (Kee, 1993). At present, ICTs include a wide range of computerized information and communication technologies, including *products*, such as desktop computers, laptops, mobile devices, wired and wireless intranet, business productivity software (editing and tabular based spreadsheets), enterprise software, data storage, and *services*, such as telecommunication and information management techniques, as well as smart-phone and tablet based applications (Taylor, 2015; Ashrafi & Murtaza, 2008). Although the term ICTs is broadly defined, this thesis focuses specifically on its representation with regard to accounting software, cloud computing, and artificial intelligence.

The study of technological change and its impact on the accounting domain is not new. Accounting Information Systems (AIS), being “the intersection of the accounting and information systems domains” (Ferguson & Seow, 2011, p 1) has been the primary research field that has been the focus for these studies. This thesis argues that the perimeter of the traditional AIS field needs to be extended to incorporate more cutting-edge technologies that to date have not yet been researched, but which have the potential to shape the accounting field. Although AIS has previously been the forum for technologies that were not perceived to be part of ‘mainstream’ or ‘core’ financial accounting/reporting and/or auditing based research, the area between these subfields has increasingly overlapped (Krahel & Vasarhelyi, 2014). With greater dependency of accounting practices on ICTs, traditional accounting fields such as financial accounting, management accounting and auditing have actively integrated with technologies such as XBRL (eXtensible Business Reporting Language), as well as ERP and expert systems (Coyne *et al.*, 2015). As a result, technologies previously considered to be solely part of the AIS field are permeating into mainstream

accounting research. However, a variety of new types of technologies that have been adopted by accountants in practice, far outweigh those that have been discussed and published within academic research. The current environment is therefore suitable for AIS research to embrace these cutting-edge technologies, such as cloud computing and AI, into a variety of empirical based studies within the accounting field.

Moreover, whilst a majority of research studies within AIS have focused on the impact of ICTs on accounting practices, accounting research has yet to fully explore ICTs impact on accounting professionals (Guthrie & Parker, 2016). Whilst some research has noted changes in the role of accountants within business (such as Grabsiki et al., 2011; Kanellou & Spathis, 2011 etc.), current research on this topic is still disbursed across all subfields in accounting. Therefore, this study argues that there is a need to review the academic literature in accounting to gauge the impact of technological change on the role of accountants within the profession, as well as the profession itself. The study presents a new lens, that being Clayton Christensen's Disruptive Innovation Theory, as a basis upon which to view the relationship between accounting and ICTs (Christensen, 1997; Christensen & Raynor, 2003).

In the traditional accounting field, research has explored technological change as a tool by which to influence the efficiency and accuracy of accounting practice. With advancements in ICTs and their adoption across the accounting field, technology is more than a simple tool to assist accountants in their daily practice. The implementation of AI and machine learning in accounting software in particular, indicates a future system that can mimic, mirror or even replace the need for professional judgement. Professional accounting knowledge, once the sole domain of accountants alone, has been commoditized by technology and thus, accounting professionals are facing the threat of losing their privilege in "the Grand Bargain"<sup>1</sup>

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<sup>1</sup> The 'Grand Bargain' is the notion that in exchange for an accountant's specialised knowledge and technical precision, society in return affords them and their profession, trust, monetary returns and a mandate for social

(Susskind & Susskind, 2015). This might ultimately threaten the existence of accounting profession. The technological change faced by accounting professionals at present, and the pace of this change, is different than it has been previously, however current research in accounting has yet to effectively address this issue. This thesis thereby adopts Clayton Christensen's Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003), and discusses its potential in the accounting field for identifying and managing the digital disruption faced by accounting professionals.

This thesis follows a Macquarie University 'PhD by Publication' format (peer reviewed papers ready for publication, but not necessarily having been published in journals), consisting of three papers:

AN EXPLORATORY STUDY OF DIGITAL DISRUPTION IN THE ACCOUNTING PROFESSION THROUGH THE LENS OF DISRUPTIVE INNOVATION THEORY		
<b>Paper 1:</b>	<b>Paper 2:</b>	<b>Paper 3:</b>
Data in Search of a Theory: Understanding the Potential of Digital Disruption in the Accounting Profession through a Structured Literature Review	Identifying and Managing Digital Disruption in the Accounting Profession through Disruptive Innovation Theory – a view from Accounting Professionals	On Cloud Nine: A Case Study on the Disruptive Innovation Effects of Accounting Software as a Service in Accounting Domain
<b>Research Question:</b>	<b>Research Question:</b>	<b>Research Question:</b>
<ul style="list-style-type: none"> <li>To what extent has accounting research examined ICTs' impact on the role of accounting professionals?</li> <li>Can Disruptive Innovation Theory contribute to future research in digital disruption within the accounting profession?</li> </ul>	<ul style="list-style-type: none"> <li>Are ICTs a disruptive innovation in accounting?</li> <li>To what extent have accounting professionals coped with digital disruption?</li> </ul>	<ul style="list-style-type: none"> <li>To what extent has Xero disrupted accounting services within the SME sector?</li> </ul>

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control, and self-autonomy.

## AN EXPLORATORY STUDY OF DIGITAL DISRUPTION IN THE ACCOUNTING PROFESSION THROUGH THE LENS OF DISRUPTIVE INNOVATION THEORY

Design/methodology/approach	Design/methodology/approach	Design/methodology/approach
<ul style="list-style-type: none"> <li>• Structured Literature Review (Broadbent &amp; Guthrie, 2008).</li> <li>• Disruptive Innovation Theory (Christensen, 1997; Christensen &amp; Raynor, 2003).</li> <li>• Primary data material is obtained through a review of prior academic literature.</li> </ul>	<ul style="list-style-type: none"> <li>• Disruptive Innovation Theory (Christensen, 1997; Christensen &amp; Raynor, 2003).</li> <li>• Primary data material is obtained through interviews with experienced accounting professionals within industry.</li> <li>• Secondary data material is from reports and documentation by government bodies and other organizations, and independent newspapers and academic literature.</li> </ul>	<ul style="list-style-type: none"> <li>• Disruptive Innovation Theory (Christensen, 1997; Christensen &amp; Raynor, 2003).</li> <li>• Primary data material is obtained through interviews with senior managers from Xero.</li> <li>• Secondary data material is from documents and media releases from Xero and from reports and documentations by governmental bodies and other organizations, and independent newspapers and academic literature.</li> </ul>

### **Paper 1 - Data in Search of a Theory: Understanding the Potential of Digital Disruption in the Accounting Profession through a Structured Literature Review**

first seeks to conduct a systematic literature review of prior studies on how ICTs impact the role of accounting professionals and professionalism and then evaluate the potential for Disruptive Innovation Theory to provide a lens by which to assess the impact of ICTs on the accounting profession. This paper contributes to 1) clarifying a field by focusing solely on the impact of ICTs on accounting professionals and professionalism, thereby creating a foundation for advancing knowledge in this specific area and 2) a re-contextualization of Disruptive Innovation Theory (Christensen, 1997) within accounting research.

### **Paper 2 - Identifying and Managing Digital Disruption in the Accounting Profession through Disruptive Innovation Theory - a View from Accounting Professionals** explores whether ICTs can be viewed as disruptive innovation to the

accounting profession and to what extent, accounting professionals have identified and coped with this digital disruption in their daily practice. This paper contributes to 1) practically implementing Disruptive Innovation Theory within an accounting context using two criteria inherent in the theory to identify the potential disruptiveness of ICTs in the accounting profession and 2) clarify the concept of Disruptive Innovation Theory and enhance its theoretical underpinning using the accounting profession as an example.

**Paper 3 - On Cloud Nine: A Case Study on the Disruptive Innovation Effects of Accounting Software as a Service in Accounting Domain** examines the case of Xero Ltd, a New Zealand domiciled public accounting software company which has recently embedded AI technology into its cloud-based accounting software. The study explores its potential disruptiveness to accounting services within the SME market. This study makes two contributions. From a theoretical perspective, this study provides an empirical example of 1) ex-post analysis of cloud computing disruption within accounting software market; and 2) an ex-ante prediction of AI disruption within the accounting services market to demonstrate the predictive power of Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) from a disruptor perspective. From an accounting perspective, this study also highlights the importance of recognizing the disruptiveness of technology by accounting researchers and provides potential solutions for accounting professionals to overcome the negative effects of digital disruption.

## **1.2 Clayton Christensen's Disruptive Innovation Theory**

In recent years, the term “disruption” has frequently appeared within newspapers, magazines and various business-oriented periodicals, having become part of the business lexicon. It has become an all-encompassing term used as the “secret solution”



for a wide variety of challenges faced by companies, industries and societies during the current fourth industry revolution (Hopp et al., 2018a, p446). This section tracks the history of Disruptive Innovation Theory by reviewing how Clayton Christensen coined “disruptive innovation” as a concept which then evolved into a theory. This section examines its potentiality for society moving forward in the current information age.

The original concept of “disruption” first appeared in Bower and Christensen’s *Disruptive Technology: Catching the Wave* in 1995. The two authors observed that many leading companies lost their dominant market share when faced with technological changes in their industry and introduced the term “disruption” to describe the process by which new entrants challenge incumbent firms. Building upon this prototype study of disruption, Clayton Christensen published his seminal book *The Innovator’s Dilemma* in 1997, articulating the initial concept of disruptive innovation. In this book, he reviewed the history of the computer hard disk drive industry, mechanical excavator industry and motorcycle industry, and distinguished and defined two types of technological change, *sustainable technology* and *disruptive technology*, each having very different effects on incumbents. *Sustainable technology* refers to technologies that “improve the performance of existing products, along the dimensions of performance that mainstream customers in major markets have historically valued” (Christensen, 1997, p11). Disruptive technology, however, brings a different value proposition which has not traditionally been appreciated by the mainstream market, even resulting in an underperformance of the existing mainstream product in the near-term. As the performance of disruptive technology improves, it will satisfy mainstream customers and displace mainstream products, as the new technology exceeds the customer’s demand and becomes more sustainable.

In 2003, Christensen and Raynor published the second book in the Disruptive Innovation series *The Innovator’s Solution* and changed the terminology from *disruptive*

*technology to disruptive innovation* to expand the application of the concept to not only reflect product innovation but also services and business model innovation. In this book, Christensen further classified disruptive innovation into low-end disruption, which targets the customers at the low end of existing value networks and new market disruption, which attracts new customers with new value networks (Christensen & Raynor, 2003). At this stage, the core concept of disruptive innovation had been established. In 2006, Christensen further evolved the concept of disruptive innovation into Disruptive Innovation Theory, emphasizing the predictive power of the theory and further tested the theory across various contexts, such as retailing (Christensen & Tedlow, 2000); education (Christensen et al., 2011); management consulting (Christensen et al., 2013) and transportation (Christensen et al., 2015).

Ever since its inception, Disruptive Innovation Theory has created significant impact among managers who seek solutions to technological changes within their industry. The term “disruptive innovation/disruption” has become a catchall phrase representing any generic threat to business. The core concept of Disruptive Innovation Theory is most frequently adopted by leaders of small entrepreneurial companies as a “guiding star” to shake up an industry (Christensen et al., 2015).

Meanwhile, scholars from a variety of disciplines including management, education, tourism, legal, information systems and social studies also contributed to a continuous enhancement and refinement of Disruptive Innovation Theory by engaging in a vibrant debate about its fundamental concepts (Yu & Hang, 2010). According to the latest statistics in the Hopp et al. (2018b) literature review<sup>2</sup> across the disruptive innovation field, over one thousand academic papers were published citing

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<sup>2</sup> The Hopp et al 2018b literature review focuses on the disruptive innovation field more broadly, whilst the first paper of this study reviews literature relating to the technological impacts on the accounting profession and justified the potential for applying disruptive innovation theory specifically within an accounting context.

disruption/disruptive innovation or Disruptive Innovation Theory between 1975 and 2016 across more than 10 disciplines. Researchers adopt the theory, on one side, to explain the emergence of start-ups/new entrants, such as Airbnb (Guttentag, 2015), the electronic bike (Ruan et al., 2014), Skype (Rao et al., 2006), Google office (Keller & Husig, 2009), and Twitter (Pegoraro, 2014). On the other hand, it has also been used to investigate the failure of incumbents, such as Nokia within the Smart Phone Market (Bouwman et al., 2014) and Kodak in digital photography (Lucas & Goh, 2009).

Scholars have also observed anomalies, that being cases where incumbents successfully cope with disruptive innovation and maintain their market share, with an example being Subramanian et al.'s (2011) study of Nintendo's re-emergence as a significant player within the game console industry against competitors Sony and Microsoft. These anomalies triggered a heated debate regarding the definition and scope of disruptive innovation (Yu & Hang, 2010). There have been criticisms that the definition of disruptive innovation has lacked precision and consistency, given that the concept has been reconstructed repeatedly to fit into various contexts, thus leading to multiple definitions and interpretations that cause conceptual ambiguity (e.g. Danneels, 2004, 2005; Paap & Katz, 2004; Markides, 2006; Dixon et al., 2014; Lepore, 2014; King & Baatarogotkh, 2015; Kumaraswamy et al., 2018). Moreover, although Christensen provides a trajectory map (see Figure 2) as a method for assessing and predicting disruptive innovation, researchers question whether Disruptive Innovation Theory in fact qualifies as a theory by challenging its predictive power and supplementing their versions of assessment frameworks (e.g. Husig et al., 2005; Govindarajan & Kopalle, 2006a; Ganguly et al., 2010; Hang et al., 2011; Sood & Tellis, 2011; Dijk et al., 2016; Kilkki et al., 2018).

In a recent study by Christensen et al. (2018, p.1052), they argue that Disruptive Innovation Theory has evolved from a descriptive theory into a normative theory with a clear definition of its core concepts and strong predict power with regard to

innovation and competitive response. Their aim was to provide “a unified theoretical base on which subsequent researchers can build” (ibid). However, Christensen further argued that Disruptive Innovation Theory has been in some sense overused, without consideration being given to its real core concept. The theory has therefore been misapplied or misunderstood by both academics and practitioners alike (Christensen et al., 2018). He therefore called upon studies that adopt Disruptive Innovation Theory as a theoretical concept, rather than studies that apply a simple terminology without any key concepts (Christensen et al., 2018). This thesis responds to this call and adopts the Disruptive Innovation Theory as a theoretical concept for understanding the digital disruption phenomenon within an accounting context. Using Disruptive Innovation Theory, this study is able to discuss: 1) whether accounting professionals as incumbents in accounting services for SMEs, have recognised ICTs as disruptive innovation; 2) how disruption occurs within the accounting profession and 3) how accounting professionals manage digital disruption.

### **1.3 Research Methodology**

This thesis aims to draw attention to a newly defined field in accounting focusing on the impact of ICTs on accounting professionals. It conducts an exploratory study on the disruption phenomenon in the accounting field by introducing Disruptive Innovation Theory and utilizes a qualitative approach to data collection and analysis.

**Paper 1 - Data in Search of a Theory: Understanding the Potential of Digital Disruption in the Accounting Profession through a Structured Literature Review** conducts a systematic literature review of prior research on how ICTs impact the role of accounting professionals by applying a modified version of Broadbent and Guthrie’s (2008) structured literature review framework. As the studies of this particular topic are scattered across the AIS, information system and management

fields, this review applies a keyword search method adopted from Haddara and Zach's study (2011) to select articles. It constructs a database of 47 articles published between 2000 and 2016. Through a meta-analysis, this study identifies the lack of a theoretical framework to guide accounting professionals in addressing the threats of ICTs and introduces Disruptive Innovation Theory to supplement this gap.

**Paper 2 - Identifying and Managing Digital Disruption in the Accounting Profession through Disruptive Innovation Theory - a View from Accounting Professionals** takes a semi-structured interview approach with 13 senior managers/CEO/CFO of firms, professional bodies and public sector organizations to seek their perceptions and experiences with technological change in accounting and draws a conclusion on the extent to which ICTs are a disruptive innovation to the accounting profession. A semi-structured interview method benefits this study because it allows researchers to vary the sequence of interview questions (Bryman, 2001) based on an interviewee's response to uncover "unexpected information" (Liamputtong, 2013, p15.) regarding disruption. As disruption is a process that takes time to occur, the selection of interviewees is based on their experience and longevity in the accounting field to ensure participants have observed and experienced several waves of technological change in order to make comparisons. All interviews were recorded and transcribed by researchers. The NVivo software is used for data analysis by creating a coded data set and a node system that summarizes 1) two themes reflecting two criteria used to evaluate disruptive innovation; and 2) shared themes reflecting the interviewee's reaction to digital disruption. This study also utilizes archival research by collecting media releases and industrial reports to strengthen the interview themes. A detailed interviewee selective process, interview questions and list of secondary data will be presented in the methodology section of Chapter 3.

**Paper 3 - On Cloud Nine: A Case Study on the Disruptive Innovation Effects of Accounting Software as a Service in Accounting Domain** adopts a case study method

focusing on a New Zealand accounting software company, Xero Ltd and its cloud-based accounting software. It explores the potential disruptiveness of Xero and its AI function in accounting services for SMEs. The case study method enables the researchers to explore this digital disruption phenomenon in an accounting context by constructing a rich contextual analysis from various data sources (Tan et al., 2015). The primary data is collected through interviews with key selected Xero executives, and the adopters of Xero (accounting firm partners). Secondary data is gathered from a variety of sources including news articles, videos and public speeches, product review websites, and other industrial research reports (a detailed list is presented in Chapter 4). The secondary data serves two main purposes, being to: 1) supplement adopters' experiences with Xero; and 2) provide a background to Xero and the accounting software industry. Both interview data and secondary data (such as transcripts from videos) are stored in NVivo for coding purposes, and a node system was developed to provide the correlation of various stages in which cloud computing and AI's capabilities have been developed to influence accounting services within SMEs.

## **1.4 Literature Review**

The following sections present a review of literature based on two themes central to this thesis, notably accounting software in computerized accounting, and Disruptive Innovation Theory in academic research. The purpose of reviewing developments in the accounting software industry is to explore how accounting software has changed and will continue to change the accounting profession with respect to its complex functionality. This review also sheds light on the application of cloud computing and AI in accounting software and how it can potentially transform accounting services. The second part of this section will review the criticism and gaps in academic research on Disruptive Innovation Theory and examine its potential within an accounting context.

#### *1.4.1 Accounting software in computerized accounting*

Reviewing the history of technological changes in accounting, the era of computerized accounting commenced when accounting tasks shifted from one of paper-based trial balances to an electronic spreadsheet using VisiCalc (invented in 1979) and Lotus 1-2-3 (invented in 1985) (Ryan, 2012). In 1987, Microsoft launched its flagship product, Excel, as a new generation of electronic spreadsheet that soon dominated the spreadsheet market (Rackliffe & Ragland, 2016), a position that it continues to hold to this day. The adoption of electronic spreadsheets in accounting, enables an elimination of paper-based ledgers, manual spreadsheets and hand-written financial statements, allowing a much easier way to correct numbers and balances within financial reports (Akroyd et al., 2013; Ghasemi et al., 2011). Spreadsheets improve the accuracy and timeliness of accounting work. Not long after spreadsheets, the first accounting package with an interface which became the prototype for today's accounting software appeared on the market serving only limited accounting functions. Compared to Excel, this first accounting package was comprised of a spreadsheet and word processor and presented a more user-friendly interface. As personal and office-based desktop computers became more prevalent as a basis upon which business activities could be undertaken, accounting software companies such as Sage (former name: Peachtree), Intuit and MYOB (Manage Your Own Business) were established during this period and launched their first generation of PC versioned accounting software.

As business activities became more diversified, accounting, as the language of business required a much more advanced information system to record these more complex activities. With greater functionalities, accounting software evolved beyond an accounting package to one of a business management tool. Furthermore, as government regulations became more complex, specialised modules dealing with tax and payroll were embedded in the accounting software package. The selection of an accounting software package became an essential decision for both large companies

and SMEs alike. The invention of accounting software realized the automation of data processing (trial balance, balance sheet and income statement) and significantly increased the efficiency in an accountant's work by improving the accuracy, capacity, timeliness and integrity of data processing (Deshmukh, 2016; Lv, 2017).

As the 20<sup>th</sup> Century drew to a close, email and the internet became more publicly available, and wireless networking technology emerged to allow greater internet accessibility and convenience. Intranet and Extranet soon changed how accountants accessed, distributed and shared information within and outside their work areas. The advent of social media further changed how accountants managed and communicated with their clients. Nowadays, technological breakthroughs such as cloud computing and AI in the Fourth Industry Revolution are poised to dramatically change the accounting profession even further. The characteristics of cloud computing<sup>3</sup>, combined with the functions of accounting software, have empowered the mobility of the accounting profession (Belfo & Trigo, 2013; Dimitrium & Matei, 2014). It has enabled accountants and their clients to simultaneously access and edit the same set of data from anywhere on a real-time basis. AI, as mentioned, is another technology recently effecting the accounting domain, and poses a considerable threat to the existence of the accounting profession (Susskind & Susskind, 2015). The technology is forecast to automate all accounting processes and is ultimately capable of making intelligent decisions. However, as the technology itself has still yet to mature, it is hard to draw conclusions at this stage as to whether AI will completely replace accounting professionals within business or whether, like technological developments before it,

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<sup>3</sup> Cloud technology is defined as "a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on a service level agreement" (Buyya et al, 2009, p. 599).



will remove mundane and everyday tasks from professionals, allowing them to further evolve and focus on more value-added responsibilities.

#### *1.4.2 The Application of Disruptive Innovation Theory*

According to a research conducted by the World Economic Forum (WEF), ongoing technological breakthroughs in the Fourth Industrial Revolution will shape the future workforce by increasingly eliminating routine-based, middle-skilled, redundant roles performed by a majority of white-collar employees within the current labor market (WEF, 2018). Accountants and lawyers are two professions classified as having redundant roles within this report, and it is predicted that they face a disruption to both their jobs and overall skills in future labour markets (ibid). Although both the accounting and legal professions are facing the same disruptive phenomenon, compared with scant research on its disruption within the accounting domain, legal researchers have been aware of digital disruption and have initiated research to explore the influence of technological advancement in transforming legal professionals through Disruptive Innovation Theory (see Robertson, 2012; Susskind, 2013; McGinnis & Pearce, 2014; Brescia et al., 2014; Sheppard, 2015; IBA, 2016). Therefore, this section of the literature review overviews disruptive innovation research within the legal profession and sheds light on the potential application of disruptive innovation theory within an accounting context.

One of the key themes identified from disruption research in the legal field is that legal professionals who themselves believed they were immune to disruption, are now experiencing replacement due to the adoption of specific technologies, including machine learning within their legal practices. McGinnis and Pearce (2014) discussed the potential application of machine intelligence across five areas of legal practice, including the review of relevant legal documents, prior legal case searches, the generation of tailored legal forms, the preparation of legal briefs and memos and prediction of litigation outcomes. Although, the primary use of machine intelligence

at this stage has been assisting lawyers to perform job tasks more accurately and efficiently, McGinnis and Pearce observed that intelligent machines are replacing lawyers in some of these tasks. The same observation is made in Sheppard's (2015) study, which demonstrates that the rise of legal technologists, such as *CodeX* and *Legalforce* has prompted the somewhat misconception that law can be translated entirely into a programming language that legal software packages can interpret, mirroring human legal advisors. Furthermore, both studies argue that disruption has already begun with a consequence of weakening lawyers' market power over the provision of legal services. As machine intelligence commoditizes legal services by transforming expert knowledge into software packages that consumers can acquire at a much lower price, the consequences are that it will shake up the traditional hourly-based fee model for legal services. These arguments also echo Susskind's (2013, 2017) study of how technology can transform legal services from "bespoke" into "commoditized" (p 25). Susskind further argues that technology enables a liberalization of the profession by democratizing legal knowledge, which grants the privilege of lawyers within the legal services market. As a result, it inhibits the competition of new entrants who are non-lawyers.

Furthermore, legal researchers have also found that disruption most likely happens at the lower-end of the legal services market, which is comprised of low- and middle-income consumers who are frustrated with the high cost of legal services provided by lawyers (Brescia et al., 2014; Robertson, 2012). Robertson's (2012) study explores how online social media, such as Facebook can significantly increase a litigant's exposure to legal services by providing more information about legal options, greater connectivity to various legal services providers and more direct communication with people who experience similar legal cases. This will potentially decrease the low and middle-income consumers' reliance on lawyers and assist in achieving self-represented success at a lower cost. Brescia et al. (2014)'s study extends particular types of technologies from social media, to include legal websites, such as *Nolo*,

*LegalZoom* and *JustAnswer* with features that enable consumers to engage with the most suitable lawyers for their needs, allow for the comparison of service fees, and support online purchase of products/services (e.g. the establishment of trusts) through automated legal forms. This has significantly reduced the cost for legal services and enabled a much important social impact that helps low- and middle-income communities achieve justice.

Researchers have also explored how the legal profession should respond to digital disruption, suggesting that alternative business models be established (IBA, 2016; Sheppard, 2015). Traditionally, legal practices operate as “solution shop”, whereby consumers approach legal experts with problems that require tailored solutions in the first instance (Christensen et al., 2013). With more and more legal technologies pervading the service market, consumers to a certain degree enable themselves to generate solutions to their legal problems in a more cheaper and efficient way. Therefore, legal scholars suggest a value-added process business model, one that combines both systems that provide commoditized legal services, with experts that provide high level legal advice (Brescia, 2015). Regarding the skills and knowledge of legal professionals’, a mixture of technical and legal expertise, and changes in legal education to enable more advanced technologies to be embraced, is seen as necessary (Pistone & Horn, 2016).

From this literature review on the application of Disruptive Innovation Theory in the legal profession, it can be seen that further potential exists to examine how the theory can be applied across the accounting profession. Following an overview of research. within the legal field, this study adopts Christensen’s disruptive innovation theory to identify technologies that have disruptive potential, in order to explain how disruption occurs in accounting services, so that solutions can be sought.

## **1.5 Overall Introduction**

Technological advances have significantly changed both the nature of professional accounting services, and how they are undertaken. It is widely acknowledged that the accounting profession is at the cusp of a wholesale digital disruption. This thesis explores the nature of digital disruption and its implications for accounting professionals and their clients. By adopting Disruptive Innovation Theory, this thesis aims to provide a lens by which to understand the nature of disruption and its impact within the accounting field by; 1) assessing the disruptive potential of ICTs in the accounting profession; 2) understanding when and how this disruption occurs/might occur, and 3) seeking potential response strategies for the accounting community.

This thesis contributes toward clarifying a particular sub-field for future accounting research, one that specifically focuses on the impact of technological change on the role of accounting professionals in business. Embedded in this field, this thesis contributes to accounting literature with respect to (1) understanding how ICTs can transform the accounting profession through the lens of Disruptive Innovation Theory; and (2) knowledge and research as to how accounting professionals should respond to this transformative shift. From a theoretical perspective, this thesis contributes to disruption literature in that it helps to (1) clarify the core concepts of Disruptive Innovation Theory through empirical evidence in an accounting context; and (2) strengthen the predictability of the theory within a case study perspective through a software firm that through its rapid and dynamic development, presents an early stage threat to incumbents, but which to date has not displaced leading incumbents (Christensen, 2006); and (3) extending the adaptability of Disruptive Innovation Theory into an accounting context.

The structure of this thesis is presented below:

Chapter 2 presents the first research paper, *'Data in Search of a Theory: Understanding the Potential of Digital Disruption in the Accounting Profession through a Structured Literature Review'*. This literature review study examines the field of accounting research focusing on the impact of ICTs on the role of accounting professionals to understand the extent to which accounting scholars have studied in this topic. This paper further introduces Christensen' Disruptive Innovation Theory to provide a new perspective for analyzing the relationship between ICTs and the accounting profession.

Chapter 3 presents the second research paper, *'Identifying and Managing Digital Disruption in the Accounting Profession through Disruptive Innovation Theory - a View from Accounting Professionals'*. This paper assesses the disruptive potential of ICTs in the accounting profession and explores whether accounting professionals have recognized the disruptiveness of ICTs and formed response strategies to it. Disruptive Innovation Theory is applied as the theoretical framework to develop two criteria for evaluating ICTs as disruptive innovation. Data is collected through interviews and other supplemental materials, including media releases and industry-based research reports.

Chapter 4 presents the third research paper, *'On Cloud Nine: A Case Study on the Disruptive Innovation Effects of Accounting Software as a Service in Accounting Domain'*. This paper undertakes a case study of Xero Ltd and its cloud-based accounting software, Xero with AI-based functions in order to explore the extent to which Xero Ltd disrupts accounting professionals and their services within the SME market. In particular, this paper assesses the disruptive potential of two technologies: cloud computing and AI using two criteria drawn from Disruptive Innovation Theory. Furthermore, this case study elaborates how disruption, that commences with technological innovations within the accounting software market, can eventually spillover into the accounting services market more broadly. Primary data

is collected through interviews with selected key executives from Xero Ltd as well as selected accounting professionals from accounting firms. Secondary data is collected from various information sources (see Table 5 in Chapter 4).

Chapter 5 summarizes the thesis, by providing a synthetic summary of the findings of the three research papers with reference to its implications for future accounting research on the effects of technological change. This chapter then presents a reflection on Disruptive Innovation Theory itself as a theoretical concept, further discussing its potential in explaining the disruption phenomenon within the accounting field. Specific recommendations and suggestions for accounting professionals to develop response strategies to this disruption are also presented in this chapter. Finally, the study's limitation, suggestions for future research, and an overall conclusion are presented.

## 1.6 References

- Akroyd, C, Askarany, D & O'Grady, W, & Spraakman, G, 2013, 'Requirements for Information Technology with Newly Hired Management Accounting Graduates'. *CAAA Annual Conference 2013*. June 13. Available at SSRN: <https://ssrn.com/abstract=2200104>.
- Ashrafi, R., & Murtaza, M. 2008. 'Use and impact of ICT on SMEs in Oman'. *Electronic Journal of Information Systems Evaluation*, 11(3) 125-138.
- Belfo, F., & Trigo, A. 2013. 'Accounting Information Systems: Tradition and Future Directions'. *Procedia Technology*. 9, 536-546.
- Bouwman, H., Carlsson, C., Carlsson, J., Nikou, S., Sell, A., & Walden, P. 2014. *How Nokia failed to nail the Smartphone market*. Paper presented at 25th European Regional Conference of the International Telecommunications Society (ITS), Brussels, Belgium, 22-25 June.
- Bower, J. L., & Christensen, C.M. 1995 'Disruptive technologies: catching the wave'. 43-53.
- Brescia, R. H. 2015. 'What we know and need to know about disruptive innovation'. *SCL Rev.*, 67, 203.
- Brescia, R. H., McCarthy, W., McDonald, A., Potts, K., & Rivais, C. 2014. 'Embracing disruption: how technological change in the delivery of legal services can improve access to justice'. *Alb. L. Rev.*, 78, 553.
- Broadbent, J. & Guthrie, J. 2008, "Public sector to public services: 20 years of "contextual" accounting research", *Accounting, Auditing & Accountability Journal*, 21(2). 129 - 169.
- Bryman, A. 2001. *Social research methods*. Oxford University Press.
- Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. 2009. 'Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility'. *Future Generation computer systems*, 25(6), 599-616.
- Christensen, C. 1997. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Harvard Business School Press.
- Christensen, C. M. and Tedlow, R. S. 2000. 'Patterns of disruption in retailing'. *Harvard Business Review*, 78, 42-45.
- Christensen, C.M. & Raynor, M.E. 2003. *The Innovators Solution: Creating and Sustaining*

*Successful Growth*, Harvard Business Press.

- Christensen, C. M. 2006. 'The ongoing process of building a theory of disruption'. *Journal of Product innovation management*, 23(1), 39-55.
- Christensen, C. M., Alton, R., Rising, C. & Waldeck, A. 2011. 'The new M&A playbook'. *Harvard Business Review*, 89, 48-57.
- Christensen, C. M., Wang, D. & Van Bever, D. 2013. 'Consulting on the cusp of disruption'. *Harvard Business Review*, 91, 106-14.
- Christensen, C. M., Raynor, M. & McDonald, R. 2015. 'What is disruptive innovation?'. *Harvard Business Review*, 93, 44-53.
- Christensen, C. M., McDonald, R., Altman, E. J., & Palmer, J. E. 2018. 'Disruptive Innovation: An Intellectual History and Directions for Future Research'. *Journal of Management Studies*. 55 (7), 1043-1078.
- Coyne, J. G., Coyne, E. M., & Walker, K. B. 2015. 'Accounting Architecture: The new Face of AIS', (Working paper).
- Danneels, E. 2004. 'Disruptive technology reconsidered: A critique and research agenda'. *Journal of product innovation management*, 21(4), 246-258.
- Deshmukh, A. 2006. *Digital Accounting: The Effects of the Internet and ERP on Accounting*. Hershey, PA: Idea Group Publishing; IRM Press.
- Dijk, M., Wells, P., & Kemp, R. 2016. 'Will the momentum of the electric car last? Testing an hypothesis on disruptive innovation'. *Technological Forecasting and Social Change*, 105, 77-88.
- Dixon, T., Eames, M., Britnell, J., Watson, G. B., & Hunt, M. 2014. 'Urban retrofitting: Identifying disruptive and sustaining technologies using performative and foresight techniques'. *Technological Forecasting and Social Change*, 89, 131-144.
- Dimitriu, O., & Matei, M. 2014. 'A new paradigm for accounting through cloud computing'. *Procedia Economics and Finance*, 15, 840-846.
- Frey, C. B., & Osborne, M. A. 2017. 'The future of employment: how susceptible are jobs to computerisation?'. *Technological forecasting and social change*, 114, 254-280.
- Ferguson, C., & Seow, P. S. 2011. 'Accounting information systems research over the past decade: Past and future trends'. *Accounting & Finance*, 51(1), 235-251.
- Ganguly, A., Nilchiani, R., & Farr, J.V., 2010. 'Defining a set of metrics to evaluate the potential disruptiveness of a technology'. *Eng.Manage.J.* 22(1), 34-44.



- Ghasemi, M., Shafeiepour, V., Aslani, M., Barvayeh, E. 2011. 'The impact of Information Technology (IT) on modern accounting systems'. *Procedia – Social and Behavioral Sciences*, 28, 112-116
- Govindarajan, V., & Kopalle, P. K. 2006a. 'Disruptiveness of innovations: measurement and an assessment of reliability and validity'. *Strategic Management Journal*, 27(2), 189-199
- Grabski, S. V., Leech, S. A., & Schmidt, P. J. 2011. A Review of ERP Research: A Future Agenda for Accounting Information Systems. *Journal of Information Systems*, 25(1), 37-78. doi:10.2308/jis.2011.25.1.37
- Guthrie, J., & Parker, L. D. 2016. Whither the accounting profession, accountants and accounting researchers? Commentary and projections. *Accounting, Auditing & Accountability Journal*, 29(1), 2-10.
- Guttentag, D. 2015. Airbnb: disruptive innovation and the rise of an informal tourism accommodation sector. *Current issues in Tourism*, 18(12), 1192-1217.
- Hang, C. C., Chen, J., & Yu, D. 2011. 'An assessment framework for disruptive innovation'. *Foresight*, 13(5), 4-13.
- Haddara, M., & Zach, O. 2011. *ERP Systems in SMEs: A Literature Review*. Paper presented at the The 44th Hawaii International Conferences on System Sciences, Hawaii.
- Hopp, C., Antons, D., Kaminski, J. and Salge, T. O. 2018a. 'Virtual Issue Editorial: Disruptive Innovation: Conceptual Foundations, Empirical Evidence, and Research Opportunities in the Digital Age', *Journal of Product Innovation Management*. 35(3), 446-457.
- Hopp, C., Antons, D., Kaminski, J. and Salge, T. O. 2018b. 'Virtual Issue Perspective: The topic landscape of disruption research: A call for consolidation, reconciliation, and generalization'. *Journal of Product Innovation Management*. 35(3), 458-487.
- Horn, M. B. & Pistone, M. R. 2016. *Disrupting Law School: How disruptive innovation will revolutionize the legal world*. Clayton Christensen Institute. Available at: <https://www.christenseninstitute.org/publications/disrupting-law-school/> [Accessed 20 Nov 2018]
- Hüsig, S., Hipp, C. & Dowling, M. 2005. 'Analysing disruptive potential: The case of

- wireless local area network and mobile communications network companies'. *R&D Management*, 35, 17-35.
- International Bar Association (IBA), 2016. 'Times are a-changin': disruptive innovation and the legal profession, *IBA Legal Policy & Research Unit*, May.
- Kanellou, A., & Spathis, C. 2013. 'Accounting benefits and satisfaction in an ERP environment'. *International Journal of Accounting Information Systems*, 14(3), 209-234. doi:10.1016/j.accinf.2012.12.002
- Kee, R. 1993. 'Data Processing Technology and Accounting: A Historical Perspective' *The Accounting Historians Journal*, 20(2), 187-216.
- Keller, A., & Hüsig, S. 2009. Ex ante identification of disruptive innovations in the software industry applied to web applications: The case of Microsoft's vs. Google's office applications. *Technological Forecasting and Social Change*, 76(8), 1044-1054. doi:10.1016/j.techfore.2009.03.005
- Kilkki, K., Mäntylä, M., Karhu, K., Hämmäinen, H., & Ailisto, H. 2018. 'A disruption framework'. *Technological Forecasting and Social Change*, 129, 275-284.
- King, A. A., & Baatartogtokh, B. 2015. 'How useful is the theory of disruptive innovation?', *MIT Sloan Management Review* 57 (1), 77-90.
- Krahel, J. P., & Vasarhelyi, M. A. 2014. AIS as a Facilitator of Accounting Change: Technology, Practice, and Education. *Journal of Information Systems*, 28(2), 1-15. doi:10.2308/isis-10412
- Kumaraswamy, Arun, Raghu Garud, & Shahzad Ansari. 2018. 'Perspectives on disruptive innovations'. *Journal of Management Studies* 55 1025-42.
- Liamputtong, P. 2013. *Qualitative research methods* (4 ed.). South Melbourne, VIC: Oxford University Press.
- Lepore, J. 2014. 'The disruption machine'. *The New Yorker*. June 23, 30-36.
- Lucas Jr, H.C., & Goh, J.M. 2009. 'Disruptive Technology: How Kodak Missed the Digital Photography Revolution', *The Journal of Strategic Information Systems*, 18(1), 46-55.
- Lv, P. 2017. 'Study on the Influence of Accounting Computerization on Accounting Development', *Advances in Social Science, Education and Humanities Research*, 101, 1022-1024.
- Markides, C. 2006. 'Disruptive innovation: In need of better theory'. *Journal of Product*

*Innovation Management*, 23, 19–25.

- McGinnis, J. O., & Pearce, R. G. 2014. 'The great disruption: How machine intelligence will transform the role of lawyers in the delivery of legal services'. *Fordham L. Rev.*, 82, 3041.
- Paap, J., & Katz, R. 2004. 'Anticipating disruptive innovation'. *Research-Technology Management*, 47(5), 13-2
- Pegoraro, A. 2014. 'Twitter as Disruptive Innovation in Sport Communication'. *Communication & Sport*. 2 (2). 132-137
- Pepe, A. A. 2011. The evolution of technology for the accounting profession. *CPA Practice Advisor* (April).  
Available at: <http://www.cpapracticeadvisor.com/article/10263076/the-evolution-of-technology-for-the-accounting-profession> [Accessed 13 Dec 2018]
- Rackliffe, R. U., & Ragland, L. 2016. 'Excel in the accounting curriculum: perceptions from accounting professors'. *Accounting Education*, 25(2), 139-166.
- Ramachandran Rackliffe, U., & Ragland, L. 2016. 'Excel in the accounting curriculum: perceptions from accounting professors'. *Accounting Education*, 25(2), 139-166.
- Rao, B., Angelov, B. and Nov, O. 2006. 'Fusion of disruptive technologies: Lessons from the skype case'. *European Management Journal*, 24, 174–88.
- Robertson, C. B. 2012. 'The Facebook Disruption: How Social Media May Transform Civil Litigation and Facilitate Access to Justice'. *Ark. L. Rev.*, 65, 75.
- Ruan, Y., Hang, C. C., & Wang, Y. M., 2014. 'Government's role in disruptive innovation and industry emergence: the case of the electric bike in China'. *Technovation*. 34 (12), 785–796.
- Ryan, E. 2012. 'The evolution of accounting software: past, present, future'. *The Journal of the Global Accounting Alliance*. Available at: <http://www.gaaaccounting.com/the-evolution-of-accounting-software-past-present-and-future/>. [Accessed 10 Jan 2019]
- Sheppard, B. 2015. 'Incomplete innovation and the premature disruption of legal services'. *Mich. St. L. Rev.*, 1797
- Sood, A. and Tellis, G. J. 2011. 'Demystifying disruption: A new model for understanding and predicting disruptive technologies'. *Marketing Science*, 30, 339–54.

- Subramanian, A. M., Chai, K., & Mu S, 2011. 'Capability reconfiguration of incumbent firms : Nintendo in the video game industry', *Technovation*, 31, 228-239.
- Susskind, R. 2013. Tomorrow's Lawyers. *Law Prac.*, 39, 34.
- Susskind, R. E., & Susskind, D. 2015. *The future of the professions: How technology will transform the work of human experts*. Oxford University Press, USA.
- Susskind, R. E. 2017. *Tomorrow's lawyers: An introduction to your future*. Oxford University Press.
- Taylor, B. M. 2015. 'The integrated dynamics of motivation and performance in the workplace'. *Performance Improvement*, 54(5), 28-37.
- Tan, F.C., Tan, B. & Land, L. 2015. 'The Affordance of Gamification in Enabling a Digital Disruptor: A Case Study of the goCatch Taxi Booking App', *48th Hawaii International Conference on System Sciences*, Hawaii.
- World Economic Forum. 2018. *The Future of Jobs Report*. Available at: <https://www.weforum.org/reports/the-future-of-jobs-report-2018>. [Accessed 15 Jan 2019]
- Yu, D., and C. C. Hang. 2010. 'A reflective review of disruptive innovation theory'. *International Journal of Management Reviews*, 12 (4). 435-52.

## **2. Paper 1: Data in Search of a Theory: Understanding the Potential of Digital Disruption in the Accounting Profession through a Structured Literature Review**

### **2.1 Abstract**

**Purpose:** This paper reviews relevant literature to determine the extent to which research has analyzed the impact of Information and Communication Technologies (ICTs) on the role and responsibilities of accounting professionals in business. It identifies key gaps in the field and introduces Disruptive Innovation Theory as one possible lens to further develop an understanding of the impact of ICTs' on accounting professionals.

**Design/methodology/approach:** This paper follows a modified literature analysis framework similar to Broadbent and Guthrie (2008). First, a descriptive meta-analysis is used to discuss research to date. Second, the paper uses a conceptual analysis to evaluate the field, highlighting gaps for future research. Third, this paper introduces Disruptive Innovation Theory and critically reviews its potential contribution to the accounting profession.

**Findings:** This review finds that prior literature has identified "*changes*" in the employment role of accounting professionals from one of core technical accounting skills to a greater focus on IT knowledge and soft skills. However, the study also finds that there is an absence of a theoretical framework in this field of research, and that Disruptive Innovation Theory might address this gap.

**Research limitations/implications:** The study assesses the methods of data collection and empirical analysis and recommends the adoption of more rigorous techniques in future studies.

**Originality/value:** This paper discusses the potential contributions of Disruptive Innovation Theory to existing accounting research.

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## 2.2 Introduction

As Information and Communication Technologies (ICTs) develop beyond being a simple tool to record accounting information, to that of assisting in issues surrounding decision-making and professional judgement, this will in turn significantly impact the role of accounting professionals within the business arena (Hunton, 2002). Within the accounting domain, ICTs refer to “a wide range of software, hardware, telecommunications and information management techniques, applications and devices”, which are predominantly used to “create, produce, analyze, process, package, distribute, receive, retrieve, store and transform information” (Taylor, 2015, p275), and further “support and improve the input, processing, and output of accounting phenomena” (Geerts *et al.*, 2013). Within industry, large-scale use of Enterprise Systems (ES) has resulted in an increase in the automatization of accounting practices, and consequently a decline in compliance work undertaken by accounting professionals. The combination of the internet, cloud computing and mobile devices has increased the mobility of accounting services, allowing the workforce to become global. Attempts to integrate Artificial Intelligence (AI) and robotics into auditing and accounting practice has significantly changed accounting professionalism, with routine manual tasks largely becoming automated. Robotic process automation (RPA) or ‘bots’ complete in one-minute what humans can complete in fifteen, with a 99% accuracy rate that can reduce operating costs by 25% - 40% (Norfleet, 2017). Automation through ICTs significantly affect the future of accounting professionals, and how they are educated, trained and undertake practice.

Although research on accounting professionalism is engrained within mainstream accounting research, studies focusing on the impact of ICTs on accounting professionals and professionalism has to date largely fallen within the Accounting Information Systems (AIS) field of research. Accounting professionals are now transitioning from their traditional role as information gatherers to information

analysts and strategic advisors to business (Vakalfotis *et al.*, 2011). The value of a professional is increasingly reflected in critical-thinking and data analytical skills (Hunton, 2002). However, AIS research in this area has largely explored ICTs' impact on accounting practice. Little research has focused solely on exploring the impact of ICT's and how the role of accounting professionals in business has changed. Understanding how ICT's impact the accounting professional and his/her exercise of professionalism at the individual level is critical in order to understand the nuances involved in shaping day to day accounting behavior and practice. This affects how accountants are and should be trained, and the skills that are and should be developed to accommodate these new tasks. More broadly, it allows an understanding of how ICTs shape work routines, which have implications for workplace productivity and employee and client satisfaction.

This paper has two aims. First, it seeks to conduct a systematic literature review of prior studies on how ICTs impact the role of accounting professionals and professionalism. Accounting professionals in this study represent accountants and auditors who either work in industry or in professional accounting firms that provide accounting or audit services. This paper applies a literature analysis framework adapted from Broadbent and Guthrie (2008). The review focuses on articles in academic journals from 2000 to 2016 that address ICTs' impact on the activities, responsibilities and the skills/knowledge of accounting professionals. Through a meta-analysis, this paper analyses how academic research has explored this field and identifies trends and gaps. Based on an analysis of literature, this study identifies two significant trends in prior literature: (1) a shift in management accountants job description due to the implementation of ERP systems, and (2) a growing recognition of the hybridization of accounting professionals and IT personnel. The study identifies an imbalance between studies that provide normative theorizing and those that engage with practice. Consequentially a lack of structure and framework exists, as

well as important systematic factors, by which to guide accounting professionals to address challenges brought about by future ICT innovations.

Second, the paper aims to evaluate the potential for Disruptive Innovation Theory to provide a different angle to assess the impact of ICTs on the accounting profession. Drawing on an analysis of prior literature in the field, this paper will explore the advantages and limitations of Disruption Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) within an accounting context, and assess its ability to enlighten avenues for future research.

The paper provides three major contributions. Firstly, it clarifies a field by focusing solely on the impact of ICTs on accounting professionals and professionalism, thereby creating a foundation for advancing knowledge in this specific area (Webster & Watson, 2002). In prior studies, research on ICTs' impact on accounting professionals and their practice have intertwined, with research focusing more on changes in practices and techniques (see (Grabski *et al.*, 2011; Granlund, 2011; Sangster *et al.*, 2009)). This paper clearly distinguishes the impact of ICTs on accounting professionals as an independent research topic. Although several reviews have been undertaken on the impact of ICTs on accounting in general, this review focuses specifically on studies regarding how ICTs impact the knowledge/skill sets, daily activities and responsibilities of accounting professionals. Research relating to the interaction between accounting professionals and ICTs is currently fragmented, appearing in a variety of journals across many fields. Therefore, a literature review will develop a more complete and systematic understanding of what has been undertaken on this topic and the main focus and arguments relating to the interaction between ICTs and accounting professionals (Petticrew & Roberts, 2008; Silverman, 2013). Through a systematic literature review (Green *et al.*, 2006), this paper contributes to an understanding of ICT's influence on the accounting professionals' role in business. Additionally, this literature review highlights gaps in existing research and suggests



several avenues for future studies.

Secondly, this paper contributes to the re-contextualization of Disruptive Innovation Theory (Christensen, 1997), arguing the theory provides a new angle for analyzing to what extent accounting professionals recognize ICTs either as opportunities or threats in their daily practice. Research in this area to date is largely empirical in nature, including case studies and surveys (see Granlund 2011), which have resulted in a lack of attention on how the field can be theoretically framed (Geerts et al., 2013). Disruptive Innovation Theory can provide a theoretical base for analyzing the relationship between accounting professionals and ICTs. This theory also seeks to address one of the key gaps identified in previous literature reviews. Previous research has explored changes in the accounting professional's role due to ICTs, but few have examined the strategies to cope with these challenges. Therefore, Disruptive Innovation Theory can contribute to an analysis of not only how accounting professionals currently manage ICTs, but how challenges including redundancies and workforce attrition caused by ICTs should also be managed. Being an early attempt at applying Disruptive Innovation Theory to accounting research, this study will contribute to the discussion surrounding the definition of 'disruptive innovation' within the services sector (Danneels, 2004).

Thirdly, this study will contribute to a discussion on how technology affects accounting professionals instead of accounting practice. Prior studies on technological change and their impact on accounting have found that it has caused radical transformation to both accounting practice and the accountant's role and expertise (Granlund, 2007, 2011; Rom & Rohde, 2007; Sánchez-Rodríguez & Spraakman, 2012). Research has placed an emphasis on the impact of ICTs on accounting practice, whereas the accounting profession, and the issues it faces, has largely been ignored (Caglio, 2003). Studies have indicated that technology has made many traditional accounting roles redundant (Hastings & Solomon, 2005). Accounting literacy has

become easily transferrable to non-accountants through technology and information system experts, resulting in accountants relinquishing their pre-eminent role as business information providers (Caglio, 2003). Although a number of studies aim to explore whether technology has fundamentally changed accounting domains, their conclusions tend to be either ambiguous or negative (Granlund, 2011). It may appear that the major benefit of technology is limited to it being able to increasingly deliver effective and efficient accounting practices and techniques, raising questions as to the future role of accounting and auditing professionals. The relevance of the accounting and auditing profession depends on the ability of members to continually meet stakeholder expectations, and to provide a service appropriate to the needs of the current IT-dominated environment (Wessels, 2005).

The paper is organized as follows. Section 2 introduces the methodology and includes 3 subsections: 1) defining the study's boundary and outlining why a review of the extant literature in this field is important at this time; 2) outlining literature review methods, and a descriptive meta-analysis of papers, and 3) identifying significant trends and gaps in the pre-defined field. Section 3 introduces and assesses the relevance of Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) within an accounting context as a basis for explaining the impact of ICTs on the accountant's knowledge and role in business. Furthermore, this section will also discuss the strengths and weaknesses of the theory, and its potential contribution to existing technological related accounting research. Section 4 provides a conclusion and suggestions for future research.

### **2.3. Literature Review Methodology**

There are two parts to this study. The first part applies a similar framework to that of (Broadbent & Guthrie, 2008), who sought to employ a literature based analysis and a

critique of public sector accounting articles. A descriptive meta-analysis was discussed surrounding the characteristics of the research, and a conceptual analysis of the literature is used to evaluate the field and highlight key gaps for future research. Although this framework was originally used in public sector accounting research, it has subsequently been extended to structured literature reviews across a range of other accounting sub-fields, including Human Competence Accounting (Guthrie & Murthy, 2009) and Intellectual Capital Accounting (Guthrie *et al.*, 2012).

The review process is undertaken across four stages. The first formulates the research objectives and establishes boundaries for defining and limiting papers, whilst the second involves article selection. The third stage involves a pilot test of the classification system, and the final stage classifies all selected articles thereby establishing a database for further analysis to identify trends and gaps.

#### *2.3.1 Stage 1: Defining a field focusing on ICTs' impact on accounting professionals in modern business*

This study defines a new field of research beyond the traditional AIS field and draws a boundary across major sub-fields of accounting, further linking each sub-field with technologies studied in information systems research. Accounting Information Systems (AIS) research focuses on topics such as ERPs, data mining and continuous auditing, particularly their first appearance within the accounting domain (Krahel & Vasarhelyi, 2014). Being at “the intersection of the accounting and information systems domains” (Ferguson & Seow, 2011, p 1), AIS provides a common location for analysis of new technologies in accounting. However, with the growing dependency of accounting on ICTs, topics and technologies that used to be discussed only in the AIS field have become prominent within mainstream accounting literature across a broad range of sub-fields. Traditional accounting fields have progressively integrated with information systems and hence, distorted the boundary between mainstream accounting and the information systems domain (Coyne *et al.*, 2015). Since the aim of

this study is to construct a preliminary understanding of the current status of research on the impact of ICTs on accounting professionals, its perimeter needs to be extended to embrace a larger context involving information systems, AIS and traditional accounting research. From this large context, this study further narrows down the field into four areas involving collaboration between ICTs and accounting sub-fields (including auditing).

First, Enterprise Systems (ESs) have become more prominent in mainstream accounting research. In particular EPRs are extensively discussed in management accounting research (Grabski *et al.*, 2011; Sangster *et al.*, 2009). They are the primary enablers of change in data collection and data integration, and directly impact the organizational breadth of management accounting (Belfo & Trigo, 2013). The adoption of ERP has led to several changes in accounting including improved decision-making processes (Spathis & Ananiadis, 2005), the production of more accurate accounting information (Velcu, 2007), and the constitution of data sources for new accounting practices (Booth *et al.*, 2000) etc. Although scholars also cite the impact of ERPs on management accountant/accounting professionals [see (Granlund & Malmi, 2002); (Newman & Westrup, 2005)], these are only briefly discussed in a subsection of a majority of management accounting papers.

Second, the type of ICTs most closely related to the auditing field is that of Big Data and Computer Assisted Audit Tools and Techniques (CAATTs). Continuous Auditing is an emerging field within auditing research (Krahel & Vasarhelyi, 2014). Several scholars have mentioned the importance of Big Data on the future of auditing (Griffin & Wright, 2015). Processes, such as audit sampling will transition readily to population analysis, and auditing risks will rely on real-time data analytics. Research has shown the benefit of Big Data on auditing (Cao *et al.*, 2015) and argued that it is a valuable complement to traditional audit evidence (Yoon *et al.*, 2015). Some scholars also considered the impact of Big Data on auditors [see (Alles, 2015; Brown-Liburd *et*

*al.*, 2015)]. Similar to ERPs and management accounting research, there is scant research related to changes in auditor behavior and responsibility.

The third area in which ICTs and accounting engage, is that of accounting education. On one hand, previous studies have explored how ICTs have been used as teaching tools to better understand accounting knowledge and these have become a core topic covered in accounting programs to meet employer needs (Ahmed, 2003). On the other hand, as organizations have widely adopted ICTs in their daily activities, accountants, in addition to dealing with existing challenges, also have the added pressure of needing to attain sufficient knowledge of IT systems (Spraaakman *et al.*, 2015). Scholars question whether traditional knowledge and skill sets covered within accounting programs are enough to meet current employment needs (Chang & Hwang, 2003; Howieson, 2003; Wessels, 2005). This review focuses on the shift of knowledge and skill sets employers require in the workplace due to the adoption of ICTs in business. Research related to the accounting curriculum will not be included.

The fourth subfield of accounting/ICT collaboration is financial accounting, specifically business reporting. The major technologies applied toward these activities are the internet and accounting software, and given their development and permeation in the 1990s, an increasing number of corporations have chosen to disclose their business reporting online (Ettredge *et al.*, 2001). A number of studies have focused on the advantages and disadvantages of online reporting (see Ettredge *et al.*, 2001; Jones & Xiao, 2004; Abdelsalam & Street, 2007). Research has explored how accounting software and other ES speed up the reporting cycle, enabling more real-time information (Asli Basoglu & Hess, 2014; Chan & Wright, 2007). These studies mainly focus on the efficiency and effectiveness of information disclosure, with accounting professionals not being the subject of attention.

Figure 1. Defining the field of ICTs relating to accounting research

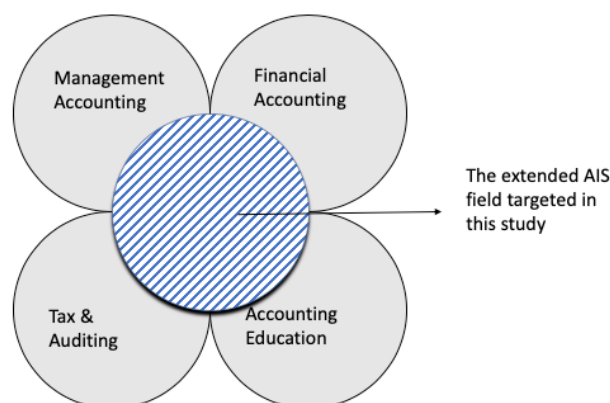


Figure 1 represents how accounting professionals from four different fields identified in previous studies, relate to different technology types. This study focuses on three categories of professional accountants: 1) management, 2) financial, and 3) auditors. Chen *et al.* (2012) classify the impact of ERP on accountants into four categories: the (1) job content<sup>4</sup>; (2) role<sup>5</sup>; (3) impact of ERP implementation<sup>6</sup>; and (4) enhancement<sup>7</sup>. The four categories reflect the accountant's daily activities, performance, his/her knowledge and skill set, and responsibilities. Guided by Chen *et al.* (2012)'s paper, literature relating to the impact of ICTs on activities, knowledge and skill sets and responsibilities of the three types of accounting professionals, is the key focus of this review.

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<sup>4</sup> Job contents include 18 daily operations of accountants, such as data input; data compliance and filing; financial analysis; ERP system maintenance and evaluation.

<sup>5</sup> Role of the accountant includes 8 types of roles, such as transaction data handlers; transactions auditors; and computer auditors.

<sup>6</sup> Impact of ERP implementation on accountants includes working environment, routine tasks, e.g. reduce workload of regular jobs, increase the quality of statement analysis and management.

<sup>7</sup> Enhancement of accountant includes skills and abilities that are improved after implementation of ERP, e.g. IT skills; communications skills; and analysis ability.

### *2.3.2 Stage 2-4 of literature review method*

Distinct from Broadbent and Guthrie's pre-determined journal list, this review applies a key word search to locate articles. As this is a review of ICTs' impact on accounting professionals and auditors involving an extensive examination of both information systems and accounting research, the scope of research will not be constrained to journals within a specific field. To fulfill the study's purpose, this research substitutes the process of selecting journals and articles in Broadbent and Guthrie's (2008) framework with that of a systematic review approach from Haddara and Zach's (2011) study. Haddara and Zach (2011) examined literature surrounding ERP systems in SMEs across various research fields. They initially applied key word searches through multiple databases. The search option was limited to titles of articles and their abstract. They then searched the same keywords across all key journals relevant to their research field to ensure no articles were missed. A primary literature database was constructed up to this stage. To ensure the relevance of the review, both authors reviewed the articles' abstracts and then selected papers directly addressing issues around ERP and SMEs.

In this study, Google Scholar, ScienceDirect and Business Source Premier were chosen as initial databases to search peer-reviewed journal articles using key words from two groups: (1) type of ICTs, and (2) accounting professionals<sup>8</sup> and "knowledge/skills". In each instance, this study chose one key word from the ICT group pairing it with one key word from the accounting group. For example, key words "ICTs" and "accountants' skills/knowledge".

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<sup>8</sup> The ICTs group involves: "ICTs"; "the Internet", "ERP", "(Integrated) Information Systems", "Big Data", and "CAATTS". The Accounting group involves: "accountants (graduates) skills/knowledge", "auditors (future) skills/knowledge", "management accountants", "financial accountants", "auditors", and any equivalent terms.

After the initial key words search, a large number of studies were presented in three databases. The authors then applied criteria to narrow down the initial result to ensure the relevance of the review. The first criterion applied to eliminate articles was the timeframe. This paper focuses on peer-reviewed articles published during the period 2000-2016, justified because spreadsheets, accounting software and ERP systems were first introduced into the accounting field in the late twentieth century and significantly changed how accounting professionals work in recording data. Furthermore, academic research relating to technology in the accounting field have also garnered greater attention since 2000, this thereby being the starting point for the literature review.

The second criterion is that ICTs need to be the principal factor affecting the role of accounting professionals in the articles reviewed, although a stream of accounting research has identified a wide range of factors influencing accounting including culture, legislation etc. The third criterion is that the articles focusing on changes in accounting processes/practices/techniques without mentioning accounting professionals, will be eliminated. From the initial sample, 61 papers were selected, downloaded as PDF files and imported into the software package 'Endnote' for full-paper analysis.

Secondary research was undertaken by scanning all references of selected journal articles to ensure database completeness. During the full-paper analysis, since the main purpose of this paper is to construct an understanding of how academic research has identified changes in the role of accounting professionals and auditors due to the impact of ICTs, this study further eliminates articles that discuss; 1) how accounting professionals and auditors shape the development of ICTs, 2) accounting professionals and auditors' acceptance/resistance toward the adoption of ICTs, and 3) how ICTs change accounting curriculum delivery method and content. This resulted in 48 academic papers being selected to construct the pool of articles.



In Step three, the author constructed, piloted test and modified a preliminary classification scheme adapted from Poston and Grabski (2000, 2001) and Ferguson and Seow (2011)'s literature review of AIS articles. The final version of the ICTs based accounting research paper classification scheme used to conduct further analysis is presented in Appendix A. The final step is presenting the characteristics of articles using a range of descriptive statistics in order to identify the trend and pattern of previous research.

## **2.4 A descriptive patterning of the identified field**

Through a narrative analytical review of selected articles, this section examines what has been undertaken in the field, the main research interests, and topics requiring further exploration. Appendix B provides a list of journals and the number of papers in that journal, whilst Appendix C provides a descriptive patterning and classification of those papers within the field.

The first issue highlighted is the significant portion of non-accounting journals publishing ICT related accounting research relating to accounting professionals, including Information systems and management journals. This is not surprising given that, as mentioned, the boundary of the IS and accounting fields are somewhat indistinct. It is worth noting that there is no specific journal focusing on publishing articles relating to ICTs and accounting professionals, with 48 publications scattered among 28 journals. In the next section, a further analysis of the relationship between topics and journal type will partially explain the results in the table. It is also interesting to see that some top-ranking journals in the accounting field are missing in Appendix B which outlines the list of journals and number of papers.

The second issue illustrated in Appendix C is research methodology, where literature reviews and syntheses dominate (including content analysis, historical analysis, and literature review) the types of research. Studies focusing more on general accounting

issues have a greater chance at focusing on accounting professionals. Empirical studies involving surveys/questionnaires and case/field studies constitute 22 articles, whereas other research methods only account for 15% of all selected studies.

The third issue considers the underlying theory applied within the selected articles. Other than a large number of articles undertaking literature reviews, there is a significant percentage of articles with no theoretical framework, particularly for empirical studies. As empirical research accounts for more than half of the research on this topic, very few are underlined by a theory or model (see Caglio, 2003; Newman & Westrup, 2005; Jack & Kholeif, 2008; Omoteso et al., 2010). The review indicates that a majority of those studies consist of relatively simple, descriptive findings (Grabski, Leech & Schmidt, 2011) using survey's, field studies, or case methodology (see Appendix C). There has been a significant lack of theory to explain the impact of ICTs on accounting professionals in a more generalized fashion (Sutton, 2006). Theories are important in being able to provide a comprehensive conceptual understanding or a lens by which to examine problems or issues. An absence of a comprehensive theory or theories to understand ICTs and accounting professionals, increases the risk that research within the field becomes unstructured and unsystematic, and our understanding of, and ability to, address issues becomes opaque and ad-hoc. A review of the selected papers has identified two theoretical frameworks that particularly relate to ICTs' impact on accounting professionals, those being: (1) Structuration Theory (Giddens, 1984); and (2) Scarbrough and Corbett (1992)'s model of technology power loop.

Giddens's (1984) structuration theory has been used in the accounting literature to underlay a number of case studies addressing accounting stability and continuity (Jack & Kholeif, 2008). Caglio (2003) stated that structuration theory is specifically helpful in explaining how ICTs have transformed the role of the accountant within the organization. He sees changes in the positions and practices of accountants' as a

structuration process, while the ERP system is interpreted as modalities of structuration. The ERP system provides a new interpretive scheme, facility and norm within organizations, and ultimately changes the role of accountants. The technology power loop applied in Newman and Westrup (2005) explains how expertise influences technological development; technologies shape the control of technologies, which in turn defines expertise. Newman and Westrup (2005) applied the power loop model to compare the changes in the control of technologies, and management accountants' expertise before and after implementation of ERP. Differing from structuration theory, this model emphasizes 'what' has changed in the accountants' role after the implementation of ERP instead of 'how' the changes occur.

In summary, the descriptive perspective on the selected articles is important as it helps identify where the articles were published, what was published, what methods were applied and the focus of the selected research. Based on the pattern identified through descriptive analysis, a further conceptual analysis will be performed to form tentative conclusions regarding ICT related accounting research.

## **2.5 Discussion**

This section will present a conceptual analysis of the selected articles and identify significant research trends as well as gaps in prior research in the field. The descriptive review of articles relating to topics is presented in Table 1.

Table 1. Review of Article by Topic

	ICTs			ES			Others	
D1.	General AP	5	D3.	General AP	5	D5.	Excel & skills of AP	1
	MA	3		MA	12		Big data & Auditor	3
	Auditors	2		Auditors	4		Online reporting & AP	1
D2.	Skills of AP	6	D4.	Skills of AP	1		Online reporting & auditor	1
	Skills of MA	1		Skills of MA	1			
	Skills of auditor	1		Skills of auditor	1			
Total: 48								

### 2.5.1 ERP systems transform the role of accounting professionals

In general, scholars have concluded that ICTs, being an important factor altering the business environment, have shifted the role of accountants from one of “record-keeper” to “internal consultant” (Grunland & Malmi, 2002; Caglio, 2003; Scapens & Jazayeri, 2003). On one hand, they have identified a significant decrease in traditional activities, such as bookkeeping, performed by accounting professionals after the adoption of ICTs (Newman & Westrup, 2005), resulting in a downsizing of the accounting departments of many firms (Caglio, 2003). On the other hand, there is evidence pointing to the fact that accounting professionals are expanding their role, and redefining their territory to maintain expertise in information provision (El Sayed, 2006). Companies are also seeking accountants, who can perform their expertise in areas such as data analysis, strategic decision-making and information technology initiatives (Caglio, 2003).

Compared with other aspects of the accounting domain, management accounting has been the area receiving the greatest attention (17 articles) (Sutton, 2006). As shown in

this review, a large portion of selected articles focus on the intertwined relationship between ERP systems and management accountants. Early research in ERP systems and management accounting change indicated that the impact of ERP systems on management accountants were constrained due to the status of the systems (Rom & Rohde, 2007). Although ERP systems enable the standardization of information provided to the accounting department, some advanced accounting techniques, such as the balanced score card, still require specialized software for further analysis (Granlund & Malmi, 2002). This has increased the complexities of the accountant's role and diminished the effectiveness of accounting activities.

Researchers found that in an ERP environment, management accountants require a broader knowledge of the business in order to become an integral part of the management team (Newman & Westrup, 2005). Management accountants require a number of skills to support the implementation of ERP systems, including software abilities, as well as significant interpersonal and analytical abilities (Newman & Westrup, 2005, Sangster et al., 2009). According to O'Mahony and Doran (2009), ERP systems allow non-accountants to undertake accounting roles more easily after a certain level of training. Being the center point for ERP systems, accountants, especially senior managers, expanded their role to that of educators, teaching a more general organizational audience about accounting related issues in ERP systems. It is also noticeable that management accountants are also evaluators of systems (Chen et al, 2012) responsible for their selection, implementation and maintenance (Burns *et al.*, 2006). In the pre-ERP era, legacy systems used in finance departments were in-house designed, at the behest of management accountants. Accountants had full control of the system and acted as its custodians (Newman & Westrup, 2005). After the generalization of ERP systems in business, accountants have become consumers of the commodified technologies, and the relevance of their expertise in consumption of technologies has weakened since the enterprise-wide scope of ERP systems. It has become the concern of general management rather than management accountants in

particular (Newman & Westrup, 2005). Although the significance of accounting professionals in business might be diluted by other groups, including IT personnel, empirical evidence indicates that management accountants still hold an important role (Granlund & Malmi, 2002).

#### *2.5.2 "Hybridization" between Accounting Professionals and IT personnel in skills/knowledge*

Another emerging trend in the literature is that ICTs, particularly ERP systems, have significantly affected the expertise of accountants who need to proactively seek and redefine their terrain of expertise (Newman & Westrup, 2005). New advances in ICTs might result in the standardization and commodification of knowledge and expertise, and hence, knowledge can become a marketable commodity, that is easily accessible by everyone (El Sayed, 2006). Accounting knowledge will be decentralized through ERP systems (Scapens & Jazayeri, 2003), and software vendors and IT experts are able to solve primarily accounting based problems through technologies and systems. The demand for accounting skills from accounting professionals may reduce accordingly (Parker, 2002). Therefore, management accountants might lose their monopoly on access to accounting data, and thus, need to seek new ways to construct their expertise to serve companies and decision-makers (Rikhardsson & Kræmmergaard, 2006).

Some scholars suggest the hybridization of both accounting and IT expertise (Caglio, 2003; El Sayed, 2006; Grabski, Leech & Schmidt, 2011; Granlund, 2011). Caglio (2003) stated in his paper that accounting professionals are experiencing "a phenomenon of "hybridization" between accountants and IS and line people, which runs both ways" (Caglio, 2003, p124). He further explained that:

"This is a consequence of ERP systems as enabling the codification of many accounting practices, while allowing the decentering of accounting knowledge and expertise within the whole organization, so that much of the traditional activities pertaining to accounting departments may move out, either into the IT area or into the business itself. At the same time, given the fact that ERPs

are freeing much energy and time of accounting departments, accountants themselves may get increasingly involved in the business and in the design and management of IT systems. It is not by chance that many companies have introduced training schemes for accountants, especially in these areas.”

El Sayed (2006) argues that accountants are attempting to “extend their control over the definition of ERP and to construct their expertise using ERP systems” (p. 92). To achieve this goal, accounting professionals require a higher-level of competency in IT knowledge and skills. Therefore, the hybridization of accounting and IT expertise also creates advantages and contributes toward re-defining the territory of accounting professionals.

Other evidence indicating the hybridization of accounting and IT expertise are the growing demands for IT/IS skills in the workplace (Wessels, 2005) and in the accounting curriculum (Ahmed, 2003). In addition to generalized use of ICTs in business, employers have shown an increasing demand for accounting graduates with higher IT/IS, communications, interpersonal and analytical skills (Hassall *et al.*, 2005). Wessels (2005) reviews literature from various professional bodies (e.g. The Institute of Chartered Accountants in Australia, the Institute of Chartered Accountants in England and Wales, the Chartered Institute of Management Accountants etc.), and identifies critical IT skills required by professional accountants. The range of skills includes business automation skills; office management skills; audit automation skills and system manager, designer and evaluator skills (Wessels, 2005). Spraakman *et al* (2015) also confirm the growing employer perception of IT competency in management accounting graduates and emphasizes the ability of continuous study in business practices to cope with emerging technologies. Compared with the demand side of the workforce market, accounting graduates are still predominately exposed to the traditional accounting curriculum (Hassall *et al.*, 2005). Many scholars have called for a re-orientation of accounting education in order to incorporate IT/IS

knowledge within accounting programs (Geerts *et al.*, 2013), and suggested a new role for AIS courses in accounting education (Krahel & Vasarhelyi, 2014).

Regarding the auditing aspect of accounting research, researchers have agreed that auditors should keep pace electronically with their clients (Curtis *et al.*, 2009). With the increasing complexity of information systems being adopted by clients, auditors need proportionate knowledge and skills to performance their work (Hunton *et al.*, 2004). Two aspects are discussed in the literature. First, researchers suggest involving IS auditors in the auditing team (see Curtis & Viator, 2000; Wright & Wright, 2002). Compared to general auditors, IS specialists are in a better position to identify risks relating to ERP systems (Brazel & Agoglia, 2004) and adopt different approaches to examining internal control, which is grounded in their education and experience in the IS field. Second, the application of CAATTs software packages also assists auditors in their employment (see Shaikh, 2005; Hunton & Rose, 2010). Decision support systems (DSS) in the Big 4 accounting firms are commonly employed to improve decision quality and effectiveness and efficiency in the auditing process (Dowling, 2009; Dowling & Leech, 2007). The skill in using DSSs, along with other IT/IS related skills, are necessary for auditors.

In summary, prior literature has explored whether implementation of ICTs within business and accounting departments have caused an expansion in the role of accounting professionals; a shift of focus in their job description, and whether this has led to a hybridization of accounting and IT expertise. This review also illustrates that the aftermath of ICTs generalization within business, has also influenced the market for accounting professionals, resulting in a growing need for IT/IS skills in both the accounting and auditing profession.



## **2.6 The case for using Disruptive Innovation Theory to advance Future Research**

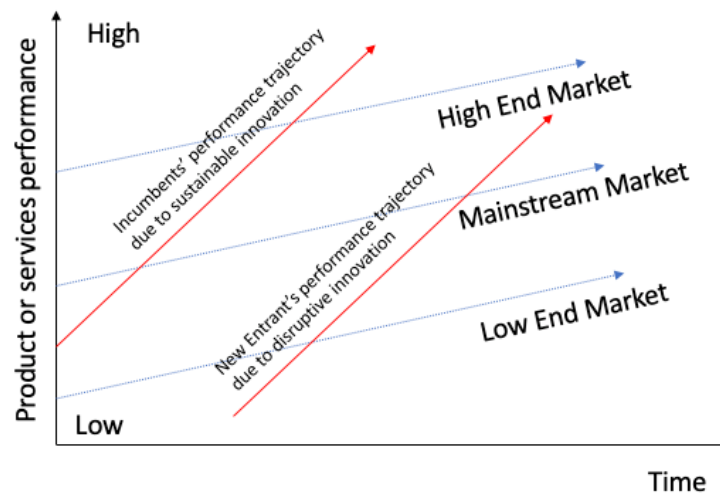
This section will begin by summarizing Disruptive Innovation Theory's genesis and key claims. It will then show how Disruptive Innovation Theory can address the gap identified through the literature review and enhance the knowledge of ICT's impact on accounting professionals.

### *2.6.1 Disruptive Innovation Theory and its origin*

Disruptive Innovation Theory has been systematically developed by Clayton Christensen through a series of case studies in the Disk Drive (floppy, optical and zip) industry to demonstrate how well-established companies often struggle when they fail to confront certain types of technological/product/business model innovations (Christensen & Raynor, 2003). Christensen argued that these innovations are usually "disruptive" in nature and result in the establishment of new markets with different value propositions (Christensen & Raynor, 2003). The Disruptive Innovation Theory shown in Figure 2 illustrates that there are two types of performance trajectories in every market. The first two red trajectory lines measures the improvement in the performance of the product or service due to different types of innovation. The second three blue trajectory lines represents the performance of the products or services that the customers can utilize. It is common that the pace of technological innovation always exceeds the performance improvement demanded by customers (Thomond *et al.*, 2003). As incumbent companies still produce products based on the customers' historical value, new market entrants who introduce a new product that were only performance competitive in niche markets, have a chance to reach customers who are less satisfied or oversupplied by the current mainstream product/service (Christensen *et al.*, 2003). Through the diffusion among customers, these disruptive innovations will finally establish mainstream markets with a new set of performance value attributes that are now more relevant than the current paradigm. As a result

incumbent companies might fail to adapt to this new performance value attributes due to the constraints of the current business model (Christensen & Raynor, 2003).

Figure 2. The Disruptive Innovation Theory



Source: Christensen et al., 2015, p49

Disruptive Innovation is described as a type of innovation that underperforms an existing product in the mainstream market and attracts a small number of marginal customers at the beginning (Christensen, 1997). Over time, it will meet the future demand of customers and displace the existing market leaders and open up opportunities for new entrants. Disruptive innovation has successfully exploited technologies, products, services, processes or business models that allow organizations to significantly change conventional competitive rules, thus transforming the demands and needs of existing markets (Hamel, 2000). As illustrated in the literature, taking a proactive position in managing disruptive innovation will allow new entrants to open up new markets, and existing incumbents to stay at the top of the industry (Kostoff *et al.*, 2004).

### *2.6.2 Disruptive Innovation Theory in different fields*

Christensen et al. (2003) argues that disruption can occur in any product or service market, and it will cause a change in the business model of incumbents eventually and a shift to new value networks. Disruptive Innovation Theory has been applied in a wide range of industries, including “retail, computers, printing, motorcycles, cars, semiconductors, cardiovascular surgery, management education, financial services, management consulting, cameras, communications, and computer-aided design software”(Christensen et al., 2015). Scholars use the theory to explain the potential impact/ threat of certain technological innovations, product innovations, and services innovations, to existing technologies/ products/ services. For example, Rao *et al.* (2006) have undertaken a study on the software application, Skype, to discuss how a merger of two or more disruptive innovations (VoIP (voice over internet protocol) and P2P (peer-to-peer)) can generate a disruptive impact within the existing market. (Keller & Hüsigg, 2009) applied disruptive innovation theory to analyze the case of the web applications Google’ office vs. Microsoft office. Christensen and Eyrings (2011) have studied disruption within the education sector, applying disruptive innovation theory to explain the industry’s slow growth. Scholars have also applied disruptive innovation theory to the healthcare service sector, in order to explore a care management program (Stein *et al.*, 2015), and online clinical consultations (Jung & Padman, 2015) etc.

### *2.6.3 Disruptive Innovation Theory’s contribution to deficiencies of the field*

Structuration theory and the technology power loop mentioned in the previous section have explained what and how changes in the role of the accounting profession occurs under the impact of ICTs. In this study, the author will argue that Disruptive Innovation Theory provides a better ex-ante understanding of the types of technology that will potentially cause disruption in the accounting domain and what should be undertaken to cope with this potential disruption. Particularly, this theory will assist

accounting professionals understand the phenomenon of ICTs replacing certain tasks undertaken by accounting professionals, and the hybridization of IT and accounting personnel. Instead of examining what actual changes there are in professional accountant work practices due to ICTs, Disruptive Innovation Theory will focus more on what accounting professionals should do to cope with changes.

As technology has become an essential part of accounting, its profession is facing unique challenges to stay relevant in business. At one end, ICTs provide potential answers to the accounting challenges, including improving the efficiency and effectiveness of accounting professionals. On the other hand, accounting research has also noticed the shift in accounting professional activities, responsibilities, and skills/knowledge demanded in the workforce market from their traditional roles in business (see (Chen *et al.*, 2012; Damasiotis *et al.*, 2015; Spraakman *et al.*, 2015)). Due to its basic practices now being highly automated, accounting is at the top of a list of professions expected to fall victim to digital disruption (PwC, 2015). In particular, accounting clerks and bookkeepers are at a 97.5% probability of being automated (PwC, 2015, p10). Clients and employers increasingly demand accounting professionals be equipped with IT knowledge, analytical skills and soft skills (Tam, 2013). As discussed in the previous literature review section, accounting professionals are undertaking less manual and routine jobs, instead evolving into a hybridization between accounting and IT personnel. Whether accounting professionals within industry are fully aware of their new role in business and ready to strategically adapt to it, remains uncertain.

In this situation, this study introduces Disruptive Innovation Theory to particularly address the gap of providing solutions to technology's disruptive impact. The original purpose of the theory is to help incumbents identify disruptive innovation at its early stage and select better strategies to cope with it (Christensen and Raynor, 2003). Since accounting professionals facing fierce competition and risk redundancy in future

markets, the theory might contribute toward helping accounting professionals recognize the disruption caused by ICTs and find better strategies to maintain market positioning. Disruptive Innovation Theory will provide “a market-based explanation of the competitive outcomes of discontinuous change focusing on the impact on performance trajectories and industries” (Bergek *et al.*, 2013, p. 1211).

Although disruption theory has been applied in a number of industries, the main focus on the theory has been on manufacturing. Although Christensen and his colleges have applied the theory in education (Christensen & Eyring, 2011) and health care (Jung & Padman, 2015), this paper attempts to extend the capability of the theory into the accounting domain. “Disruption” is a relative phenomenon (Christensen, C. M. *et al.*, 2015), and a more thorough discussion around the theory’s implications will be needed before its application.

## 2.7 Conclusion

As ICTs have created significant impact in the accounting field, the interaction between technology and the accounting profession is increasingly becoming inseparable. In prior research, scholars have already investigated the influence of various types of ICTs on different accounting fields (Granlund, 2011). Despite the large number of papers focusing on accounting practice, there is scant research focusing solely on the relationship between, and impact of ICTs on accounting professionals, and their knowledge/skillsets in business. This paper focuses precisely on literature surrounding *changes* in the role of accounting professionals and a *shift* in their knowledge/skillsets due to ICTs. This study finds that this is present in both management and information system journals, as well as accounting journals. Management journals in particular have published many studies exploring the impact of ERPs on management accountants, while information systems journals focus more on newer technologies including cloud computing and big data. There are two issues identified in this review. First, as accounting professionals face challenges in an ICT

environment, a stream of studies have emerged that discusses the hybridization between accounting and IT personnel, to enable accounting professionals to better serve business. Changes in the role of accounting professionals found in previous studies include elevating professional skills from one of bookkeeping to data analysis; expanding traditional roles into business advisory roles; and adopting new skills in IT/IS when the business is implementing new systems.

Second, existing studies illustrate a significant lack of theoretical presence, and this review argues that Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) might contribute toward addressing this gap. A disruption study in accounting research provides a new perspective on the relationship between ICTs and accounting. Furthermore, the introduction of “disruptive technology” and disruptive theory into accounting research might contribute toward cross-disciplinary studies that can investigate the dynamic and complex relationship between ICTs and the role of accounting professionals, and the functionality of accounting firms. What is the nature of this dynamic? How is it different to how innovation has occurred in the profession historically?

What is evident is that the pace of change in the information age, including the digital revolution, has far exceeded that in previous era's, including the first (1760-1840) and second (1870-1914) industrial revolutions. The timeframe from concept to delivery is much shorter today than it was historically. The ability to penetrate markets and provide services online are far quicker than the long lead times often experienced in the product supply chain process. The rise of information intensive industries, including the accounting profession, have provided opportunities, challenges and competition for accounting professionals. The growth and diversification in worldwide accounting/professional services over the last 30 years, have in part been reflected in this shift to an information age. Disruptive Innovation provides a lens by which to understand the increasing dynamic between those who provide information

services and those who consume them. It allows us to understand how industry and the professions respond to changes in information and communication technologies. This is critical in understanding the ongoing growth and transformation of the accounting and the professional services market.

## 2.8 References

- Abdelsalam, O. H., & Street, D. L. (2007). Corporate governance and the timeliness of corporate internet reporting by UK listed companies. *Journal of International Accounting, Auditing and Taxation*, 16(2), 111-130.
- Ahmed, A. (2003). The level of IT/IS skills in accounting programmes in British universities. *Management Research News*, 26(12), 20-58. doi:10.1108/01409170310783709
- Alles, M. (2015). Drivers of the Use and Facilitators and Obstacles of the Evolution of Big Data by the Audit Profession. *Accounting Horizons*, 29(2), 439-449. doi:10.2308/acch-51067
- Asli Basoglu, K., & Hess, T. J. (2014). Online Business Reporting: A Signaling Theory Perspective. *Journal of Information Systems*, 28(2), 67-101. doi:10.2308/isys-50780
- Belfo, F., & Trigo, A. (2013). Accounting Information Systems: Tradition and Future Directions. Paper presented at the Conference on Enterprise Information Systems.
- Bergek, A., Berggren, C., Magnusson, T., & Hobday, M. (2013). Technological discontinuities and the challenge for incumbent firms: Destruction, disruption or creative accumulation? *Research Policy*, 42(6), 1210-1224.
- Booth, P., Matolcsy, Z., & Wieder, B. (2000). The impacts of enterprise resource planning systems on accounting practice—the Australian experience. *Australian Accounting Review*, 10(22), 4-18.
- Brazel, J. F., & Agoglia, C. P. (2004). The effects of computer assurance specialist competence and auditor AIS expertise on auditor planning judgments. Available at SSRN 497287.
- Broadbent, J., & Guthrie, J. (2008). Public sector to public services: 20 years of “contextual” accounting research. *Accounting, Auditing & Accountability Journal*, 21(2), 129-169. doi:10.1108/09513570810854383
- Brown-Liburd, H., Issa, H., & Lombardi, D. (2015). Behavioral implications of Big Data's impact on audit judgment and decision making and future research directions. *Accounting Horizons*, 29(2), 451-468.
- Burns, J., Hyvönen, T., Järvinen, J., & Pellinen, J. (2006). The role of standard software packages in mediating management accounting knowledge. *Qualitative Research in Accounting & Management*, 3(2), 145-160. doi:10.1108/11766090610670677
- Caglio, A. (2003). Enterprise Resource Planning systems and accountants: towards hybridization? *European Accounting Review*, 12(1), 123-153. doi:10.1080/0963818031000087853
- Cao, M., Chychyla, R., & Stewart, T. (2015). Big Data analytics in financial statement audits. *Accounting Horizons*, 29(2), 423-429.
- Chan, S. H., & Wright, S. (2007). Feasibility of More Frequent Reporting: A Field Study Informed Survey of In-Company Accounting and IT Professionals. *Journal of*



- Information Systems*, 21(2), 101-115.
- Chang, C. J., & Hwang, N.-c. R. (2003). Accounting education, firm training and information technology: a research note. *Accounting Education*, 12(4), 441-450. doi:10.1080/0963928032000065557
- Chen, H. J., Huang, Y., Chiu, A. A., & Pai, F. C. (2012). The ERP system impact on the role of accountants. *Industrial Management & Data Systems*, 112(1), 83-101. doi:10.1108/02635571211193653
- Christensen, C. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, MA: Harvard Business School Press.
- Christensen, C., Aaron, S., & Clark, W. (2003). Disruption in Education. *Education Review*, 38, 44-55.
- Christensen, C., & Eyring, H. J. (2011). *The innovative university: Changing the DNA of higher education from the inside out*: John Wiley & Sons.
- Christensen, C., & Raynor, M. (2003). *The Innovation's Solution*. Harvard Business School Press, Boston, Massachusetts.
- Christensen, C. M., Raynor, M. E., & McDonald, R. (2015). Disruptive innovation. *Harvard Business Review*, 93(12), 44-53.
- Christensen, C. M., Scott, D. A., & Erik, A. R. (2004). *Seeing What's Next: Using the Theories of Innovation to Predict Industry Change*. Boston: Harvard Business School Press.
- Coyne, J. G., Coyne, E., M., & Walker, K., B. (2015). *Accounting Architecture: The New Face of AIS*. SSRN.
- Curtis, M. B., & Viator, R. E. (2000). An investigation of multidimensional knowledge structure and computer auditor performance. *Auditing: A Journal of Practice & Theory*, 19(2), 83-103.
- Curtis, M. B., Jenkins, J. G., Bedarad, J. C., & Deis, D. R. (2009). Auditors' Training and Proficiency in Information Systems: A research Synthesis. *Journal of Information Systems*, 23(1), 79-96.
- Damasiotis, V., Trivellas, P., Santouridis, I., Nikolopoulos, S., & Tsifora, E. (2015). IT Competences for Professional Accountants. A Review. *Procedia - Social and Behavioral Sciences*, 175, 537-545. doi:10.1016/j.sbspro.2015.01.1234
- Danneels, E. (2004). Disruptive technology reconsidered: A critique and research agenda. *Journal of product innovation management*, 21(4), 246-258.
- Dowling, C. (2009). Appropriate audit support system use: The influence of auditor, audit team, and firm factors. *The Accounting Review*, 84(3), 771-810.
- Dowling, C., & Leech, S. (2007). Audit support systems and decision aids: Current practice and opportunities for future research. *International Journal of Accounting Information Systems*, 8(2), 92-116.
- El Sayed, H. (2006). ERPs and accountants' expertise: the construction of relevance. *Journal of Enterprise Information Management*, 19(1), 83-96. doi:10.1108/17410390610636896
- Ettredge, M., Richardson, V. J., & Scholz, S. (2001). The presentation of financial

- information at corporate Web sites. *International Journal of Accounting Information Systems*, 2(3), 149-168.
- Ferguson, C., & Seow, P. S. (2011). Accounting information systems research over the past decade: Past and future trends. *Accounting & Finance*, 51(1), 235-251.
- Geerts, G. L., Graham, L. E., Mauldin, E. G., McCarthy, W. E., & Richardson, V. J. (2013). Integrating Information Technology into Accounting Research and Practice. *Accounting Horizons*, 27(4), 815-840. doi:10.2308/acch-50573
- Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*: Univ of California Press.
- Grabski, S. V., Leech, S. A., & Schmidt, P. J. (2011). A Review of ERP Research: A Future Agenda for Accounting Information Systems. *Journal of Information Systems*, 25(1), 37-78. doi:10.2308/jis.2011.25.1.37
- Granlund, M. (2007). On the interface between management accounting and modern information technology-A literature review and some empirical evidence. Working Paper.
- Granlund, M. (2011). Extending AIS research to management accounting and control issues: A research note. *International Journal of Accounting Information Systems*, 12(1), 3-19. doi:10.1016/j.accinf.2010.11.001
- Granlund, M., & Malmi, T. (2002). Moderate impact of ERPS on management accounting: a lag or permanent outcome? *Management Accounting Research*, 13(3), 299-321. doi:https://doi.org/10.1006/mare.2002.0189
- Green, B. N., Johnson, C. D., & Adams, A. (2006). Writing narrative literature reviews for peer-reviewed journals: secrets of the trade. *Journal of chiropractic medicine*, 5(3), 101-117.
- Griffin, P. A., & Wright, A. M. (2015). Commentaries on Big Data's Importance for Accounting and Auditing. *Accounting Horizons*, 29(2), 377-379. doi:10.2308/acch-51066
- Guthrie, J., & Murthy, V. (2009). Past, present and possible future developments in human capital accounting. *Journal of Human Resource Costing & Accounting*, 13(2), 125-142.
- Guthrie, J., Ricceri, F., & Dumay, J. (2012). Reflections and projections: a decade of intellectual capital accounting research. *The British Accounting Review*, 44(2), 68-82.
- Haddara, M., & Zach, O. (2011). *ERP Systems in SMEs: A Literature Review*. Paper presented at the The 44th Hawaii International Conferences on System Sciences, Hawaii.
- Hamel, G. (2000). *Leading the Revolution*. Boston, Massachusetts: Harvard Business School Press.
- Hassall, T., Joyce, J., Arquero Montaña, J. L., & Donoso Anes, J. A. (2005). Priorities for the development of vocational skills in management accountants: A European perspective. *Accounting Forum*, 29(4), 379-394. doi:10.1016/j.accfor.2005.03.002
- Hastings, C. I., & Solomon, L. (2005). Technology and the accounting curriculum:

- Where it is and where it needs to be. *Advances in Accounting*, 21, 275-296.
- Howieson, B. (2003). Accounting practice in the new millennium: is accounting education ready to meet the challenge? *The British Accounting Review*, 35(2), 69-103. doi:10.1016/s0890-8389(03)00004-0
- Hunton, J., Wright, A., & Wright, S. (2004). Are Financial Auditors Overconfident in Their Ability to Assess Risks Associated with Enterprise Resource Planning Systems?(Retracted). *Journal of Information Systems*, 18(2), 7-28.
- Hunton, J. E. (2002). Blending Information and Communication Technology with Accounting Research. *Accounting Horizons*, 16(1), 55-67.
- Hunton, J. E., & Rose, J. M. (2010). 21st Century Auditing: Advancing Decision Support Systems to Achieve Continuous Auditing. *Accounting Horizons*, 24(2), 297-312. doi:10.2308/acch.2010.24.2.297
- Jack, L., & Kholeif, A. (2008). Enterprise Resource Planning and a contest to limit the role of management accountants: A strong structuration perspective. *Accounting Forum*, 32(1), 30-45. doi:10.1016/j.accfor.2007.11.003
- Jones, M., & Xiao, J. (2004). *Financial reporting on the Internet by 2010: a consensus view*. Paper presented at the Accounting Forum.
- Jung, C., & Padman, R. (2015). *Disruptive digital innovation in healthcare delivery: The case for patient portals and online clinical consultations The Handbook of Service Innovation* (pp. 297-318): Springer.
- Keller, A., & Hüsigg, S. (2009). Ex ante identification of disruptive innovations in the software industry applied to web applications: The case of Microsoft's vs. Google's office applications. *Technological Forecasting and Social Change*, 76(8), 1044-1054. doi:10.1016/j.techfore.2009.03.005
- Kostoff, R., Boylan, R., & Simons, G. (2004). Disruptive technology roadmaps. *Technological Forecasting and Social Change*, 71(1-2), 141-159. doi:10.1016/s0040-1625(03)00048-9
- Krahel, J. P., & Vasarhelyi, M. A. (2014). AIS as a Facilitator of Accounting Change: Technology, Practice, and Education. *Journal of Information Systems*, 28(2), 1-15. doi:10.2308/isyis-10412
- Newman, M., & Westrup, C. (2005). Making ERPs work: accountants and the introduction of ERP systems. *European Journal of Information Systems*, 14(3), 258-272. doi:10.1057/palgrave.ejis.3000539
- Norfleet, N. 2017, April 18 Robotic Software Sweeping Large Accounting Firms and Clients, *The Australian Financial Review*, Available at: <https://www.afr.com/business/accounting/robotic-software-sweeping-large-accounting-firms-and-clients-20170418-gvymkap>. [Accessed 20 May 2018]
- O'Mahony, A., & Doran, J. 2009. The changing role of management accountants; Evidence from the implementation of ERP Systems in large organisations. *International Journal of Business and Management*, 3(8), 109.
- Omoteso, K., Patel, A., & Scott, P. 2010. 'Information and communications technology and auditing: current implications and future directions'. *International Journal*

- of Auditing*, 14(2), 147-162.
- Parker, M. (2002). *Against management: Organization in the age of managerialism*: Polity Press in association with Blackwell.
- Petticrew, M., & Roberts, H. 2008. *Systematic reviews in the social sciences: A practical guide*: John Wiley & Sons.
- Poston, R., & Grabski, S. 2000. Accounting Information Systems Research: Is it Another QWERTY. *International Journal of Accounting Information Systems*, 1(1), 9-53.
- Poston, R., & Grabski, S. 2001. Financial impacts of enterprise resource planning implementations. *International Journal of Accounting Information Systems*, 2(4), 271-294.
- PricewaterhouseCoopers, 2015, *A smart move - future-proofing Australia's workforce by growing skills in science, technology, engineering and maths*, Available at: <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>. [Accessed 28 Nov 2017]
- Rao, B., Angelov, B., & Nov, O. 2006. Fusion of Disruptive Technologies. *European Management Journal*, 24(2-3), 174-188. doi:10.1016/j.emj.2006.03.007
- Rikhardsson, P., & Kræmmergaard, P. 2006. 'Identifying the impacts of enterprise system implementation and use: Examples from Denmark'. *International Journal of Accounting Information Systems*, 7(1), 36-49.
- Rom, A., & Rohde, C. 2007. 'Management accounting and integrated information systems: A literature review'. *International Journal of Accounting Information Systems*, 8(1), 40-68. doi:10.1016/j.accinf.2006.12.003
- Sánchez-Rodríguez, C., & Spraakman, G. 2012. 'ERP systems and management accounting: a multiple case study'. *Qualitative Research in Accounting & Management*, 9(4), 398-414. doi:10.1108/11766091211282689
- Sangster, A., Leech, S. A., & Grabski, S. V. 2009. 'ERP Implementations and Their Impact upon Management Accountants'. *Journal of Information Systems and Technology Management*, 6(2), 125-142.
- Scapens, R. W., & Jazayeri, M. 2003. 'ERP systems and management accounting change: opportunities or impacts? A research note'. *European Accounting Review*, 12(1), 201-233. doi:10.1080/0963818031000087907
- Scarbrough, & Corbett, J. M. 1992. *Technology and Organization: Power, Meaning, and Design*: Routledge.
- Shaikh, J. M. 2005. 'E-commerce impact: Emerging technology-electronic auditing'. *Managerial Auditing Journal*, 20(4), 408-421.
- Silverman, D. 2013. *Doing qualitative research: A practical handbook*. SAGE Publications Limited.
- Spathis, C., & Ananiadis, J. 2005. 'Assessing the benefits of using an enterprise system in accounting information and management'. *Journal of Enterprise Information Management*, 18(2), 195-210.
- Spraakman, G., O'Grady, W., Askarany, D., & Akroyd, C. 2015. 'Employers'

- Perceptions of Information Technology Competency Requirements for Management Accounting Graduates'. *Accounting Education*, 24(5), 403-422. doi:10.1080/09639284.2015.1089177
- Stein, D., Chen, C., & Ackerly, D. C. 2015. 'Disruptive innovation in academic medical centers: balancing accountable and academic care'. *Academic Medicine*, 90(5), 594-598.
- Sutton, G. 2006. 'Enterprise systems and the re-shaping of accounting systems: A call for research'. *International Journal of Accounting Information Systems*, 7(1), 1-6. doi:10.1016/j.accinf.2006.02.002
- Tam, T. 2013. What IT Knowledge and Skills do Accounting Graduates Need? *New Zealand Journal of Applied Business Research*, 11(2), 23-42.
- Taylor, B. M. 2015. 'The integrated dynamics of motivation and performance in the workplace'. *Performance Improvement*, 54(5), 28-37.
- Thomond, P., Herzberg, T., & Lettice, F. 2003. *Disruptive innovation: Removing the innovators dilemma*. Paper presented at the British Academy of Management Annual Conference: 'Knowledge into Practice.
- Vakal Fotis, N., Ballantine, J., & Wall, A. 2011. *A Literature Review on the Impact of Enterprise Systems on Management Accounting*. Paper presented at the The 8th International Conference on Enterprise Systems, Accounting and Logistics, Thassos Island, Greece.
- Velcu, O. 2007. 'Exploring the effects of ERP systems on organizational performance: Evidence from Finnish companies'. *Industrial Management & Data Systems*, 107(9), 1316-1334.
- Webster, J., & Watson, R. T. 2002. 'Analyzing the past to prepare for the future: Writing a literature review'. *MIS quarterly*, xiii-xxii
- Wessels, P. L. 2005. 'Critical information and communication technology (ICT) skills for professional accountants'. *Meditari Accountancy Research*, 13(1), 87-103. doi:10.1108/10222529200500006
- Wright, S., & Wright, A. M. 2002. 'Information system assurance for enterprise resource planning systems: unique risk considerations'. *Journal of Information Systems*, 16(s-1), 99-113.
- Yoon, K., Hoogduin, L., & Zhang, L. 2015. 'Big data as complementary audit evidence'. *Accounting Horizons*, 29(2), 431-438.

### 3. Paper 2: Identifying and Managing Digital Disruption in the Accounting Profession through Disruptive Innovation Theory - a View from Accounting Professionals

#### 3.1 Abstract

**Purpose:** The purpose of this paper is to explore the extent to which Information and Communications Technology (ICT) disrupts accounting services, and how accounting professionals manage and strategize this disruption, through the lens of Disruptive Innovation Theory.

**Design/methodology/approach:** This paper conducts in-depth semi-structured interviews with thirteen accounting professionals chosen from professional firms and associations, across different industries (including the public sector), and to explore their experience with digital disruption. Interviews were coded using NVivo software and were supplemented with related media releases and industry research reports to provide background and context to interview data.

**Findings:** This study finds that ICTs are a potential disruptive innovation to accounting professionals, but disruption has yet to fully materialize. Accounting professionals have learnt to collaborate with ICTs as tools to achieve high value services. They also adapt different strategies to enhance their capability to innovate.

**Research limitations/implications:** Interviews were conducted with a small number of respondents in professional firms and associations, so that it is difficult to generalize the voice of respondents. Other socio-political agents may have engaged in the field of digital disruption within accounting. The voices of respondents are based on their individual opinions as accounting professionals.

**Originality/value:** There are three main contributions. First, this paper introduces Disruptive Innovation Theory into the accounting field. The theory provides an alternate approach to explaining the impact of ICTs on accounting professionals: highlighting how accounting firms have taken precautions to cope with disruptive innovation. Second, this paper also contributes to disruptive innovation studies by clarifying its concept and enhancing its theoretical underpinning. Third, the paper fills a gap in previous studies on accounting professionals, and the impact of ICTs on their knowledge and skill sets within a business context. Through the lens of disruptive innovation theory, this paper not only identifies new roles for accounting professionals in business, but also discusses how accounting professionals cope with disruptive impact brought by ICTs.

*Keywords: Accounting; Disruption Innovation; Information and Communication Technology*

### 3.2 Introduction

The role of accounting professionals within business is transforming due to the continuous development of Information and Communication Technologies (ICTs) (Guthrie & Parker, 2016). Accounting professionals are transitioning from “information gatherers” to information analysts and hence strategic advisors to business (Vakalfotis *et al.*, 2011). Both industrial and academic researchers have identified this transformation and have applied various accounting theories to illustrate the transformation process.

This paper aims to explore the influence of ICTs on the role of accounting professionals through the lens of Disruptive Innovation Theory (Christensen & Raynor, 2003). First, this paper explores whether ICTs can be viewed as disruptive innovation or not by comparing two criteria drawn from previous studies. Second, this paper analyses the interview data of accounting professionals from various accounting firms and related organizations, and discusses to what extent, accounting professionals have coped with the disruption caused by ICTs. Third, this paper further argues Disruptive Innovation Theory can guide accounting professionals to develop better strategies to deal with digital disruption.

Disruptive Innovation Theory has been the subject of increasing academic attention since being coined by Clayton Christensen in his 1997 book *The Innovators Dilemma* (Christensen, 1997). The theory mainly explains why disruptive innovation can hurt successful, well-managed incumbents that are always responsive to their customers’ needs (Christensen & Raynor, 2003). The theory not only alerts companies to identify disruptive innovation in advance, it also guides companies to develop strategies to cope with disruption. Debate surrounding Disruptive Innovation Theory has been continuous since its inception. Researchers argue that the definition remains vague (Danneels, 2004; Markides, 2006; Nagy *et al.*, 2016); requiring further clarification. Furthermore, the tools used to predict disruptive innovation need development. In his 1997 book, Christensen stated that disruptive innovation is relative, and might be disruptive to some incumbents but remain sustainable to others (Christensen, 1997). Although the theory has been widely used across various research fields ranging from management, marketing, education and innovation, it is yet to be applied in

accounting. Therefore, this study develops modified criteria for assessing disruptive innovation within an accounting context.

This study interviewed 13 accounting professionals from professional service providers, professional associations and accounting practitioners. Through content analysis, this paper seeks to assess to what extent ICTs constitute disruptive innovation and identify what constraints accounting professionals are facing when confronting digital disruption. Interview data was analysed using NVivo software.

The result of this study demonstrates that ICTs are potentially disruptive to accounting professionals in two ways. ICTs have had an impact on both how accounting professionals utilize their time, as well as how the knowledge and value that they possess, appeals to mainstream clients. However, ICTs cannot substitute for 'trust', or replace 'face-to-face' interaction. A majority of clients still prefer human interaction and view ICTs as tools to facilitate this rather than a separate tool to completely replace accounting professionals. Whilst employment pressures are being placed on accounting professional's due to technological change, including redundancies and labour market contractions for repetitive, unskilled tasks, there is less evidence of significant 'disruptive innovation' for key skilled tasks.

This study finds that accounting professionals have also learnt to accommodate ICTs, adopting different strategies to cope with disruption. Large accounting firms choose to establish separate units or "innovation center's" to drive innovation within the firm. Furthermore, there has been acquisition of technology-based firms to eliminate potential disruptors in the market. Accounting firms also embed innovation culture into their recruitment strategy to broaden their talent base across all disciplines. Individual accounting professionals also choose, and feel client pressure to, undertake continuous study, through professional associations and training to upgrade skills and adapt to constant technological change. This paper concludes that although accounting professionals realize the significant impact of ICTs on their role in business, they still lack recognition of the disruptive nature of technology within the accounting profession.



The study makes three contributions. First, it focuses solely on accounting professionals and explores how ICTs have changed their business role. Debates surrounding the role of accounting professionals within the future workplace have been present in both the popular press and in academic research, which provide the foundation for this study. The second contribution of this paper is to introduce Disruptive Innovation Theory as a basis to explore the current impact of technology on accounting professionals, hence providing a theoretical construct upon which to develop appropriate strategies surrounding digital disruption. The third contribution of this study is to extend Disruptive Innovation Theory into the accounting field, allowing disruptive innovation to be explored within a service innovation context.

The paper is structured as follows: the next section reviews relevant literature regarding how the accounting profession has evolved alongside the development of ICTs and Disruptive Innovation Theory. Section 4 outlines the study's three (3) research questions, whilst the research method and data analysis process are discussed in section 5. Section 6 presents an analysis of the results of the research questions. Section 7 presents the conclusion and discusses the implications of the study for both the field of accounting research and Disruptive Innovation Theory.

### **3.3 Literature review**

#### *3.3.1 The Evolving Nature of Accounting Professionals and ICTs*

Literature has highlighted a broader role for accounting professionals in the digital business environment (Chen *et al.*, 2012; Rom & Rohde, 2006), including the transformation of accounting professionals from information processor to strategic business advisor due to the adoption of ICTs in business (Holtzman, 2004). As companies are increasingly relying on information systems, such as ERPs, accounting professionals have changed their activities and responsibilities. Reflected in previous studies, accounting professionals perform less repetitive information input tasks (Granlund & Malmi, 2002); have an increasing responsibility for analytical work (Sánchez-Rodríguez & Spraakman, 2012); require a deeper and wider knowledge of business; necessitate greater collaboration across departments (Lodh & Gaffikin, 2003) and command greater control of information systems within the business (Caglio, 2003).

However, a majority of these studies are only derivatives of those regarding ICTs' impact upon accounting practices and techniques. Few papers have sought to distinguish research surrounding changes in the role of accounting professionals from that of accounting practices and techniques due to the impact of ICTs (see, eg., Caglio, 2003; Chen *et al.*, 2012; Jack & Kholeif, 2008; Newman & Westrup, 2005). Scholars have instead focused on exploring how accounting techniques have changed due to the adoption of ICTs. This paper argues that the role of accounting professionals should be distinct from that of accounting practices and techniques regarding the impact of ICTs. Consequently, this topic explores real life issues such as automation and task replacement within the workplace (CEDA, 2015).

Most ICT based accounting papers focus on describing the role of accounting professionals after technological transformation, but few have explored how ICTs have significantly changed accounting professionals. According to a report by PriceWaterhouseCoopers (PwC, 2015), accounting professionals top the list of professions under the threat of replacement by systemization, where technology automates and transforms workflow systems. This illustrates a need for research exploring how accountants seek to maintain and/or transform, their professional work activity.

Accounting firms have also increasingly sought to venture into the field of ICTs. PwC Australia invested in developing its online tax-rebating tool *Nifty R&D* to catch up with the disruptive effect of the Internet on buying behaviours (King, 2016). PwC has set technology and science at the heart of its strategy and has made a large investment in its digital division. KPMG has acquired several technology firms, including *Hands-on Systems* and *Crimsonwing* (price around \$13.5 million), in order to build up its capability in the technology enablement space across a number of different areas, with the aim of undertaking a broader advisory business (Smith, 2015). Ernst & Young has also acquired data analytics firm *C3 Business Solutions* to strengthen its capability and capacity, with the aim of becoming world leading enterprise intelligence advisors (King, 2015). Deloitte acquired a number of technology-related firms; namely *Dataweave*, *Qubit*, and *Cloud Solutions Group* in 2015, and is aggressively competing with the other three accounting firms in the technology race (Redrup, 2015). These

events all illustrate that accounting firms increasingly view ICTs as strategically important to their business, each having responded to digital disruption in various ways.

Considering the gap between published academic research and the debate within the popular press around ICTs' impact on the accounting profession, this paper applies disruptive innovation theory to explore to what extent ICTs have changed the role of accounting professionals within business.

### 3.3.2 *Disruptive Innovation Theory*

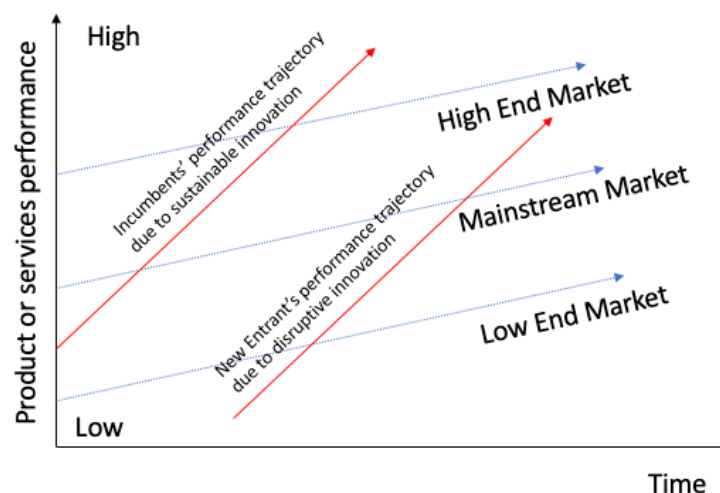
The concept of Disruptive Innovation was first introduced by Clayton Christensen in his book *The Innovator's Dilemma* in 1997. Since then, scholars across different fields have long investigated this concept (see, eg., Danneels, 2004; Dijk *et al.*, 2016; Gemici & Alpkan, 2015; Guttentag, 2015; Hwang & Christensen, 2008; Markides, 2006). The original idea of disruptive innovation is to explain why large, well-managed firms fail when facing market and technological change, and to guide these firms to develop strategies to cope with disruption (Christensen, 1997). Christensen case studied the disk drive industry as an example of disruptive innovation. The term "disruptive technology" (ibid, p.11) was used to differentiate technology that creates a different value proposition and causes leading incumbents' to fail, with "sustaining technology" (ibid) which focuses predominantly on improving the performance of existing products along the dimensions of performance that major markets historically value.

Christensen and Raynor (2003) later replaced "disruptive technology" with "disruptive innovation" to expand the application of the concept to include both services and business model innovation. In addition, Christensen and Raynor (2003) further refined their theory and classified disruptive innovation into two categories: low-end and new-market disruptive innovation. Since their study focuses on market-based explanation of outcomes of discontinuous change caused by innovation, the major difference between these two categories is targeted customer type. Low-end disruptive innovation targets lease-profitable customers, whereas new-market disruptive innovation attracts new customers (ibid).

### 3.3.3 From Concept to Theory

Christensen then further extended the disruptive innovation concept into Disruptive Innovation Theory (Christensen *et al.*, 2006), illustrated by the iconic trajectory map shown in Figure 2. As the performance demanded by customers of an existing market increases over time, so does the performance provided within a technological paradigm. At some point, the product/service will over-supply the needs or desires of customers. A disruptive innovation then enters the market with less than satisfactory quality and performance, targeting a fringe customer element (Hwang & Christensen, 2008). Improvements in performance over time, result in the disruptive innovation eventually meeting the needs and desires of mainstream customers in a new market (Keller & Hüsig, 2009). Performance improvement is driven firstly by the market, and second by innovation. The intersection point on the trajectory map is where disruption occurs, by creating a new value network and eventually a new market. This process will occur over a period of time, and success is not assured (Christensen & Raynor, 2003), but whether these lines intersect is a key element in predicting disruption.

Figure 2. The Disruptive Innovation Theory



Source: Christensen et al., 2015, P49.

Christensen (Christensen, 1997; Christensen & Raynor, 2003) further explored why incumbent firms fail when faced with disruptive innovation, and recommended strategies that might assist incumbents to survive. First, resource allocation is a key factor in the failure of leading incumbents (Christensen, 1997). The organization's ability to invest in disruptive innovation is limited by its dependency on financial and human resources.<sup>9</sup> Established cost structures often inhibit an organizations ability to test and trial potential disruptive innovations (Vecchiato, 2017). Second, organizational structure has been found to influence the probability of effective disruptive innovation (Christensen & Raynor, 2003). Third, a firm's marketing competence has been identified as a factor effecting disruptive innovation (Christensen, 1997; Vecchiato, 2017). As disruptive innovation creates a new set of performance dimensions, it is necessary for organizations to actively seek new markets and successfully commercialize new services/products. Christensen suggested three ways to extend organizational capabilities for innovation: (1) acquisition of business units/start-ups; (2) separate out an independent organization to trial, and (3) change current processes and values.

#### *3.3.4 Applications and Criticisms of Disruptive Innovation*

Disruptive Innovation Theory has also been applied within a health and education context (see, eg., Christensen & Eyring, 2011; Christensen *et al.*, 2008), and scholars from various fields have sought to further develop the theory (Yu & Hang, 2010). Developments have focused on three major areas of disruptive innovation: 1) its definition and measurement; 2) the theory's potential capability to predict future events; and 3) the reasoning behind an incumbent's failure or success when faced with disruptive innovation (ibid).

Although Christensen has stated the definition of disruptive innovation in his *Innovators* book series, several scholars have attempted to construct a general definition by assembling common elements within Christensen's work (Danneels,

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<sup>9</sup> See 'theory of resource dependency' (ibid, p.14)

2004; Hang *et al.*, 2011). Appendix E provides a summary of key literature that define disruptive innovation.

Through a holistic view of these studies, two elements have been identified as necessary factors for disruptive innovation, being that it; (1) establishes a new value network which consists of various dimensions of performance key to the needs of customers/clients (Assink, 2006; Thomond *et al.*, 2003), and (2) normally only attracts niche market or new market participants at the early stage but which eventually meets mainstream customer needs through continuous growth in performance quality, which in turn leads to market dominance (Christensen & Raynor, 2003; Schmidt & Druehl, 2008).

First, disruptive innovation introduces a different set of features/performance attributes/value networks relative to existing products. In Christensen's study (1997), a value network is a package of attributes valued as a service/product by mainstream customers. He argues that the first criterion for disruption occurs when the products/services based on disruptive innovation bring to market a very different value proposition than has been available previously. Danneels (2004), Rao *et al.* (2006) and Hang *et al.* (2011) further concur the necessity of this element to determine disruptive innovation. The new performance features of disruptive innovation create a more radical and fundamental change to the needs of both an existing market (Thomond, *et al.*, 2003; Thomond & Lettice, 2002), and prospective niche market (Hang *et al.*, 2011). Normally, products based on disruptive innovation will be cheaper, smaller, more convenient to use and easier to access (Schmidt & Druehl, 2008). Therefore, to recognize a product as disruptive innovation, it is necessary to find a new set of value networks that differ from existing products.

The second common element of these definitions is the 'process' that disruptive innovation follows to dominate the mainstream market. Researchers have tried to approach this 'process' by classifying disruptive innovation into more specific categories. Originally, Christensen introduced two categories of disruptive innovation including low-end disruptive innovation (1997) and new market disruptive innovation (2003). Markides argued that disruptive innovation, as articulated by

Christensen, is only a type of “technological innovation” (2004, p. 19). He further distinguished another two types of disruptive innovation including Business Model Innovation and Radical Product Innovation. The former refers to “a fundamentally different business model in an existing business” (p.20) while the latter refers to “new-to-world products that introduce products and value propositions that disturb prevailing consumer habits and behaviors in a major way” (p.22). Govindarajan and Kopalle’s (2006) study is another attempt to supplement the classifications. They added high-end disruptive innovation as a contrary to low-end DI in Christensen’s theory. All these classifications related to DI are reflecting a process of how DI is less competitive initially but attains a mainstream customer base through different diffusion channels. Christensen used a trajectory map as outlined above in Figure 2 to describe the process while other scholars have developed other approaches.

### *3.3.5 Tools to predict DI need further development*

Since Christensen established Disruptive Innovation Theory, a number of critiques and enhancements have been raised regarding *ex ante* identification of disruptive innovation and when disruption happens specifically (Nagy et al., 2016; Hang et al., 2011; Keller & Husig, 2009, Schmidt & Druehl, 2008; Danneels, 2004). As an early reflective study of disruptive innovation, Danneels (2004) called for finer analytical tools for identifying disruptive innovation and argued that “technology-forecasting procedures could be tailored” based on an organization’s own situation (p. 215). After that, several scholars have developed different tools/frameworks to assess disruptive innovation within different contexts (Keller & Husig, 2009). These frameworks are not limited to testing the definition of disruptive innovation, moreover, scholars use them to predict the disruption process. Paap and Katz (2004) pointed out the importance of interaction between communication with current and future customers and prediction of DI. Govindarajan and Kopalle (2006) developed a comprehensive framework to measure the disruptiveness, radicalness and competency of innovations to predict DI. Keller & Husig (2009) combined a criteria sheet with a trajectory map to compare the relative competitive advantage of incumbents and new entrant firms. Hang et al. (2011) introduced an assessment framework to capture the essential characteristics of disruptive innovation. Despite these frameworks, successfully predicting the

potential disruptiveness of an innovation, and when disruption actually occurs, remains unclear (King & Baatartogtokh, 2015).

### *3.3.6 Incumbent Reaction to Disruptive Innovation*

The last issue surrounding the disruptive innovation concept is how should incumbents react to disruptive innovation and maintain their leading position? One stream of studies explores the three constraints on an organization's ability to develop DI as listed in Christensen and Raynor (2003)'s study (see Danneels, 2004; Yu & Hang, 2010, Govindarajan & Kopalle, 2006). Other studies show a progressive development toward understanding an incumbents' failure (Dijk et al., 2016). Organizational culture is a new element discussed in several papers (Vecchiato, 2017; Wan *et al.*, 2015). Both Tellis *et al.* (2009) and Thomond et al. (2003) discuss the importance of an innovation-oriented culture to nourish an organization's capability to innovate. Furthermore, several papers demonstrate that failure is not the necessary fate of all incumbents. Organizations might survive if they can choose appropriate strategies (Charitou & Markides, 2002; Markides & Geroski, 2004). In Macher and Richman (2004)'s paper, they list three common strategies that organizations employ to address DI: 1) Internal ventures, 2) Joint ventures, and 3) Acquisitions. Wagner (2016) argues that acquisitions enable organizations to underlie capabilities and obtain access to disruptive innovation directly. Wan et al. (2015)'s study shows that while larger incumbents are limited by their existing resource structure to develop DI, new entrants, such as start-ups or entrepreneurs are searching for funds to invest into their potential disruptive ideas. Therefore, collaboration between large firms and start-ups is also a strategy enhancing the potential disruptive innovation capability. However, as Christensen states, disruptive innovation is relative. The strategies employed by incumbents should be tailored based on their own situation.

Considering all these critiques mentioned above, this study adopts a modified version of disruptive innovation, to assess whether ICTs represent disruptive innovation or not regarding the transformation of accounting professionals. Two criteria include: 1) whether ICTs create a new set of value networks for accounting professionals; and 2) whether ICTs gain mainstream customers and replace the work of accounting professionals in the service market. This study also explores constraints accounting



professionals face when coping with disruptive innovation, and what strategies they should use to better adapt to disruption.

### **3.4 Research Questions**

This study focuses on three research questions:

- (1) Are ICTs disrupting accounting services? If so, which ICTs cause the most disruption?
- (2) To what extent have accounting professionals coped with disruption caused by ICTs? What strategies do they adopt?
- (3) What strategies should accounting professionals adopt to manage disruption caused by ICTs?

### **3.5 Research Methods**

This study uses in-depth, semi-structured interviews to explore the extent to which ICTs are a disruptive innovation to accounting professionals, and to what extent accounting professionals manage disruption. A sample of 13 senior managers/CEO of firms, professional bodies, and public sector organizations provide the main data source for this study. Secondary data, including media releases and industrial research papers are also used to strengthen interview themes. Interviews were conducted face-to-face for approximately 60 to 90 minutes duration. In-depth interviews enable researchers to gain an “insider perspective” (Taylor, 2005, p39) of a situation within its own social context (Alvesson, 2003). Disruptive innovation is a relative term (Christensen, 1997), and interviews allow us to draw out its interpretation within specific contexts. This study also adopts a localized approach combined with semi-structured interviews to enable interviewees to elaborate their experience in their own words (Qu & Dumay, 2011). A semi-structured interview method enables researchers to adjust questions based on interviewee’ responses to uncover “hidden perceptions” (Marvasti, 2004, p.22) or “unexpected information” (Liamputtong, 2013, p. 52). This is crucial for this study as prior research has only

outlined two criteria to evaluate disruptive innovation, therefore how accounting professionals cope with disruption, is largely open to interpretation. Face-to-face communication also helps researchers better capture “complex interpersonal interaction” (Alvesson, 2003, p.15). Disruption has not been explored empirically within the accounting domain to date, yet it has become a popular, but commonly misconstrued term, used as a broad brush to explain technological change. Therefore, in-depth, semi-structured interviews will contribute toward better articulating the meaning of ‘disruptive innovation’ and explaining the disruption phenomenon within the accounting domain.

As this study focuses on innovation in professional service instead of innovation in manufacturing, a tailored set of measurement of performance/value of service and innovation strategies should accordingly be developed due to differences in the value networks (Barrett *et al.*, 2015; Charitou & Markides, 2002; Drejer, 2004). Therefore, in this study, interview questions<sup>10</sup> are constructed around four dimensions drawn from Den Hertog’s (2000, p66) “four-dimensional model of service innovation”, namely: “service concept, client interface; service delivery system and technology”<sup>11</sup>. The first set of interview questions investigate *whether* ICTs represent a disruptive innovation to accounting professionals and their services. The second set of questions relate to *how* accounting professionals react to disruption and revolve around factors outlined by Christensen.

All interviews were recorded and transcribed, and a content analysis undertaken (Strauss & Corbin, 1998). The NVivo software package was used for coding purposes. Researchers firstly created two themes reflecting two criteria used to evaluate disruptive innovation. Second, the remaining part of the interviews were open coded to identify shared themes reflecting accounting professionals’ reaction to disruption.

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<sup>10</sup> The interview guide is presented in Appendix L and the Information and Consent Letter is presented in Appendix N. Anonymity of the interviewees in this study is protected in accordance with the requirements of Macquarie University’s Human Ethics Committee. An approval statement of the University Human Ethics Committee is presented in Appendix P.

<sup>11</sup> In Den Hertog’s study, service concept is about what is the new service in the market; client interface refers to how clients are involved in the service; service delivery system is about how service is delivered to the clients; technology is to make sure an effective and efficient delivery of service,

Finally, researchers conducted further analysis on how accounting professionals cope with disruption through synthesized shared themes.

Table 2. List of Interviewees

	Size	Organization	Positions & Expertise
Service Providers	Large Firms	Professional Firm A (Big 4)	A1: Partner
			A2: Manager
		Firm B (Big 4)	B1: Partner
			B2: Former Partner
		Firm C (Mid-Tier)	C1: Former National Head-Professional Standards
		Firm D (Former Big 5)	D1: Former Member-System Advice
	SMEs	Professional Body	PB1: CEO-SMEs strategy consulting
		Accounting software company	AS1: Head of Accounting-Software specialist
Clients		Public Sector	PS1: Director-Public Auditing
		Public Sector 2	PS2: Finance Officer
		Pharmaceutical Company	PC1: Pricing Controller-SAP System Expert
		Resource Company	RC1: Group Treasury
		Technology Company	TC1: CFO

### 3.6 Results

#### 3.6.1 ICTs as Disruptive Innovation

Interview analysis indicates that the technology causing significant impact on accounting professionals fall into three categories. The first involves data analysis related tools, such as Business Intelligence (BI), machine learning, and AI etc. The second category represents technologies that enable mobility, including phones and cloud computing. The third are cyber security related technologies, including Blockchain and the Internet of Things (IoT). Although interviewees fully realise the significant impact of technologies on accounting professionals, no interviewee clearly pointed out a particular technology as being a disruptive innovation. Therefore, this study further analyses interview data, and applies two criteria developed from the literature review to assess whether ICTs are disruptive innovations or not and answers the first research question. The two criteria are; 1) a shift in the values of accounting

professionals and professional services, and 2) a process whereby new ICTs are increasingly accepted by mainstream clients as a potential alternative to professional services.

### *3.6.1 Changes in values of accounting professionals in business*

The data collected in this study clearly illustrates that the values of, and professional services provided by, accounting professionals, change due to the impact of ICTs. “Time and knowledge” (PB1 - CEO of Professional Body) are two commodities accounting professionals trade with their clients. When a client engages with an accounting professional, he expects depth of professional knowledge, which the client himself could not obtain within a short period of time. Knowledge can vary from tax to assurance to business strategy. ICTs, in this case, have challenged both two commodities, and changed the service concept of accounting professionals’ as well as the client service experience.

From the perspective of time, several interviewees mentioned that accounting professionals worked “faster” (A2; B1; B2; C1; RC1; TC1), were “more accurate” (AS1; C1; PS1) and “more efficient” (PS1; PS2; AS1) because ICTs are replacing manual processes in basic levels of work, including data entry. Efficiency in machine processing enables accounting professionals to save time undertaking repetitive work. Also, as ICTs enable “live data feeds” (AS1) and create a network allowing data to flow through the whole system after initial entry, “integrity [...] is raised” (AS1). With the time saved by ICTs and more accurate data, accounting professionals are able to provide a deeper analysis of a client’s business leading to “higher value services”.

One significant issue identified from the interviews is that ICTs challenge the notion of ownership of professional knowledge. Accounting professionals historically were privileged with controlling accounting knowledge. Clients engage professionals to gain access to the knowledge they cannot master in a short period of time. ICTs, particularly business software, such as accounting software and ERP systems, commoditize and democratize accounting knowledge and skills. Several interviewees (TC1, PC1, RC1) mentioned that ICTs replacing human labor at the basic level is not a new concept, and there is no denying that ICTs reduce the burden of “compliance-

based work” (A1) for accounting practitioners. Although repetitive work has been eliminated, accounting professionals are also experienced in seeking new services to maintain their value. For example, B1, who is the partner of an accounting firm stated that the compliance side of tax work has been automated by tax software and accounting professionals now provide more advisory based services. Industrial reports also support this result. The 2016 KPMG Financial report illustrates that its advisory division was responsible for more than half of firm revenue (52%) and delivered 20% growth throughout the year (KPMG, 2016).

Furthermore, interviewees also revealed that with the advancement in technologies, lower levels of accounting work are either outsourced to countries with lower labor costs or performed by people without a formal accounting background. Consequently, accounting professionals are required to migrate to higher levels of value-added work to remain market competitive. However, interviewees indicated concerns with respect to the future development of ICTs, particularly with “data analytical tools” and “machine learning”. Accounting professionals face potential threats of loss of control of specialized knowledge even at a higher level of value add.

“Machine learning will ‘knock off’ [or] impact 50 percent of professional services firm’s business. [...] What that means to the firm is that once you build that machine [filled with all accounting knowledge], anybody can own it, right? So your competitors are not just your three [...] or five [major competitors] if you include some of the consulting firms. It's anybody who can afford that machine or acquire that technology to build that machine. [There are] definitely more competitors. [...] The body of intellectual property that formerly was only held by the so-called professions, is now publicly available to them.” (B2 - *former Partner*)

To a large degree, this will significantly impact the operation of, and change the market for, professional accounting services.

ICTs enable various methods to deliver services and communicate with clients in a positive way. Communication channels between accounting professionals and clients are largely enriched by ICTs. Email is commonly agreed by interviewees as being the primary tool for communication. Cloud storage and portals are also widely used by professionals. Some interviewees argued that social media and live chatting were new methods for communication. Most importantly, all interviewees pointed out that traditional “face-to-face meetings” are still critical to developing client relationships.

However, not all core values of accounting professionals have changed through ICTs. Interviews indicate that accounting professionals still value “trust” and “emotional interaction” in professional services. Professional services are still very much a “people to people” (A1 – Big 4 firm partner) business and accounting professionals are still “the most trusted person”, especially to small business owners stated by the CEO of professional body (PB1). This importance of trust between the profession and their clients is reflected in recent research regarding the perception of ethics and honesty. According to Roy Morgan’s (2017) research, accountants are still ranked as the most trusted financial related profession, behind the legal and medical professions.

Despite the fact that all the information can be publicly available to clients through ICTs, face-to-face communication with their “trusted” accountants is still a priority to a majority of clients. For large accounting firms, face-to-face meetings are the principal method to communicate and develop close relationships with “gold clients” (B2 – former partner of Big 4) and understand their needs. Clients also prefer to rely on already developed trust-based relationships, when seeking further services from accounting firms. PS1 as a client representative stated that:

The Big four sitting there [is of course] one of reputation itself. Second is the relationship. There's a very strong solid relationship in the market which enable them to expand a business and the name itself counts as well. (PS1 –Finance Officer)

For small accounting practices, accounting professionals need more “personal engagement” (PB1 - CEO of Professional Body) with business owners. Emotional

interaction allows professionals to choose the most appropriate strategy to communicate with their clients. Although ICTs are able to process work related tasks efficiently and effectively, it does not provide an emotional engagement with people.

Our experience has been [that] if we go to them and say, “why aren't you embracing technology, you haven't implemented efficient processes in your practice?”. Their response is...it's almost as if you're personally insulting them...and I can understand that because you've got so much personal equity involved in the business, both in terms of their own financial equity but also their own personal emotional equity. So, I think we can't underestimate the emotional equity of smaller practitioners. (PB1 - CEO of Professional Body)

In summary, ICTs have changed the time value of accounting professionals in a positive way. They have altered the ownership of professional knowledge, but not the values of professionals in “trust” relationships requiring emotional interaction.

### 3.6.2 *Technology-oriented professionals services' appeal to Users*

Client expectations toward accounting professionals and their services are also changing due to reliance on ICTs. “Faster”, “more accurate”, and “more value” are key words mentioned by all interviewees. Not restricted by time or space, clients are able to reach out to their accountants through all types of communication methods, such as “social media” and “portals”. Clients expect to receive service “24/7” (PB1, B1, A2), as well as a free quick consultant time-

Our members all talk about clients who stop them in the supermarket on a Sunday afternoon. They're asking for advice and of course that none of them expect. None of the clients expect them to be billed for that advice. So, you're sort of on call, whether it's Facebook, whether it's Twitter, whether it's a chat box on your website. (PB1 - CEO of Professional Body)

Through ICTs, particularly cloud technology, both large and SME clients have access to information freely and easily, and they have gathered all data related to their business even before seeing an accounting professional to seek advice. In this case, ICTs have replaced accounting professionals in their “information collector” role (RC1, PS2, TC1). Clients in turn raise their expectations towards professional services and demand a more value-added service from their professionals.

“Clients don’t want to pay the same fees they paid previously. [...] No one sees value in standard compliance. [...] They demand more complex requests”. (PB2 - Partner from Professional Firm B)

They [SME clients] are expecting the accountant to have a broader, more personal understanding of their individual business owners hopes and aspirations”. (PB1 - CEO from Professional body)

However, interview responses also indicate that clients still rely on accounting professionals to “interpret” information for them in most cases. Clients also prefer “face-to-face” communication with their accountants despite using ICTs as a method of correspondence. The concepts of “trust” and “safety” during “people-to-people” communication are always required by clients (A1 - Partner from Professional Firm A).

Accounting professionals use ICTs to develop a better understanding of client needs. Three interviewees in this study present positive feedback when asked whether clients are satisfied with accounting services. They believe that their services fulfil client needs regarding “integrity” and “creativity”. To respond to the “duty call” of clients’ 24/7, accounting professionals can draw on partner offices across different countries.

“.....our support desk is 24 hours, because we've got an office in Canada and in London. When Australia goes to sleep, London takes over. London works on it and when London sleeps, Canada takes over. As Canada sleeps, we are back on line...our clients expect it. But then it's possible because of the Internet. All the documents are shared online, all the support tickets and [others] are shared online.” (AS 1 - Head of Accounting from the accounting software company)



Accounting professionals expect to share working progress with clients and receive real-time feedback. Professional firms also adjust their weight toward different products and services to respond to a demand for higher value work. The following table illustrates the extent to which advisory services remain a significant portion of revenue for the whole industry throughout the 2015-2018 financial year.

Table 3: The Summary of Australian Accounting Services Segmentation 2015-2018

<b>Services Type</b>	<b>2015-2016</b>	<b>2016-2017</b>	<b>2017-2018</b>
Audit Services	41%	42%	42%
Advisory Services	34%	33%	33%
Tax Services	22%	22%	22%
Bookkeeping Services	3%	3%	3%
Total	100% (\$17.7 Billion)	100% (\$20.4 Billion)	100% (\$19.7 Billion)

Source: IBISWorld Industry Report 2015, 2017, 2018

Regarding the service concept, ICTs “significantly change core offerings” of accounting professionals, with the centre of accounting services shifting from compliance towards advisory. Interviewees with a consulting background agree on the increasing trend of advisory services (A1; A2; PB1; AS1).

“I don’t know that you can actually call professional services firms accounting firms, as more than half of our businesses is consulting. Probably 55% consulting, 25-30% assurance, and 20% tax.” (A1 Partner of large accounting firm)

Two respondents from a Big 4 firm saw the main purpose of ICTs being “automation” and “the codification of what used to be professional judgment” (B2 former partner – risk Big 4).

“...cost wise. Because a lot of companies see compliance as a chore. They don't want to pay a lot of money for it. And technology enables us to deliver our services more cost effectively.” (B1 Partner-Corporate Tax – Big 4 firm)

In summary, accounting professionals are trying to maximize the capability of ICTs to sense and shape market needs through their leverage in business. In this study, accounting professionals are able to adapt to market demands when utilizing ICTs. However, it is still unclear whether artificial intelligence and robotics facilitate or impede the ability of accounting professionals to provide services that will fulfil future clients demands. However, clients are attracted by ICTs and there is a risk that accounting professionals fail to meet client expectations, who then place greater faith in artificial intelligence and machine learning, which lowers the value of “trust” created through human interaction. In conclusion, ICTs can be a potential disruptive innovation to accounting professionals.

### *3.6.2 Response to the disruption of ICTs*

Interview responses illustrate that accounting professionals realize the changes in their roles and responsibilities due to the impact of ICTs and react accordingly. Several interviewees (A1, PB1, PC1) stated that “IT is not new” and that accounting professionals have learnt to cooperate with ICTs as a necessary tool in their daily work. However, interpreting the attitude of interviewees in this study towards the role of technology in their life, this study shows that a majority of accounting professionals still see ICTs as just a tool, with only one or two interviewees indicating that ICTs disrupt their role and threaten their existence. Others seems to be confident and more prepared for disruption.

...we recognize the digital disruption well before and well in advance and have been positioning ourselves. But we're actually disrupting ourselves to some of the stuff that will come out in the next few months.  
(B1 Partner-Corporate Tax)

Combining interview data and media releases from professional firms involved in this study, it appears that all have developed a systematic strategy to cope with disruption. It is also interesting to find that interviews indicate that the strategies developed by these professional firms are quite similar. For example, two interviewees from Professional Firm A emphasized their firm recent acquisition of mainly technology-related firms across different industries, including “human wellness” and “human rights”. Partner of Firm A believes that those firms create new areas of value and meet the needs of clients. Professional Firm B also shows a similar acquisition strategy. A former partner of Firm B (Big 4) stated that recent acquisitions all aim to “better serve clients ability to move to digital business” (B2).

Moreover, both Firm A and Firm B have internally established an “Innovation Center” (A1, B1) to focus on advanced technology. The separate unit directly reports to the firm CEO and has primary responsibility for organizational innovation. Interviewees also stipulated that both organizations have changed their recruitment strategy and are “broadening the talent base across all disciplines” (A2, B1), including IT, engineering, psychology and philosophy. To maintain the competitiveness of current employees, both firms have developed a training and education system to coach “soft skills, such as leadership” and keep employees informed about advanced technology.

Interviewees also expressed their concerns regarding the current recruiting strategy and over-reliance of ICTs. They argue that there is a shortage of talent for future company growth when machines replace humans at basic levels of work. Automation reduces the need for employees at the bottom level of the pyramid, whilst machine learning eliminates managers at the middle level, which raises questions about “where do you get future partners from?”. Employees would rarely exercise their fundamental accounting skills at the entry (graduate) level and this would be even less so when promoted to manager.

“So these days, managers of every department should be qualified enough to know the systems from end to end, so that they could train their staff. But in many cases, that's not the case. Managers are probably more people to people [oriented] rather than solving problems”. (PC1 - Finance manager - Pharmaceutical company)

Firms therefore might not be able to find appropriate candidates among current employees to promote to manager, and further to partner/CEO, if the base of the work force pyramid is too small.

“you're cutting to the bone now. You're not just cutting flesh. [...] So what's your chance of getting the right talent for the future leadership of the firm? [There are] more competitors, [but] where is your future talent? So that's what I think are some of the challenges that are going to come out of machine learning.” (B2 - Former partner - Firm B)

For the individual accountant, the key strategy applied is continuous learning and training to improve expertise in both accounting and technology. The interviewee from the accounting software company argues that there is always a market for professional skills. However, what has changed is what skills are more appealing to clients. As time goes on, clients need “skills to help them grow”, and a “mastery” of IT skills by accounting professionals is fundamental to this. Two interviewees in this study pointed out that accounting professionals should “aim at being a super user” of their accounting system in order to progress in their professional career. Furthermore, it is also important that accounting professionals “understand technology as a way of talking to one another” (AS1) since “connection” is the key.

To date, a majority of accounting professionals have relied on internal training provided by their firms, with some professionals completing training courses from professional associations.

“I don't think accountants naturally have that capacity. So we're finding our own way in which we design our own product, training products and education products that have changed.” (PB1 - CEO - professional body)

He believes that professional bodies have a role to play to help accounting professionals improve their knowledge given the pace of technological development.

Several interviewees argued the need to incorporate ICTs into the accounting curriculum and increase the weight of accounting information system courses in any accounting programs. ICTs should be naturally involved in accounting education and should not be seen as an “add-on” (PB1).

### **3.7 Discussion & Conclusion**

As the role of ICTs expands within the accounting services market, debate about the changing role of accounting professionals and the transformation of accounting services in this new environment has become more profound. Prior studies have identified that ICTs are transforming the role of accounting professionals within business, but that a gap exists as to what extent this transformation has happened. By analyzing the perceptions of accounting professionals within accounting firms and accounting practitioners from commercial organizations, this study aims to explore whether ICTs represent disruptive innovation to accounting professionals, and if so, to what extent they have coped with disruption.

Using Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) as a theoretical lens to address the research objective, this study reveals some insights into the digital disruption phenomenon within the accounting field. First, as the interviewees involved in this study have experienced several technological changes during their career in accounting, they are able to distinguish the unique challenges brought about by recent technological advances. Results indicate that ICTs are a potential disruptive innovation to accounting professionals, but disruption has yet to fully materialize. At this stage, accounting professionals have realized ICTs’ significant impact on their roles in business and have developed various strategies to cope with technological influences. However, this paper argues that it is important for accounting professionals to fully understand that ICTs have the potential to replace existing positions and dismantle the professional based environment in the near future. Therefore, systematic strategies should be developed to ensure accounting professionals maintain their preeminent position.

For accounting professionals, “ICTs are not new” (A1). Accounting professionals have been using ICTs for a long time to improve productivity and efficiency. Computers,

particularly, enable accounting professionals to better deal with information. ICTs help solve specific accounting-based tasks. Compliance, repetitive, robust types of work are being replaced by computers, and accounting professionals are comfortable with this. However, machines now learn autonomously, with ongoing improvements in decision-making abilities. Specialized knowledge once possessed by accounting professionals are now being commoditized into a series of program codes. Whoever can afford to buy the program will be the possessor of knowledge and will compete with accounting professionals in the accounting services market. Consulting and software firms already occupy this space, and accounting professionals, therefore, need to adapt before disruption occurs.

This study also provides insight into disruptive innovation theory with specific application to the accounting profession. It applies synthesized disruptive innovation criteria to evaluate ICTs as disruptive innovation to accounting services. A majority of disruptive innovation literature focuses on product innovation, whilst little attention has been paid to disruptive innovation in the service sector. Distinct from product innovation, service innovation has a particular emphasis on customer involvement. The value network of a service is different to that of a product. In this study, ICTs have transformed two important elements of accounting professional service, that of time and knowledge. However, ICTs have not changed the importance and value placed on “trust” and “face-to-face” communication with clients. This is a unique value in service innovation and has yet to appear within the disruptive innovation literature.

However, this study is not without its limitations. Interviews were conducted with a small number of respondents at the executive level in large accounting firms, large organizations and a professional association. Interviewees in this study were carefully selected based on their experience of several technological changes in accounting field, their overview of revolutions within the accounting domain, and their up-to-date knowledge of accounting practice. Whilst these respondents were key decisions makers with respect to how technology impacts service, it is difficult to infer these results to the small business sector, without undertaking a more broad-based study, which will be undertaken in Chapter 4. As this paper aims to direct the attention of

accounting scholars to study digital disruption, ongoing future research is required on this topic. In particular more comprehensive quantitative based research that encompasses the different attitudes of respondents toward disruptive technology across different professional domains (medical, engineering, actuarial, legal etc) would provide a more comprehensive understanding of technology across the full professional services field and at different levels within each field. This research explores ICTs disruptive potential by focusing on its power as an generic concept, however future research can concentrate on the disruptive effect of specific types of technologies, such as machine learning, which is examined in chapter 4.

### 3.8 References

- Abdelsalam, O. H., & Street, D. L. (2007). Corporate governance and the timeliness of corporate internet reporting by UK listed companies. *Journal of International Accounting, Auditing and Taxation*, 16(2), 111-130.
- Ahmed, A. (2003). The level of IT/IS skills in accounting programmes in British universities. *Management Research News*, 26(12), 20-58. doi:10.1108/01409170310783709
- Alles, M. (2015). Drivers of the Use and Facilitators and Obstacles of the Evolution of Big Data by the Audit Profession. *Accounting Horizons*, 29(2), 439-449. doi:10.2308/acch-51067
- Alvesson, M. (2003). Beyond neopositivists, romantics, and localists: A reflexive approach to interviews in organizational research. *Academy of management review*, 28(1), 13-33.
- Asli Basoglu, K., & Hess, T. J. (2014). Online Business Reporting: A Signaling Theory Perspective. *Journal of Information Systems*, 28(2), 67-101. doi:10.2308/isys-50780
- Assink, M. (2006). Inhibitors of disruptive innovation capability: a conceptual model. *European Journal of Innovation Management*, 9(2), 215-233. doi:10.1108/14601060610663587
- Barrett, M., Davidson, E., Prabhu, J., & Vargo, S. L. (2015). Service innovation in the digital age: key contributions and future directions. *MIS Quarterly*, 39(1), 135-154.
- Belfo, F., & Trigo, A. (2013). *Accounting Information Systems: Tradition and Future Directions*. Paper presented at the Conference on Enterprise Information Systems.
- Bergek, A., Berggren, C., Magnusson, T., & Hobday, M. (2013). Technological discontinuities and the challenge for incumbent firms: Destruction, disruption or creative accumulation? *Research Policy*, 42(6-7), 1210-1224. doi:10.1016/j.respol.2013.02.009
- Booth, P., Matolcsy, Z., & Wieder, B. (2000). The impacts of enterprise resource planning systems on accounting practice—the Australian experience. *Australian Accounting Review*, 10(22), 4-18.
- Brazel, J. F., & Agoglia, C. P. (2004). The effects of computer assurance specialist competence and auditor AIS expertise on auditor planning judgments.
- Broadbent, J., & Guthrie, J. (2008). Public sector to public services: 20 years of “contextual” accounting research. *Accounting, Auditing & Accountability Journal*, 21(2), 129-169. doi:10.1108/09513570810854383
- Brown-Liburd, H., Issa, H., & Lombardi, D. (2015). Behavioral implications of Big Data's impact on audit judgment and decision making and future research directions. *Accounting Horizons*, 29(2), 451-468.
- Burns, J., Hyvönen, T., Järvinen, J., & Pellinen, J. (2006). The role of standard software packages in mediating management accounting knowledge. *Qualitative Research in Accounting & Management*, 3(2), 145-160. doi:10.1108/11766090610670677
- Caglio, A. (2003). Enterprise Resource Planning systems and accountants: towards hybridization? *European Accounting Review*, 12(1), 123-153. doi:10.1080/0963818031000087853
- Cao, M., Chychyla, R., & Stewart, T. (2015). Big Data analytics in financial statement



- audits. *Accounting Horizons*, 29(2), 423-429.
- Chan, S. H., & Wright, S. (2007). Feasibility of More Frequent Reporting: A Field Study Informed Survey of In-Company Accounting and IT Professionals. *Journal of Information Systems*, 21(2), 101-115.
- Chang, C. J., & Hwang, N. R. (2003). Accounting education, firm training and information technology: a research note. *Accounting Education*, 12(4), 441-450. doi:10.1080/0963928032000065557
- Charitou, C. D., & Markides, C. C. (2002). Responses to disruptive strategic innovation. *MIT Sloan Management Review*, 44(2), 55-64.
- Chen, H. J., Huang, Y., Chiu, A. A., & Pai, F. C. (2012). The ERP system impact on the role of accountants. *Industrial Management & Data Systems*, 112(1), 83-101. doi:10.1108/02635571211193653
- Christensen, C., Aaron, S., & Clark, W. (2003). Disruption in Education. *Education Review*, 38, 44-55.
- Christensen, C., Baumann, H., Ruggles, R., & Sadtler, T. M. (2006). Disruptive innovation for social change. *Harvard Business Review*, 84(12), 94.
- Christensen, C., & Eyring, H. J. (2011). *The innovative university: Changing the DNA of higher education from the inside out*: John Wiley & Sons.
- Christensen, C., Horn, M. B., & Johnson, C. W. (2008). *Disrupting class: How disruptive innovation will change the way the world learns* (Vol. 98). New York: McGraw-Hill.
- Christensen, C., & Raynor, M. (2003). The Innovation's Solution. *Harvard Business School Press, Boston, Massachusetts*.
- Christensen, C., Raynor, M., & McDonald, R. (2015). The Big Idea What is Disruptive Innovation? *Harvard Business Review*, 44-53.
- Christensen, C. M. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, Massachusetts: Harvard Business School Press.
- Christensen, C. M., Raynor, M. E., & McDonald, R. (2015). Disruptive innovation. *Harvard Business Review*, 93(12), 44-53.
- Christensen, C. M., Scott, D. A., & Erik, A. R. (2004). *Seeing What's Next: Using the Theories of Innovation to Predict Industry Change*. Boston: Harvard Business School Press.
- Coyne, J. G., Coyne, E., M., & Walker, K., B. (2015). *Accounting Architecture: The New Face of AIS*. SSRN.
- Curtis, M. B., Jenkins, J. G., Bedarad, J. C., & Deis, D. R. (2009). Auditors' Training and Proficiency in Information Systems: A research Synthesis. *Journal of Information Systems*, 23(1), 79-96.
- Damasiotis, V., Trivellas, P., Santouridis, I., Nikolopoulos, S., & Tsifora, E. (2015). IT Competences for Professional Accountants. A Review. *Procedia - Social and Behavioral Sciences*, 175, 537-545. doi:10.1016/j.sbspro.2015.01.1234
- Danneels, E. (2004). Disruptive technology reconsidered: A critique and research agenda. *Journal of product innovation management*, 21(4), 246-258.
- Dijk, M., Wells, P., & Kemp, R. (2016). Will the momentum of the electric car last? Testing an hypothesis on disruptive innovation. *Technological Forecasting and Social Change*, 105, 77-88. doi:10.1016/j.techfore.2016.01.013
- Do, K. (2018). *IBISWorld Industry Report M6932- Accounting Services in Australia*. Available at: <https://www.ibisworld.com.au/industry-trends/market-research-reports/professional-scientific-technical-services/accounting->

services.html

- Dowling, C. (2009). Appropriate audit support system use: The influence of auditor, audit team, and firm factors. *The Accounting Review*, 84(3), 771-810.
- Dowling, C., & Leech, S. (2007). Audit support systems and decision aids: Current practice and opportunities for future research. *International Journal of Accounting Information Systems*, 8(2), 92-116.
- Drejer, I. (2004). Identifying innovation in surveys of services: a Schumpeterian perspective. *Research Policy*, 33(3), 551-562. doi:10.1016/j.respol.2003.07.004
- El Sayed, H. (2006). ERPs and accountants' expertise: the construction of relevance. *Journal of Enterprise Information Management*, 19(1), 83-96. doi:10.1108/17410390610636896
- Ettredge, M., Richardson, V. J., & Scholz, S. (2001). The presentation of financial information at corporate Web sites. *International Journal of Accounting Information Systems*, 2(3), 149-168.
- Ferguson, C., & Seow, P. S. (2011). Accounting information systems research over the past decade: Past and future trends. *Accounting & Finance*, 51(1), 235-251.
- Geerts, G. L., Graham, L. E., Mauldin, E. G., McCarthy, W. E., & Richardson, V. J. (2013). Integrating Information Technology into Accounting Research and Practice. *Accounting Horizons*, 27(4), 815-840. doi:10.2308/acch-50573
- Gemici, E., & Alpkan, L. (2015). *Disruptive Innovation Theory in Light of Practical Implications*. Paper presented at the Conference on Engineering And Technology Management GCETM-2015.
- Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*: Univ of California Press.
- Govindarajan, V., & Kopalle, P. K. (2006). The usefulness of measuring disruptiveness of innovations ex post in making ex ante predictions. *Journal of product innovation management*, 23(1), 12-18.
- Grabski, S. V., Leech, S. A., & Schmidt, P. J. (2011). A Review of ERP Research: A Future Agenda for Accounting Information Systems. *Journal of Information Systems*, 25(1), 37-78. doi:10.2308/jis.2011.25.1.37
- Granlund, M. (2007). On the interface between management accounting and modern information technology-A literature review and some empirical evidence.
- Granlund, M. (2011). Extending AIS research to management accounting and control issues: A research note. *International Journal of Accounting Information Systems*, 12(1), 3-19. doi:10.1016/j.accinf.2010.11.001
- Granlund, M., & Malmi, T. (2002). Moderate impact of ERPS on management accounting: a lag or permanent outcome? *Management Accounting Research*, 13(3), 299-321. doi:10.1006/mare.2002.0189
- Green, B. N., Johnson, C. D., & Adams, A. (2006). Writing narrative literature reviews for peer-reviewed journals: secrets of the trade. *Journal of chiropractic medicine*, 5(3), 101-117.
- Griffin, P. A., & Wright, A. M. (2015). Commentaries on Big Data's Importance for Accounting and Auditing. *Accounting Horizons*, 29(2), 377-379. doi:10.2308/acch-51066
- Guthrie, J., & Murthy, V. (2009). Past, present and possible future developments in human capital accounting. *Journal of Human Resource Costing & Accounting*, 13(2), 125-142.
- Guthrie, J., & Parker, L. D. (2016). Whither the accounting profession, accountants and

- accounting researchers? Commentary and projections. *Accounting, Auditing & Accountability Journal*, 29(1), 2-10.
- Guthrie, J., Ricceri, F., & Dumay, J. (2012). Reflections and projections: a decade of intellectual capital accounting research. *The British Accounting Review*, 44(2), 68-82.
- Guttentag, D. (2015). Airbnb: disruptive innovation and the rise of an informal tourism accommodation sector. *Current issues in Tourism*, 18(12), 1192-1217.
- Haddara, M., & Zach, O. (2011). *ERP Systems in SMEs: A Literature Review*. Paper presented at the The 44th Hawaii International Conferences on System Sciences, Hawaii.
- Hamel, G. (2000). *Leading the Revolution*. Boston, Massachusetts: Harvard Business School Press.
- Hang, C., Chen, J., & Yu, D. (2011). An assessment framework for disruptive innovation. *Foresight*, 13(5), 4-13.
- Hassall, T., Joyce, J., Arquero Montaña, J. L., & Donoso Anes, J. A. (2005). Priorities for the development of vocational skills in management accountants: A European perspective. *Accounting Forum*, 29(4), 379-394. doi:10.1016/j.accfor.2005.03.002
- Hastings, C. I., & Solomon, L. (2005). Technology and the accounting curriculum: Where it is and where it needs to be. *Advances in Accounting*, 21, 275-296.
- Holtzman, Y. (2004). The transformation of the accounting profession in the United States. *Journal of Management Development*, 23(10), 949-961. doi:10.1108/02621710410566856
- Howieson, B. (2003). Accounting practice in the new millennium: is accounting education ready to meet the challenge? *The British Accounting Review*, 35(2), 69-103. doi:10.1016/s0890-8389(03)00004-0
- Hunton, J., Wright, A., & Wright, S. (2004). Are Financial Auditors Overconfident in Their Ability to Assess Risks Associated with Enterprise Resource Planning Systems?(Retracted). *Journal of Information Systems*, 18(2), 7-28.
- Hunton, J. E. (2002). Blending Information and Communication Technology with Accounting Research. *Accounting Horizons*, 16(1), 55-67.
- Hunton, J. E., & Rose, J. M. (2010). 21st Century Auditing: Advancing Decision Support Systems to Achieve Continuous Auditing. *Accounting Horizons*, 24(2), 297-312. doi:10.2308/acch.2010.24.2.297
- Hwang, J., & Christensen, C. M. (2008). Disruptive innovation in health care delivery: a framework for business-model innovation. *Health Aff (Millwood)*, 27(5), 1329-1335. doi:10.1377/hlthaff.27.5.1329
- Jack, L., & Kholeif, A. (2008). Enterprise Resource Planning and a contest to limit the role of management accountants: A strong structuration perspective. *Accounting Forum*, 32(1), 30-45. doi:10.1016/j.accfor.2007.11.003
- Jones, M., & Xiao, J. (2004). *Financial reporting on the Internet by 2010: a consensus view*. Paper presented at the Accounting Forum.
- Jung, C., & Padman, R. (2015). Disruptive digital innovation in healthcare delivery: The case for patient portals and online clinical consultations *The Handbook of Service Innovation* (pp. 297-318): Springer.
- Keller, A., & Hüsig, S. (2009). Ex ante identification of disruptive innovations in the software industry applied to web applications: The case of Microsoft's vs. Google's office applications. *Technological Forecasting and Social Change*, 76(8), 1044-1054. doi:10.1016/j.techfore.2009.03.005

- King, A. (2015). *Ernst & Young buys data firm C3 Business Solutions*. *The Australian Financial Review*. Available at: <https://www.afr.com/business/accounting/ernst-and-young-buys-data-firm-c3-business-solutions-20150223-13ltkf>. [Accessed 14 Jan 2017].
- King, A. (2016). PwC's new 'hybrids' are a hot commodity. *The Australian Financial Review*.
- King, A., & Baatartogtokh, B. (2015). How useful is the theory of disruptive innovation? *MIT Sloan Management Review*, 57(1), 77.
- Kostoff, R., Boylan, R., & Simons, G. (2004). Disruptive technology roadmaps. *Technological Forecasting and Social Change*, 71(1-2), 141-159. doi:10.1016/s0040-1625(03)00048-9.
- KPMG, (2016). Annual Report, Available at: <https://home.kpmg/au/en/home/media/press-releases/2016/08/fy16-results-8-aug-2016.print.html>.
- Krahel, J. P., & Vasarhelyi, M. A. (2014). AIS as a Facilitator of Accounting Change: Technology, Practice, and Education. *Journal of Information Systems*, 28(2), 1-15. doi:10.2308/isis-10412
- Liamputtong, P. (2013). *Qualitative research methods* (4 ed.). South Melbourne, VIC: Oxford University Press.
- Lodh, S. C., & Gaffikin, M. J. (2003). Implementation of an integrated accounting and cost management system using the SAP system: a field study. *European Accounting Review*, 12(1), 85-121.
- Macher, J. T., & Richman, B. D. (2004). Organisational responses to discontinuous innovation: a case study approach. *International Journal of Innovation Management*, 8(01), 87-114.
- Markides, C. (2006). Disruptive innovation: In need of better theory. *Journal of product innovation management*, 23(1), 19-25.
- Markides, C., & Geroski, P. A. (2004). *Fast second: How smart companies bypass radical innovation to enter and dominate new markets* (Vol. 325): John Wiley & Sons.
- Marvasti, A. (2004). *Qualitative Research in Sociology*. Sage
- Nagy, D., Schuessler, J., & Dubinsky, A. (2016). Defining and identifying disruptive innovations. *Industrial Marketing Management*, 57, 119-126. doi:10.1016/j.indmarman.2015.11.017
- Newman, M., & Westrup, C. (2005). Making ERPs work: accountants and the introduction of ERP systems. *European Journal of Information Systems*, 14(3), 258-272. doi:10.1057/palgrave.ejis.3000539
- O'Mahony, A., & Doran, J. (2009). The changing role of management accountants; Evidence from the implementation of ERP Systems in large organisations. *International Journal of Business and Management*, 3(8), 109.
- Paap, J., & Katz, R. (2004). Anticipating disruptive innovation. *Research-Technology Management*, 47(5), 13-22.
- Parker, M. (2002). *Against management: Organization in the age of managerialism*: Polity Press in association with Blackwell.
- Petticrew, M., & Roberts, H. (2008). *Systematic reviews in the social sciences: A practical guide*: John Wiley & Sons.
- Poston, R., & Grabski, S. (2000). Accounting Information Systems Research: Is it Another QWERTY. *International Journal of Accounting Information Systems*, 1(1), 9-53.

- Poston, R., & Grabski, S. (2001). Financial impacts of enterprise resource planning implementations. *International Journal of Accounting Information Systems*, 2(4), 271-294.
- PricewaterhouseCoopers, 2015, *A smart move - future-proofing Australia's workforce by growing skills in science, technology, engineering and maths*, Available at: <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>. [Accessed 28 Nov 2017]
- Qu, S., & Dumay, J. (2011). The qualitative research interview. *Qualitative Research in Accounting & Management*, 8(3), 238-264.
- Rao, B., Angelov, B., & Nov, O. (2006). Fusion of Disruptive Technologies. *European Management Journal*, 24(2-3), 174-188. doi:10.1016/j.emj.2006.03.007
- Ray Morgan, (2017). *Image of Professions Survey 2017*. Available at : <http://www.roymorgan.com/findings/7244-roy-morgan-image-of-professions-may-2017-201706051543>. [Accessed at 15 Jan 2018]
- Redrup, Y. (2015). Deloitte acquires Cloud Solutions Group. *The Australian Financial Review*. Available at <https://www.afr.com/technology/deloitte-acquires-cloud-solutions-group-20151106-gksfde>. [Accessed at 15 Jan 2016]
- Rikhardsson, P., & Kræmmergaard, P. (2006). Identifying the impacts of enterprise system implementation and use: Examples from Denmark. *International Journal of Accounting Information Systems*, 7(1), 36-49.
- Rom, A., & Rohde, C. (2006). Enterprise resource planning systems, strategic enterprise management systems and management accounting. *Journal of Enterprise Information Management*, 19(1), 50-66. doi:10.1108/17410390610636878
- Rom, A., & Rohde, C. (2007). Management accounting and integrated information systems: A literature review. *International Journal of Accounting Information Systems*, 8(1), 40-68. doi:10.1016/j.accinf.2006.12.003
- Sánchez-Rodríguez, C., & Spraakman, G. (2012). ERP systems and management accounting: a multiple case study. *Qualitative Research in Accounting & Management*, 9(4), 398-414. doi:10.1108/11766091211282689
- Sangster, A., Leech, S. A., & Grabski, S. V. (2009). ERP Implementations and Their Impact upon Management Accountants. *Journal of Information Systems and Technology Management*, 6(2), 125-142.
- Scarbrough, & Corbett, J. M. (1992). *Technology and Organization: Power, Meaning, and Design*: Routledge.
- Schmidt, G. M., & Druehl, C. T. (2008). When Is a Disruptive Innovation Disruptive? *Journal of product innovation management*, 25(4), 347-369.
- Shaikh, J. M. (2005). E-commerce impact: Emerging technology-electronic auditing. *Managerial Auditing Journal*, 20(4), 408-421.
- Silverman, D. (2013). *Doing qualitative research: A practical handbook*: SAGE Publications Limited.
- Smith, P. (2015). KPMG buys Australian tech firm Hands-on Systems as Big Four tech push continues. *The Australian Financial Review*. (September 1). Available at: <https://www.afr.com/technology/kpmg-buys-australian-tech-firm-handson-services-as-big-four-tech-push-continues-20150828-gj9o4r>. [Accessed at 23 Jan 2017].
- Spathis, C., & Ananiadis, J. (2005). Assessing the benefits of using an enterprise system

- in accounting information and management. *Journal of Enterprise Information Management*, 18(2), 195-210.
- Spraakman, G., O'Grady, W., Askarany, D., & Akroyd, C. (2015). Employers' Perceptions of Information Technology Competency Requirements for Management Accounting Graduates. *Accounting Education*, 24(5), 403-422. doi:10.1080/09639284.2015.1089177
- Stein, D., Chen, C., & Ackerly, D. C. (2015). Disruptive innovation in academic medical centers: balancing accountable and academic care. *Academic Medicine*, 90(5), 594-598.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research techniques*. Thousands Oaks: Sage publications.
- Sutton, G. (2006). Enterprise systems and the re-shaping of accounting systems: A call for research. *International Journal of Accounting Information Systems*, 7(1), 1-6. doi:10.1016/j.accinf.2006.02.002
- Tam, T. (2013). What IT Knowledge and Skills do Accounting Graduates Need? *New Zealand Journal of Applied Business Research*, 11(2), 23-42.
- Taylor, B. M. (2015). 'The integrated dynamics of motivation and performance in the workplace'. *Performance Improvement*, 54(5), 28-37.
- Tellis, G. J., Prabhu, J. C., & Chandy, R. K. (2009). Radical innovation across nations: The preeminence of corporate culture. *Journal of marketing*, 73(1), 3-23.
- The Committee for Economic Development of Australia (CEDA), 2015, *Australia's future workforce?* Available at: <http://www.ceda.com.au/Research-and-policy/All-CEDA-research/Research-catalogue/Australia-s-future-workforce> [Accessed 18 Jan 2017]
- Thomond, P., Herzberg, T., & Lettice, F. (2003). *Disruptive innovation: Removing the innovators dilemma*. Paper presented at the British Academy of Management Annual Conference: 'Knowledge into Practice.
- Vakalfotis, N., Ballantine, J., & Wall, A. (2011). *A Literature Review on the Impact of Enterprise Systems on Management Accounting*. Paper presented at the The 8th International Conference on Enterprise Systems, Accounting and Logistics, Thassos Island, Greece.
- Vecchiato, R. (2017). Disruptive innovation, managerial cognition, and technology competition outcomes. *Technological Forecasting and Social Change*, 116, 116-128. doi:10.1016/j.techfore.2016.10.068
- Velcu, O. (2007). Exploring the effects of ERP systems on organizational performance: Evidence from Finnish companies. *Industrial Management & Data Systems*, 107(9), 1316-1334.
- Wagner, M. (2016). Managing disruptive innovation with technology acquisitions: the informing case of software-based high-technology industries. *Technology Analysis & Strategic Management*, 28(8), 979-991. doi:10.1080/09537325.2016.1181736
- Wan, F., Williamson, P. J., & Yin, E. (2015). Antecedents and implications of disruptive innovation: Evidence from China. *Technovation*, 39, 94-104.
- Wessels, P. L. (2005). Critical information and communication technology (ICT) skills for professional accountants. *Meditari Accountancy Research*, 13(1), 87-103. doi:10.1108/10222529200500006
- Williams, T. (2015). *IBISWorld Industry Report M6932- Accounting Services in Australia*. Available at: <https://www.ibisworld.com.au/industry-trends/market->

research-reports/professional-scientific-technical-services/accounting-services.html

- Windle, P. (2017). *IBISWorld Industry Report M6932- Accounting Services in Australia*. Available at: <https://www.ibisworld.com.au/industry-trends/market-research-reports/professional-scientific-technical-services/accounting-services.html>
- Wright, S., & Wright, A. M. (2002). Information system assurance for enterprise resource planning systems: unique risk considerations. *Journal of Information Systems*, 16(s-1), 99-113.
- Yoon, K., Hoogduin, L., & Zhang, L. (2015). Big data as complementary audit evidence. *Accounting Horizons*, 29(2), 431-438.
- Yu, D., & Hang, C. C. (2010). A Reflective Review of Disruptive Innovation Theory. *International Journal of Management Reviews*, 12(4), 435-452. doi:10.1111/j.1468-2370.2009.00272.x

## 4. Paper 3: On Cloud Nine: A Case Study on the Disruptive Innovation Effects of Accounting Software as a Service in Accounting Domain

### 4.1 Abstract

**Purpose:** Accounting professionals are facing threats from technology disruption. Some industrial reports have predicted that the accounting profession will be severely affected in the next 20 years. There is ongoing debate as to whether the profession can evolve to cope with this disruption. This paper analyses Xero Ltd, a cloud-based accounting software company, and explores the extent to which software-as-a-service (SaaS) and AI technology disrupted and innovated the market for accounting services within the small to medium enterprise sector.

**Design/methodology/approach:** This paper adopts a case study approach, through the lens of Disruptive Innovation Theory (Christensen, 2003), to explore the case of Xero Ltd (Yin, 2017), a cloud-based accounting software company which has experienced rapid growth since its inception in 2007. Primary data was collected from interviews with six key Xero senior managers, and secondary data was from various information sources including relevant media releases, industry research reports, online forums, and newspaper articles. Interview transcripts and secondary data were saved and coded in NVivo software.

**Findings:** This study identifies two levels of disruption associated with Xero. The first wave occurred when *Xero*, the cloud accounting software initially entered the traditional desktop accounting software market and disrupted the market with its SaaS business model. This study posits that this first wave is drawing to a close, and cloud-based accounting software has become embedded within the mainstream accounting software market across the SME sector. The second wave of disruption identified in this study begins with the application of machine learning and AI in accounting software. This study argues that the potential effects of this disruption has spread from the accounting software market to the accounting services market. Furthermore, this study argues that the centre of AI disruption is not the technology itself, but how it is used to access professional knowledge.

**Research limitations/implications:** As with most case studies, results are only valid for the subject in question, therefore the ability to replicate the study is limited. A small number of interviewees from Xero selected in this study might contribute to data bias as they responded to interview questions based on individual experience with Xero. The supplement of secondary data, especially online customer reviews, aims to mitigate this limitation.

**Originality/value:** This study is the first to (1) use a case study of an accounting software provider to explore the extent to which cloud computing has disrupted the traditional software market and changed the model for accounting service delivery, and (2) explore the extent to which AI can potentially disrupt the professional accounting service market.

*Keywords:* Accounting; Disruption Innovation; Information and Communication Technology



## 4.2 Introduction

“Disruption” is a buzzword frequently used across mainstream media (e.g., *The Wall Street Journal*) and various professional magazines (e.g., *The Economist*, *Forbes* and *Harvard Business Review*) to describe the dramatical changes and threats posed by advanced technologies to the future of professions (Susskind & Susskind, 2015; Sutton et al., 2016, Tan et al., 2015). Professions, such as law and management consulting who traditionally have been immune to disruption, are now experiencing an unavoidable transformation in their service concept, skills and knowledge (Brescia et al., 2014; Christensen et al., 2013). Studies within the legal field indicate that technologies, especially intelligent machines are commoditizing professional services and democratizing expert knowledge, allowing non-professionals to compete in the legal services market (McGinnis & Pearce, 2014). Legal researchers further identify that disruption most likely happens in the lower-end market, comprised of low to middle-income consumers who struggle to afford high services fees (Sheppard, 2015).

In the accounting field, leading accounting firms and accounting professional bodies (e.g., CPA, ACCA) have all contributed to extensive discussions around digital disruption and argue that the accounting profession is under severe threat by technology. Statistics shown in a recent PwC report indicate that accounting professionals, especially accounting clerks and bookkeepers fall into the category of the highest risk of being replaced by technologies with a 97.5% probability in next 20 years (PwC, 2015, p 10). In addition, accounting practitioners ranked the adoption of cloud computing and the application of Artificial Intelligence (AI) in accounting software as the two major factors that threaten the accounting profession within the next 3 – 10 years (ACCA, 2016). Notably, the AI-based smart accounting software and systems are believed to not only replace accounting practitioners in non-skilled or lower-skilled accounting functions, such as bookkeeping, but also can partially replace human judgments in higher-skilled accounting tasks, such as tax compliance in the near future (Frey & Osborne, 2017; Richins et al., 2017).

On the contrary, academic research, indicates that there might not be a decline in the future employment of accounting professionals (Granlund & Malmi, 2002; O’Leary, 2004; Kanellou & Spathis, 2011). Accounting scholars argue that technology primarily

increases the efficiency of an accountant's work, allowing more time to focus on providing more analytical and decision-based tasks that provide higher client value (Rom & Rhodes, 2006; Jarvenpaa, 2007; Davenport, 2015; Galarza, 2017). There are several studies showing that innovative technologies provide even more opportunities for accountants to extend their expertise and secure business opportunities (Scapens & Jazayeri, 2003; El Sayed, 2006; Hyvonen et al., 2006). Examining prior literature, scholars have observed how accounting expertise has transformed accordingly to the adoption of technologies (Guthrie et al., 2015; Freeman & Wells, 2015; Fawcett, 2015), such as the hybridization between accounting and IT personnel due to the adoption of integrated systems in an organization (Caglio, 2003; El Sayed, 2006), an expansion of knowledge into the management and consulting side of business (Grandland & Malmi, 2002, Rom & Rohdes, 2007), and an increasing necessity in developing soft skills, including communication (Scapens & Jazayeri, 2003) to meet future employment needs. Additionally, it is worth noting that there is an absence of the term "disruption" in the technology related research in academic literature.

However, in recent years, other scholars have adopted a contrasting position, suggesting that recent technological developments, especially in the AI area might cause a reduction in the future employment of accounting personnels (Grabsiki et al., 2011). Scholars argue that AI-based business software, or "smart machines" - will challenge today's accounting professionals whose value resides in the "grand bargain (Susskind & Susskind, 2015, p19)", the arrangement that grants various monopolies to professionals and the global service networks of which they constitute. By transforming the knowledge required for professional judgment into codes and algorithms, these smart machines are capable of performing their own "judgment" more accurately and efficiently than accounting professionals, in turn promoting more affordable and accessible professional services. The diminishing value of the accounting profession seems inevitable in the longer term (Susskind & Susskind, 2015). Its future, according to these scholars, is that "smart machines" will outperform humans, eventually replacing accounting professionals at all levels of accounting activity.

Although both opinions engender meaningful debate within academia, mainstream accounting research has yet to draw significant attention to the future of the accounting profession, not to mention recognizing the transformative potential of AI-based software in the accounting field. Current accounting research in AI-related topics mainly focuses on expert systems, a subclass of AI applications (Gray et al., 2014), and neglects the usability of other AI applications within the accounting domain, especially the use of machine learning techniques by the accounting profession in recent years (Sutton et al., 2016). Due to the potential for AI-based software to replace knowledgeable accounting professionals, there is a need in accounting research to understand the “disruptive” nature of AI to the profession (Brynjolfsson & McAfee, 2011, 2014; Guthrie & Parker, 2016). This paper examines the case of Xero, an accounting software company which has recently embedded AI technologies within its cloud-based accounting software, to explore the potential disruptiveness of AI within the accounting domain.

Xero Ltd<sup>12</sup> is a public Software as a Service (SaaS) accounting software company domiciled in New Zealand. It has offices in Australia, the United States, United Kingdom and Canada, and is listed on the Australian Stock Exchange. The company provides online cloud-based accounting software, that focus on SMEs. Its products are used globally. Its market capitalization has increased markedly since its establishment in 2006, with a valuation at \$6.9 billion at February 2019<sup>13</sup>. After 10 years of development of its cloud platform, the company launched its “code-free accounting plans” (Delaney, 2017) that included an AI-based “auto-coding” function. Media, industrial researchers, and accounting practitioners have commented on Xero’s potential impact in the accounting services market for SMEs (see Macpherson, 2016; Watson, 2016; Macpherson, 2018). This academic case analysis of Xero provides an in-depth, contextualized and critical understanding of the extent to which Xero has

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<sup>12</sup> To distinguish the company Xero with its product *Xero*, in this paper Xero will represent the company, and *Xero* the product.

<sup>13</sup> The valuation of the company is retrieved from <https://www.asx.com.au/asx/share-price-research/company/XRO> on 27th Feb 2019.

disrupted the relationship between accounting professionals and their clients in the SME sector. Given its disruptive potential, this study examines the case of Xero through Christensen's Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor; 2003). This case study identifies Xero Ltd as a disruptor, a new entrant who entered into the accounting services market for SMEs with its product *Xero* as its disruptive innovation. By triangulating different information sources including interviews, social media, newspaper releases, etc., the researchers provide a detailed description of Xero Ltd and its products, in order to develop a narrative of how the company disruptively innovates not only the accounting software market but also accounting professionals themselves and the traditional services they provide to the SME market.

This study provides two major contributions. First, despite Disruptive Innovation Theory's popularity as a basis of explanation across various fields, such as tourism (Airbnb by Guttentag, 2015), education (online learning by Christensen et al., 2011), and transportation (Uber by Elbanna & Newman, 2016 and Electric Car by Dijk et al., 2016) etc., its intellectual core is still subject to debate (e.g. Danneels, 2004; Markides, 2006; Lepore, 2014; Weeks, 2015). Its conceptual ambiguity and lack of predictive power are two major factors that question whether Disruptive Innovation Theory can qualify as a theory or not. From a theoretical perspective, this study adopts a unique disruptor's point of view, in the relationship between technology and the accounting profession. By analysing the company's strategy of innovation and its disruptive intention, this study provides an empirical example of the ex-ante prediction of AI disruption in the accounting field, in turn demonstrating the predictive power of the theory. Furthermore, this case study also extends the application of Disruptive Innovation Theory toward understanding how disruption can permeate across different industries. Academic research has applied the theory to explain the phenomena of disruption within a single industry. This case study finds the pathway of diffusion of disruption from one of technological innovation in the accounting software industry to a shift in the role of accounting professionals in the accounting services market for SMEs. Second, this study further contributes toward highlighting

the importance of recognizing the disruptiveness of technology by providing potential solutions for accounting professionals to manage digital disruption.

This case study paper is organized as follows. Section 4.3 traces the development of Disruptive Innovation Theory since its creation in 1997 and advances two criteria for assessing *Xero* as disruptive innovation following Christensen's seminal work. In the same section, this study also reviews the innovative business model created by the disruptor that should be paired with disruptive innovation to enable disruption to occur (Hwang and Christensen, 2008). Section 4.4 includes the case study methodology and two research questions, whilst section 4.5 provides a background overview on Xero Ltd and its product. Section 4.6 discusses the results of the case study, and the final section focuses on the implications of the results, followed by a conclusion.

### **4.3 Theoretical Framework: disruptive innovation and disruptor's business model**

#### *4.3.1 From "Disruptive Technology" to "Disruptive Innovation" to Disruptive Innovation Theory*

As the founder of Disruptive Innovation Theory, Christensen firstly introduced the term disruptive technology in his book *The Innovator's Dilemma* in 1997. In this seminal work, through analysis of several cases of well-managed, leading companies that failed when confronted with technological change brought by new entrants, Christensen distinguishes between two types of technological changes, one being sustainable and the other disruptive. He defined sustainable technology as that which improves the performance of existing products/services along the trajectory of the dimensions of performance that customers in major markets have historically valued (Hwang & Christensen, 2008). Disruptive technology, on the other hand, provides a different value proposition from mainstream products and might serve a new or niche market demand that is usually neglected by major players in the market. Usually, new products based on disruptive technologies underperform established products in mainstream markets initially, but gradually gain mainstream traction through continuous performance improvement (Christensen, 1997, p. 11).

With the ongoing development of the concept, Christensen found that technological innovation alone is not the key factor causing disruption to incumbents. The Innovative business model in which the technology is deployed is the principal factor threatening incumbents (Christensen, 2006). Therefore, Christensen and Raynor (2003) changed the term “disruptive technology” to that of “disruptive innovation” in order to capture the business model enabled disruptive innovation. The definition of “Disruptive Innovation” therefore, is a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors. (Christensen et al, 2015). After the change in terminology, Christensen further developed the concept of “disruptive innovation” into Disruptive Innovation Theory and aimed to explain disruption phenomenon in its entirety, including why some successful incumbents fail to compete against a new entrant who introduces a disruptive innovation into an existing market (Christensen, 1997; Christensen & Raynor, 2003). After the establishment of fundamental elements of Disruptive Innovation Theory in a descriptive format, Christensen further advanced the theory to the normative stage with the aim of predicting potential disruption and developing potential solutions that can guide managers to adapt disruption across various industries (Christensen 2006; Christensen et al., 2018).

Although Christensen (2006) argued that disruptive innovation has moved from being a concept into a “normative theory” (p 42), the intellectual core and predictability of the theory has been the subject of scholarly criticism. Reviewing the past 20 years of evolution in disruptive innovation research, Hopp et al. (2018a)’s literature review studies found that the number of publications picked up significantly since 2006 and the application of the theory has extended into a diverse range of disciplines ranging from Innovation and Technology, to Marketing, Management, and Economics. The concepts of the theory have been repeatedly recreated to fit into these various contexts. These diverse definitions cause the loss of important logical and theoretical connections cored around Christensen’s original Disruptive Innovation Theory, causing ambiguity in the core concepts of the theory. This situation further leads to stagnation in theory development (Hopp et al., 2018a). Christensen also pointed out

that, despite the overuse of the term “disruptive innovation”, a majority of “disruption” research ignored the core concepts of Disruptive Innovation Theory (Christensen et al., 2015). Hopp et al. (2018a) echoed Christensen’s critiques, stating that the development of the intellectual core of disruptive innovation is falling behind. Under this circumstance, this study adopts Christensen’s original version of Disruption Innovation Theory and draws upon two critical elements to predict a disruption phenomenon that includes; 1) a new value network distinguished from the existing one, and 2) a continuous expansion in market share.

#### *4.3.2 Two elements to predict a disruption*

Within research centered around Christensen’s version of disruptive innovation, prior literature distinguished two types of innovation, one being sustainable and the other disruptive. Disruptive innovation creates a more radical and fundamental change to the performance attributes of a product/service in an existing market (Thomond & Lettice, 2002). It brings to market a very different value proposition not available previously and can create a new market turning non-consumers into consumers (Christensen et al., 2015). Therefore, the first criteria for assessing disruptive innovation is whether the innovation creates a new value network distinct from one already existing. Usually, disruptive products/services will be cheaper, smaller, more convenient to use, and easier to access.

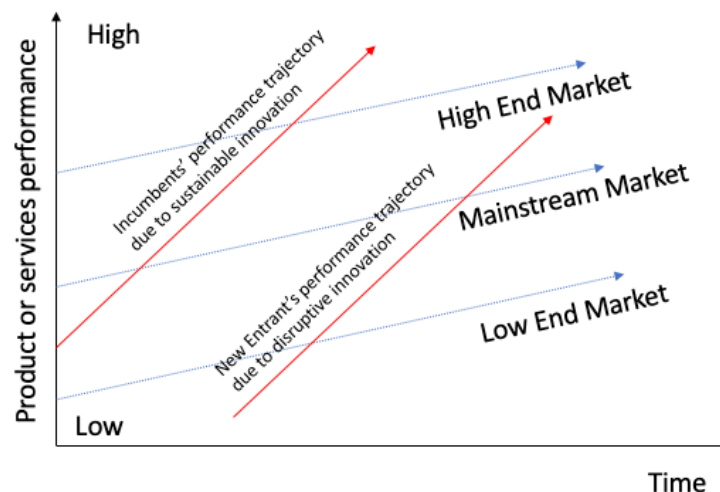
As illustrated in Christensen’s (1997) case study on the development of the Disk Drive, their diameter size shrank from 14 inches to 8, 5.25, 3.5, 2.5 and eventually 1.8 inches<sup>14</sup>. The attributes used to measure the quality of the disk drive in the then market included capacity, physical volume, weight, access time, cost per megabyte and unit cost. As a result of the decrease in size, the 5.25-inch drives had much less capacity and physical volume, but longer access time compared with 8-inch drives, although it weighed less and cost one thousand dollars less in unit cost. Despite its less weight and lower price, the 5.25-inch drive was not preferred because minicomputers dominated the then mainstream computer market and they were only compatible

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<sup>14</sup> The details of disk drive case can be found in Chapters 3 and 4 in Christensen’s book published in 1997

with disk drives that had a large capacity. By contrast, the attributes of 5.25-inch disk drive made it more suitable to be used on desktop computers which however was merely an emerging market then (Christensen, 1997).

Figure 2. The Disruptive Innovation Theory



Source: Christensen et al., 2015, p49

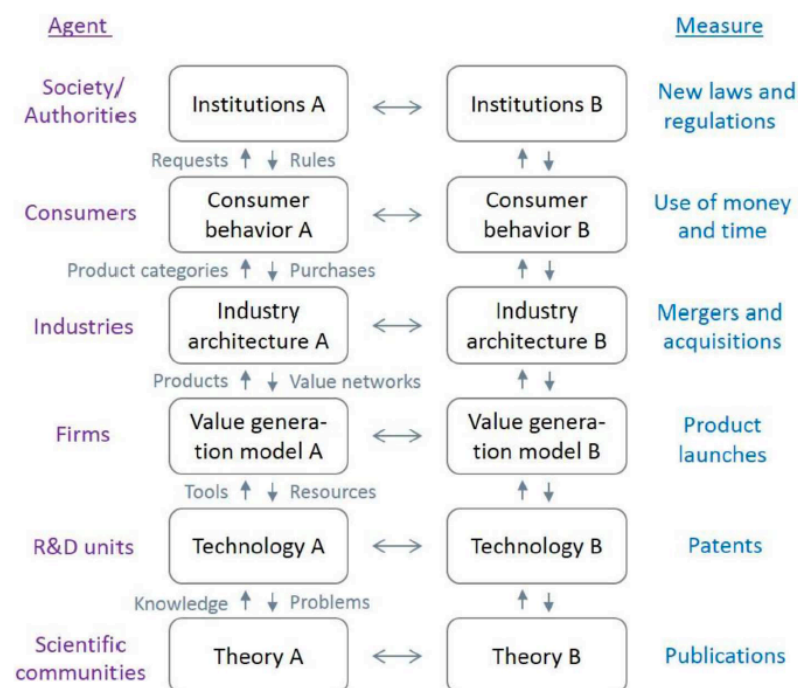
The second element of disruptive innovation is the progress of gaining a mainstream market shown in the trajectory map of performance across time (as shown above in Figure 2). The graph illustrates that the performance demanded by customers of an existing market increases over time. At a certain point, the function of an existing product/service will exceed the needs/desires of its customers. Meanwhile, disruptive innovation occurs when a product/service enters the market with less than satisfactory quality and performance, where only a fringe of customers are targeted (Hwang & Christensen, 2008). However, with improvements in performance over time, the disruptive innovation will eventually meet the needs/desires of mainstream customers in the new market (Keller & Husig, 2009). According to Christensen's study of disk drives (1997), when 5.25-inch disk drives were first introduced in 1980, they were not preferred by mainstream customers who were minicomputer manufacturers and demanded large capacity disk drives. However, with the development of desktop computing, desktop manufacturers, such as Apple and IBM sought smaller sized and



cheaper disk drives, which brought the 5.25-inch disk drive to the fore. Driven by the growing market demand, the disk drive manufacturers increased the storage capacity of the 5.25-inch drive by 50 percent. As a result, the whole disruption process was pervasive in the market of the 1990s, lasting approximately ten years.

However, Christensen's trajectory map shown in Figure 2 is traditionally used to explain the disruption phenomenon within one layer of a single industry. This study aims to predict disruption phenomena that diffuses between accounting software to accounting services, or across 'layers'. Therefore, this study uses a six layered model created by Kilkki et al., (2018) to capture the dynamics of disruption.

Figure 3. A Six-layered Framework for Disruption



Source: Kilkki et al. 2018, p277

#### 4.4 Methodology

This paper uses a case study approach to conduct an in-depth investigation of the potential disruptive impact of Xero across the accounting services market in the global SME sector. A case study is suitable for situations where the research questions are

“how” and “why” oriented (Yin, 2017) with a focus on investigating a contemporary phenomenon in its real-world context. This method has been widely used in exploratory research and allows for the identification of nuances in a particular subject matter. Studies in the disruptive innovation field have also preferred the case study as a basis for exploring disruption phenomenon across various industries (Christensen, 2006; Yu & Hang, 2010). In its earliest phase of development, Christensen provided the foundation for Disruptive Innovation Theory using case studies on the hard disk drive and steel minimills (Christensen, 1997).

Through examining multiple sources of evidence, this study aims to answer the following research question:

**To what extent does Xero disrupt accounting services within the SME market?**

The primary material in this study are semi-structured interviews<sup>15</sup>, which allow the authors to gain valuable insights from the perspective of participants responsible for the critical issues explored in the case study (Blumberg, Cooper & Schindler, 2008). It also enables the interviewees to expand their thoughts and reveal further hidden details that might not have been considered by the authors previously (Qu & Dumay, 2011). The semi-structured interview is deemed a useful tool for exploring under-researched topics (Yin, 2017). The interviewees were six senior managers who oversaw sales, partner relationships, the marketing and R&D departments in Xero Ltd. Because the purpose of this study is to explore how strategic issues are being disrupted, it requires a ‘birds-eye view’ on Xero’s development and thus only senior, or chief level managers at Xero were selected as the interviewees (see Table 4). Furthermore, a partner from a small accounting firm also participated in this study to express his view on Xero’s impact on professional accounting services based on his 5-year-experience of the software. Interviews were approximately 1-1.5 hours in

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<sup>15</sup> The interview guide is presented in Appendix M and the Information and Consent Letter is presented in Appendix O. Anonymity of the interviewees in this study is protected in accordance with the requirements of Macquarie University’s Human Ethics Committee. An approval statement of the University Human Ethics Committee is presented in Appendix P.

duration and were audio recorded and initially transcribed by the AI transcription software *Trint*. To supplement the primary interview data, this study drew on the insights of Xero founder Rod Drury, through the transcription of three of his speeches, namely 1) *Accounting 2020 – A vision for where our industry is going* at Xerocon 2016 in Brisbane, Australia; 2) *Reinventing Productivity* at Xerocon UK 2016 in London; and 3) the opening keynotes at Xerocon 2018 in Brisbane, Australia. The transcripts were checked to ensure their accuracy and integrity. During the interview, some interviewees also referred to certain documents or blog articles, which were supplemented into the data pool.

Table 4. The List of Interviewees

<b>Organizations</b>	<b>Name</b>	<b>Position</b>
<b>Xero</b>	Manager 1	Head of Accounting
	Manager 2	Territory Sales Manager
	Manager 3	Director Partner Management
	Manager 4	Head of Partner Community - Global
	Manager 5	Director – Product Design
	Manager 6	Marketing Strategy and Brand Management
<b>Accounting Firm</b>	User 1	Partner

Secondary data were collected from various sources (Table 5) to form a rich tapestry of evidence used for preparing interview questions before the interview, and also for triangulation purposes (Yin, 2017; VanWynsberghe & Khan, 2007). Official company websites and associated social media accounts (such as Facebook, LinkedIn and Twitter) were reviewed to develop a deeper understanding of Xero’s business strategy, product development timeline and its communications with stakeholders. Moreover, to identify the potential disruptive aspects of technology, the study also reviewed patents issued to Xero (see Appendix J) to assess its technological competencies (Sorenson & Fleming, 2004). Appendix F include stock prices and selected key financing statistics for Xero. To track the social impact of Xero’s activities, this study

conducted a keyword search in Factiva for news relating to Xero and its competitors (see Appendix K). To develop an insight regarding the customers evaluation of *Xero*, this study also collected online evaluation data from three credited review websites (*GetApp*, *TrustRadius* & *G2Crowd*). As both Xero and its competitors launch their apps for mobile devices, this study also included a search of customer reviews on Apple's 'App Store' and Google's 'Google Play'. The results of the search are presented in Appendix G. Specialized review articles and institutional research were also gathered to supplement the database.

Table 5. The List of Data Sources

Resource	Content
Xero website & its social media accounts (Facebook & Twitter)	<ul style="list-style-type: none"> <li>• History of the company (Appendix H)</li> <li>• Annual reports &amp; media release (Appendix K)</li> <li>• Details of its product, target markets, strategies and business culture</li> </ul>
Xero Events	<ul style="list-style-type: none"> <li>• Xero RoadShow (2018)</li> <li>• Xerocon (2016-2018)</li> <li>• Former and Current CEO's keynote speech</li> </ul>
Other Relevant Websites Eg. ASX, ATO, IP Australia and US Patent and Trademark Office	<ul style="list-style-type: none"> <li>• Xero and its competitor's financial status (Appendix F) and trading information (Appendix I)</li> <li>• Xero and its competitor's intellectual property information (Appendix J)</li> </ul>
Major newspapers worldwide	<ul style="list-style-type: none"> <li>• News relating to Xero and its competitor in Australia and New Zealand market (Appendix K)</li> </ul>
Major Product Review websites and accredited review articles	<ul style="list-style-type: none"> <li>• Online product reviews by customers (Appendix G)</li> <li>• Professional assessments reports (e.g. Canstar Blue's review)</li> </ul>
Research institution websites and other publications	<ul style="list-style-type: none"> <li>• Research in the accounting software industry or related topics (e.g. 2018 Morgan Stanley's research report)</li> </ul>

Xero regularly holds promotional and communication events for its users, developers, and partners. Small events, such as Xero Refresh are held in local suburbs with small groups of local accountants and firm partners. Larger events, such as Xero Roadshow

and Xerocon are held at different cities across the US, UK, and Australia. The number of attendees were over 3,000 in 2017 at Xerocon Melbourne. Considering the significant influence of the large Xero event, the author attended the 2018 Xero Roadshow at the International Convention Center (ICC) in Sydney on 31st January 2018. The roadshow commenced at 8:30 am and concluded at 11:00 am and contained five sessions with 20 minutes per session. The primary audience for this event were accountants and bookkeepers who were partners of Xero in Sydney. Each participant was provided a brochure containing stories of successful accounting practices who are Xero partners. The main content of this event was to update partners on new product releases within the last six months and to illuminate the potential achievements the partners can make when utilizing these tools. Direct observation of the Xero event provides a unique opportunity to gain insights into the Xero case from an insider's perspective (Yin, 2017).

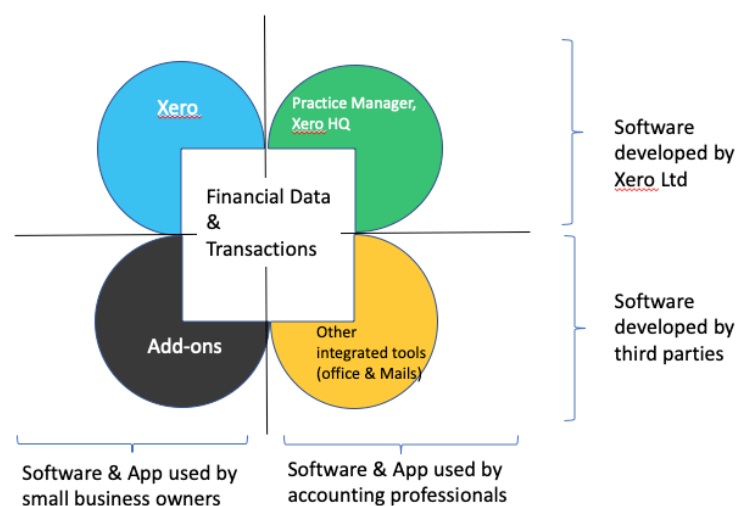
Regarding the data analysis process, NVivo was employed for the qualitative elements including interview transcripts, relevant research articles, and news stories. NVivo software helped to categorize the data and assist with further analysis. First, this study developed a chronological timeline of Xero's significant events (Appendix H) and a detailed background of Xero's developments. Second, the study applied Christensen's Disruptive Innovation Theory to assess 1) whether *Xero* is a disruptive innovator, and 2) whether Xero creates an innovative business model. At the final stage, a modified disruptive framework was adopted (Kilkki et al., 2018) to illustrate the diffusion of disruption vertically within one market and horizontally between two markets. This will explain how Xero, a new entrant in the accounting software market can potentially disrupt accounting services for SMEs.

#### **4.5 The Background of Xero**

Xero is a New Zealand Based company in the accounting software industry specializing in cloud-based accounting solutions targeting small and medium businesses (SMEs) worldwide. This company was founded in 2006 by Rod Drury, a New Zealand based information technology entrepreneur. The company released the

*Xero* prototype in New Zealand one year later and decided to list publicly on the New Zealand Exchange (NZX) at a price of NZ\$1 per share on 4 June 2007. After experiencing a difficult beginning, the company entered the Australian and U.K market in 2008. In 2011, it expanded into the U.S market, and in 2016 *Xero* entered the Asian and South African markets. By May 2018, *Xero* has gained over 1.2 million subscribers worldwide, establishing 20 offices across four continents (Appendix F). As of February 2019, the company was listed solely on the Australian Stock Exchange (ASX) with a market capitalization of AUD \$6.9 billion and had recently been added to the ASX 100 (Appendix I). Appendix H shows a timeline of *Xero*’s history with significant events included.

Figure 4. *Xero* Ecosystem



From its single *Xero* product, the company now has two primary product lines including the fully functional *Xero* for small and medium business owners and *Xero* tools for accountants and bookkeepers such as *Xero* Practice Manager and *Xero* HQ. These cloud-based products are priced based on monthly subscription fees with no fixed contracts. *Xero* also creates a free Application Programme Interface (API) that enables its users to connect with over 700 third-party built applications (Add-ons) for small business owners. Combining two product lines and the add-ons together, *Xero* has developed what it terms an “ecosystem” (see Figure 4). The ecosystem reflects the original purpose of *Xero*’s founding by Rod Drury, being a platform allowing small

business owners and their accountants and bookkeepers to work on the same set of financial data with access anywhere, anytime (Drury, 2016b).

Xero was conceived from Rod Drury's experience running and selling his own business. As a business owner, he felt the current version of accounting software did not meet the accounting needs for small business owners (Drury, 2016b). This inspired the first *Xero* prototype in 2006. While other successful incumbents in the accounting software market were still focusing on traditional desktop-based software, Xero pioneeringly developed its product solely on a Software as a Service (SaaS) basis. SaaS is a software licensing and delivery model in which software is licensed on a subscription basis and the data is centrally hosted (Hoch et al., 2001). Users access the software via a web browser instead of a desktop application. Xero has continually built upon its SaaS model, continuously updating its products, and expanding its product functions in order to address problems with traditional accounting software, such as limited flexibility when choosing cash or accrual-based accounting, and the lack of real-time conversion in multi-currency. As shown in Appendix F, Xero has heavily invested in Research and Development (R&D), with it accounting for approximately one third of total revenue in 2018.

With billions of transactions sitting in the Xero platform, the company started to expand its capability and launched the *Small Business Insights*<sup>16</sup> to understand the size, scale, and health of the small business sector. The company also analysed how small businesses use accounting and concluded that failing to code transactions correctly into the software program is the top-ranking issue in small business accounting (Delaney, 2018). To address this issue, Machine learning and AI were introduced. In 2016, Xero introduced the concept of "non-code accounting" where the software automatically codes transactions to specific accounts following the logic learned from similar prior transactions (Xero, 2017a, 2017e). To utilize the capability of machine

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<sup>16</sup> *Small Business Insight* is an online database with up-to-date data reflecting the conditions and health of small business in Australia and New Zealand. The data is drawn from Xero's subscribers.

learning and AI, Xero migrated its platform to Amazon Web Services (AWS) in 2017 (Xero, 2017b).

Among accounting software vendors, it is common to establish an accountants and bookkeepers 'partner program' to boost indirect software sales, such as MYOB and Quickbooks. Similar to its competitors in the software market, Xero also has a Partner Program with four different partner levels (from Bronze to Platinum) and rewards accounting partners with more subscription discounts and greater tailored support. The partners level is based on the points earned by actively engaging with *Xero* products, training and events. To complete *Xero's* ecosystem, it has also launched the Developer Partner Program<sup>17</sup> to encourage more add-ons to integrate with the *Xero* platform. As *Xero* aims to serve as a core financial platform for small business, the add-ons strategically extend the functionality of *Xero*. Currently, Xero has over 700 applications connected to its core *Xero* product<sup>18</sup>.

As a new entrant in the accounting software market, Xero quickly expanded its market share (Thomson & Drummond, 2016). As shown in Appendix F, the number of Xero subscribers is about three times that of MYOB<sup>19</sup>. Due to its significant growth and strong expansion in the accounting software market, Credit Suisse crowned Xero "the apple of accounting software" (Power, 2018, p24). After confidently claiming domination of the Australia and New Zealand market, Xero set its strategy on creating a global platform for accounting services (ibid). In March 2018, Steve Vamos, the former MD of Apple Australia and Microsoft Australia became the new CEO replacing Rod Drury (Redrup, 2018).

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<sup>17</sup> *Developer Partner Program* is a partner program between Xero and third-party developers who develop applications (apps) that can integrate with the Xero Platform.

<sup>18</sup> The figure of apps that connected with *Xero* is calculated by the authors by visiting <https://www.xero.com/au/marketplace/>

<sup>19</sup> The number of Xero subscribers and MYOB subscribers is retrieved from Xero's annual report from 2015 to 2018 and from MYOB's annual report from 2015 to 2017.



## 4.6 Results

This study identified two disruptions led by Xero in both the accounting software and accounting services markets for SMEs. The first centred around cloud technology that occurred when *Xero* first entered the traditional desktop accounting software market. Evidence from this study posited that the first disruption is drawing to a close, with cloud-based accounting software now becoming mainstream. This study also found evidence for a second disruption caused by Xero's recent AI features which predicted that the potential effects of this disruption have spread from the accounting software market to the accounting services market. The transition point is the shift in client expectations as to the core value of professional services. However, there is no clear evidence showing that Xero has completely disrupted accounting services, although based on the evidence in this study, there are early signs of disruption across multiple layers within the professional services market.

### 4.6.1 *The First Disruption: SaaS VS traditional accounting software*

Two elements were identified that indicated that Xero's cloud-based product disrupted the accounting software industry. The central element driving the first disruption in Xero's case is cloud technology, which is defined as "a style of computing where massively scalable IT-enabled capabilities are delivered 'as a service' to external customers using Internet technologies" (Gartner, 2008). The technology itself is not new, with it having already been widely used in online entertainment, marketing (Chopra et al., 2013) and enterprise software, such as ERP systems (Seethamraju, 2015). However, it is a relatively new technology within the accounting field. Xero, a pioneer of cloud-based accounting software, identified the potential of cloud technology in solving the "*pain points of small business*" accounting [Manager 1-Xero]. It found that small businesses "*are exposed to significant financial ... and compliance requirements to run their business, yet it is not their core business*" [Manager 6 - Xero]. To fulfil these requirements, small business owners rely on tools such as accounting software and professionals such as accountants and bookkeepers to "*reduce the amount of friction and time, stress and effort that (they) have to put into the compliance and financial side of running the business.*" (ibid)

#### 4.6.1.1 A new value network altering usability

This study found that *Xero* created a different value network for accounting software products. It altered the weight of performance attributes in a value network used to assessing software quality. In traditional desktop accounting software, the value network contains five performance attributes including Functionality, Usability, Performance, Support, and Documentation (Cohill et al., 1986). Compared with the traditional desktop model, *Xero* has lower functionality, extremely high usability, lower but continuous improvements in performance with higher support and documentation. In the usability category, accessibility and connectivity are two unique elements empowered by the cloud that differentiates *Xero* from existing accounting software. Due to the nature of cloud computing, *Xero* has provided a new solution for accounting that allows its users to access, update and synchronize data anywhere anytime through a webpage or app. Therefore, not only small business owners but also any potential business advisors can work on the same set of data simultaneously. This single-ledger has the potential to change the way related parties collaborate within the SME economy.

Accountants, bookkeepers, lawyers, banks or whoever the advisors that happened to be [...] can access the same set of data. So there was one piece of truth. That changed the game, because what that meant was the accountants could then suddenly collaborate around a set of numbers, financial reports and put forecasts together, and do it in real time. [*Manager 3 – Director, Partner Management at Xero*]

Connectivity is another element highlighted in *Xero*. The traditional desktop accounting software is hard to integrate with other programs and the cost to integrate is exceptionally high because the conventional model of business IT is all-under-one-roof monolithic IT system. For SMEs, the cost of creating customized software for their own business outweighs the benefits of having one. For software vendors, creating the on-premises model of software with full functions is also expensive. Cloud

technology provides a solution to enhance configurability and customization in business software with a much lower cost (Seethamraju, 2015).

So in terms of software, it's so phenomenally expensive and complicated to build. You have to be really really careful about what it is you choose to build and invest in...and there's lots of things that we could do but that we probably shouldn't or aren't with in our line of focus. So opening up API and advertising yourself as an API provider of data means that other businesses can develop products that you wouldn't be able to afford to do or would you choose not to do and have them integrate into your ecosystem. [Manager 5 - Director – Product Design at Xero]

Xero created an open API and launched its *Xero App Marketplace*. Users were then able to choose their preferred third-party software applications or “apps”, to add to their *Xero* platform. These add-ons extend the functionality of *Xero* and increase the user experience in software performance. During 2018 there were over 700 apps that connected with *Xero* that covered 14 industries<sup>20</sup>.

Regarding customer reviews of *Xero*, the product has won “the Most Satisfied Customer Award” three times in a row in the Canstar Award<sup>21</sup> (Canstar Blue, 2015, 2016, 2017). Based on customers reviews on three key review websites<sup>22</sup> collected in this study, a majority of *Xero* users are satisfied with the product with an average score of 4.3 out of 5 based on over 1500 reviews (Appendix G). The software is ranked high in aspects such as ease of use, availability, and performance. In particular, the strong accessibility enabled by the cloud is appreciated by users. However significant

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<sup>20</sup> The figure of apps that connected with *Xero* is calculated by the authors by visiting <https://www.xero.com/au/marketplace/>

<sup>21</sup> Canstar Award is an award issued by Canstar Blue, a customer satisfaction research and rating business. For each year, Canstar Blue will award the business that has received most satisfaction from customers in their industry.

<sup>22</sup> The purpose of using online review website is to supplement customer’s evaluation of *Xero* regarding its product quality and customer care. Since the three credited websites contains over 1500 reviews for *Xero*, this can be considered as sufficient evidence to develop insights into *Xero* users’ experiences. Online customers review is a common data source for marketing research (Rose et al., 2011), and thereby, inspires this study.

critiques published on online customer review websites arise from two aspects: functionality of the software and customer support. Inventory, reporting, and payroll are three functions that were seen as less than satisfactory by one of the respondents;

I think the financial statements for special purpose accounts (needs to improve). It doesn't have sufficient nodes and it's not user friendly. It updates a lot of irrelevant notes in the template which you have to delete. It's very difficult to use. [...] The other comment is that the payroll function does not have award rates. The Payroll function should be used to automatically update the award rates for service in the hospitality industry and pay hospital staff in the hospitality industry. [*Partner - Accounting Firm*]

Several Xero users on review websites have also raised concerns over difficulties in being able to receive sufficient customer support. One irate reviewer from *GetApp*, published a review on 12 Feb 2019 stating that “Fix your support options. Support is key – I’ve waited days and still can’t login due to change of 2FA device. Such a bad experience”. A further reviewer lamented “The only way to get in touch with Xero is by email, and they are slow/do not respond” (posted on 22 Jan 2019). These reviews indicate that a lack of direct telephone contacts for customer support appears to be one of the biggest issues that have compromised the customer relationship between Xero and its users.

#### 4.6.1.2 *The second element – trajectory map*

Reviewing the timeline of significant events in Xero (Appendix H), it can be seen that the company has been continuously improving product performance with a continuous release cycle resulting in over 500 product updates. The latest version of Xero covers 21 features for every aspect of the business. As one Xero user comments,

“small business doesn’t mean that their transactions are not complex. The functionality of Xero is catching up with traditional accounting software, such as MYOB, but still hard to support the complexity of transactions in SMEs’ [*Partner – Accounting Firm*].

Although Xero's functionality is still developing, the company is at the forefront of advancing cloud accounting software within the accounting software market (Wallbank, 2015). A majority of software incumbents created the cloud version as a separate product line from that of their existing desktop products. In Australia, the dominant player MYOB released its cloud version in 2012. In the UK, Sage released its cloud version Sage One in 2015. In the US, Intuit released Quickbooks Online in 2001 with limited functions redeveloping the software in 2007 to target a more global market. According to an industry report published by Lo (2018), cloud technology, along with online connectivity and the proliferation of smartphones and tablets, have all contributed to the growth of the software publishing industry. Enterprise software, particularly accounting software, shows a significant trend toward cloud-based models. A US survey of customer confidence in cloud-based accounting (O'Loughlin, 2015) indicates that the number of respondents using a cloud-based platform has nearly doubled since 2014 from 16% to 30%. Xero also capitalized on the increasing use of mobile devices with the release of Xero App in 2011. Users can therefore utilize desktops, laptops, as well as tablets and smartphones to access their Xero account through webpage login or apps. However, the quality of Apps is under question. Based on user reviews of Xero App in Apple's digital distribution platform "App Store" and Google's digital distribution service "Google Play", users are not satisfied with the functionality of the app, arguing that it is only good for doing "very simple things." Compared to other accounting software companies in the market, Xero has led in the development of the app for mobile device access. This less-satisfied product catches only a niche market, and improvements in product quality is a necessity to expand its market.

As Christensen and Raynor (2013) argue, the innovative business model empowers disruptive innovation which ultimately causes disruption. In this paper, it is argued that the SaaS business model adopted by Xero causes disruption at an industrial level. A recent industry report (Lo, 2018) indicates that the whole software publishing industry, particularly accounting software, and other enterprise software, preference a subscription-based SaaS business model. This new business model expects to

contribute growth of 15.9% in revenue for the whole software. Instead of relying on a traditional retail distribution channel, the SaaS business model enables end users who purchase subscriptions with software vendors to access their software directly over the internet. This new model eliminates packing costs, delivery expenses, and markups by software retailers (IBM, 2015), allowing software vendors such as Xero to improve profit margins. Another benefit of this business model is the creation of a recurring revenue stream which relieves the burden of constant customer acquisition, assuming customer churn<sup>23</sup> is monitored and managed accordingly. Brand value and customer loyalty are two important factors in maintaining customers, which has been a significant focus for Xero. The Partner program is a good example of how Xero established partnerships with accountants and bookkeepers.

It is clear that Xero sees accountants and bookkeepers as important partners to its business. Observed in several interviews, the difficulties and the high cost of direct sales to small business owners are the reasons why Xero initially partnered with accounting professionals.

Direct business sales are expensive...[because of]...lead time, training, and support, whilst Xero doesn't have an implementation team." [Manager 1 - Xero]

Another interviewee described the difficulties in acquiring customers at the early development stage.

By the middle of 2007 they had listed with 100 customers, 100 people running small businesses. Rod often jokes that some of those people may have...had a disproportionate number of the surname Drury, as a lot of them were family and friends of his.

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<sup>23</sup> Customer Churn refers to when a customer cancels its relationship with a company. In this article, it refers to when subscriber cancels its subscription of software/ services with a SaaS model company.

Very early on they realized that when they were trying to sell software, they struggled to sell it directly to the small business owner. [This is] because by and large, most small business owners don't like accounting and they're not comfortable doing it. [...] So what they did is they said 'look you're going to have to talk to our accountant. [Manager 3- Xero]

This completely changed the entire sales and distribution focus for Xero. The company views accountants and bookkeepers as a “much better and cheaper way to sell the product” [Manager 1 - Xero]. As the Manager 3 explains,

So registered accountants and bookkeepers in every region that we operate (is) the No.1 channel for the new businesses. [...] They are adding new businesses and what Xero probably is wanting from our partners is to train up clients properly [ibid].

As a result, Xero increases its subscriber numbers and further increases market share. The company currently holds the largest market share in the cloud-based accounting software market in Australia, New Zealand, and the United Kingdom. In the United States, Xero only occupies a niche market compared with Intuits<sup>24</sup> (Datanyze, 2018). Besides being a sales channel, these partners constitute a database enabling Xero to receive feedback on, and testing of new products, in order to identify opportunities for innovative ideas. Regarding the protection of brand value, Xero utilizes its digital marketing strategy particularly in “digital advertising” and “social media.” Xero has signed a special team looking after bad reviews on review websites and social media. The founder of Xero, Rod Drury also personally responds to bad reviews. One such example was a BAS agent who posted a review article of Xero on 24<sup>th</sup> April 2014 complaining about the company taking advantage of the accounting community by using them only as a sales channel. For example, only accounting practices with large

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<sup>24</sup> Intuits is a US based business and financial software company which has produced Quickbooks, a small business accounting program since the 1990s. It currently holds more than 80% of the SME market in the United States.

numbers of clients who are subscribers of Xero's, will be listed on the "accounting partners directory board" (McLoughlin, 2014). Drury responded and promised a new directory based on knowledge expertise, experience and location of accounting practices. The BAS agent was satisfied that her opinion was addressed and posted an updated article in August 2014 with a positive review of the new directory.

This paper has so far identified that Xero's SaaS model creates new value networks that consist of better accessibility and connectivity compared to existing value networks that are associated with traditional desktop accounting software. Furthermore, Xero's improvements in product quality, as well as its continuous expansion in market share, and its ability to lead a transition of the accounting software market into a cloud-based model, indicate that the company has created a disruption in the accounting software market.

#### *4.6.2 Ex ante identification of Xero's disruptive threat in the accounting services market*

##### *4.6.3.1 The development of AI-based features in Xero*

With Xero having completed taking desktop accounting software to the cloud, the phase of cloud-based disruption is drawing to a close. What has followed has been the rise of the SaaS model within the accounting software market. In 2016, Drury presented *Accounting 2020 - A vision for where our industry is going* (Drury, 2016a) at the Brisbane Xerocon. With over 2000 people in attendance, Drury announced the next stage of Xero was to "make accounting magical" (Drury, 2016a). One of its goals was to eliminate data-entry tasks and achieve code-free accounting for SMEs. Harnessing the power of AI and machine learning on AWS, Xero launched its machine learning automation project in the same year. Further disruption inspired by AI and machine learning have begun to emerge.

Although it is common for people to use AI and machine learning interchangeably, these two technologies are different in nature. AI is a technology that emulates human performance by learning and coming to its own conclusions. Its capable of being able



to “understand complex content, engaging in natural dialog with people, enhancing human cognitive performance or replacing people on execution of nonroutine tasks” (Gartner, 2017). Machine Learning is a technology that allows a machine to learn from existing information and then automatically perform analysis of new data without human intervention (McClelland, 2017). The technology is primarily used to analyse vast amounts of data to find patterns and clusters, and then generate a model that can classify new data. Machine learning is a way to achieve AI by building a machine’s capability to self-learn. Inventions such as Google’s AlphaGo<sup>25</sup> and Microsoft’s supercomputer Watson<sup>26</sup> are examples of how machine learning has been used to create an AI product.

In Xero’s case, the company also developed AI-based products built upon machine learning. One of them involves a feature called “auto-code suggestions” launched in late 2016 (Xero, 2017a). Its function is to auto-fill account codes when users record transactions. The motivation for designing this new feature is to address issues regarding incorrect-coding that Xero identified when applying machine learning to gain insights into SMEs accounting on their platform. Xero found that, because of the limited professional skills and knowledge in accounting, small business owners struggled to code daily transactions correctly.

[...] one in five invoices of those wrong were recoded from sales, (because) it's the first one in the drop-down box. Small businesses have no clue. They pick the first one. They don't know what's going on.

1,500 invoices re-coded in expense transactions are revenue into an invoice. [...] There are 10 million different account codes in Xero. [...] This is the Wild West. People are making the stuff up. Accounting is really hard for small business. None of them have done the training

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<sup>25</sup> AlphaGo is a computer program developed by Google DeepMind. It’s capable of playing the game Chinese Chess and competing with professional human players. The algorithm used in AlphaGo enables it to undertake moves based on knowledge previously learned by machine learning.

<sup>26</sup> Watson is a IBM supercomputer that combines AI and sophisticated analytical software for optimal performance to answer questions posed in natural language. It is soon to become commercialised as a suite of enterprise-ready AI services, applications, and tooling.

we've done. In fact, the ones that have done slightly a little bit of training are probably worse than the ones that have done none. So we ask small businesses to code transactions. They have got no clue. (Drury, 2016a)

To avoid significant coding mistakes by small business owners, Xero introduced automated coding, termed “No-coding accounting”, in order to eliminate manual transactions. Xero created a tuned model tailored for each individual customer combining a big model created by AWS<sup>27</sup>'s standard machine learning engine and a small model created by Xero's self-designed machine learning engine.

[..] we (Xero) have [...] heaps and heaps of databases. So with the Amazon technology, we can just reach in and start looking at all that data really effectively and look for patterns. So you start looking at some machine learning scenarios. We found some great problems to solve using big models. And big models look after the whole system, the wisdom of the crowd. [...]

We also found there were small models and we need to go and see how an individual customer uniquely codes things. [...] So we have these little kind of micro bots that are looking right inside each individual Xero user. [...] So it costs us money, but we can spin up these little services that are sitting there intelligently watching what's going on with each individual small business. (Drury, 2016a)

With this new model, Xero is able to understand the tailored coding patterns for its users and created the feature - “auto-coding suggestions” to let the machine complete the coding tasks. Xero believes that a machine can do the tasks better than small

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<sup>27</sup> AWS refers to Amazon Web Services, which is an on-demand cloud computing platform which offers subscribers a virtual computer.

business owners regarding efficiency and accuracy and thus, ultimately eliminate the coding process for small business.

[...] small businesses are coding the things every day to eliminate that horror of catching up before a BAS return is due. We're now going a whole step further. They don't need to do that anymore. We can code that better. [...] So the [...] coding goes away. It happens because of that very deliberate technology strategy we've been working with and a lot of discovery as we've been playing with AI and machine learning. We're now solving this massive, massive problem. As a company we are focused on eliminating coding. This I think is one of the biggest changes that's ever happened to accounting ever. Think about how many millions of hours are wasted by small businesses across the world coding transactions. It's going away. (Drury, 2018)

In 2016, Xero launched *Machine Learning Automation in Account Coding*. This automation coding feature was first integrated with the Invoicing function, and soon expanded to the Bills function of Xero. As at 2018, it has made over 750 million accounting coding recommendations to Xero users (Xero, 2018a).

Despite the commitment of Xero to this AI-based product, it appears questionable whether the AI-based feature developed by Xero saves both time and cost for small business owners in completing coding tasks, in turn impeding the ability to achieve complete automation of accounting as expected. We find that this new feature is still at an experimental phase with the accuracy rate estimated by Xero itself at around 75-80%. Despite this new feature having been rolled out widely by Xero to its subscribers, feedback from users indicates an ambiguous attitude. Relevant reviews raised in Xero community<sup>28</sup>, indicates that some users are not fully supportive of this new feature. Some users reported that the account code recommended by Xero is random and

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<sup>28</sup> Xero Community is a platform for Xero users to share experience of current Xero product and requests for new features or functions for Xero product.

actually required more time and effort to correct auto-suggestions. One possible reason for this failure is that the current development in AI and machine learning still cannot address the complexities of the accounting coding process.

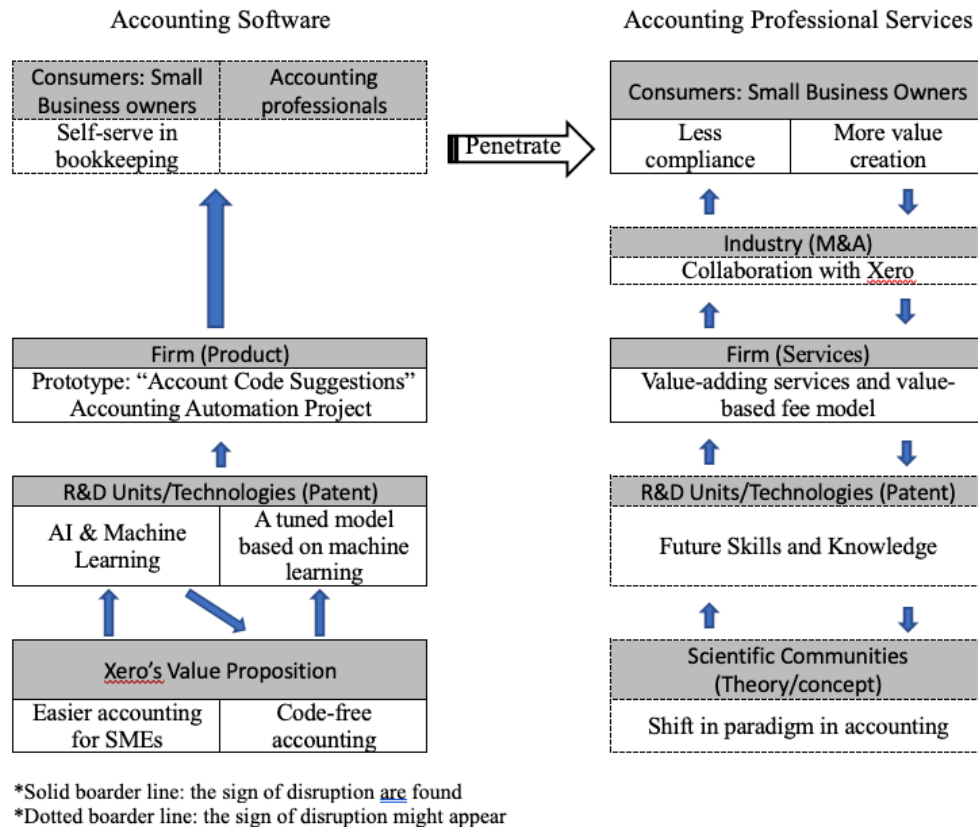
[It] sounds easier than it is in practice. In these days, if I go out with my credit card and I'm a small business owner, I take somebody out for lunch. (The cost is considered) as entertainment. But when it's the same spend on a breakfast, now it is considered as a travel cost. How does Xero know that? How does the software know that I'd actually gone further than a certain distance from my home and the cost spent there is a travel cost?...so its things like that. Let alone some of the other complexities with coding. [Manager 3 - Xero]

Considering the current lack of mature AI technology and questionable performance, we find that two criteria drawn from Christensen's disruptive innovation theory might not be applicable in this circumstance to assess the disruptive potential of *Xero's* current AI-based feature. The current AI-based feature "account-code suggestion" is merely a prototype of *Xero's* preconceived AI-based product. It might potentially improve user efficiency when recording invoice and billing activities in SME accounting; nevertheless, it depends largely on a high accuracy rate. If the accuracy rate is low, small business owners may need to pay for accounting professionals to make corrections. Small business owners still need to make judgements as to which account the transaction should go to. Interventions from accountants and bookkeepers are necessary to adjust wrongly-coded transactions to ensure accounting data is clean. For this reason, it is too early to assess the disruptive potential of *Xero* based solely on the current version of its product.

However, by exploring *Xero's* design intention for its "account-code suggestion" feature and its code-free accounting project, we have gained an insight in to how *Xero* plans to use its AI-based solutions to influence SME accounting. This study found that *Xero Ltd* can qualify as a potential disruptor because of the design intention of *Xero's* concept of "accounting automation" (*Xero*, 2017a), which poses potential disruptive threats to accounting professionals in the accounting services market for SMEs. The

diagram in Figure 5 shows the pathway of how an innovative concept created by Xero within the accounting software market will ultimately generate a disruptive impact.

Figure 5: A Pathway of the Second Disruption in Accounting Services market for SMEs



As shown in the left column of Figure 5, the beginning of Xero's design for its "Account-code suggestion" starts from Xero's original intention upon inception. During interviews for this study, the managers from Xero keep reemphasizing the original intention of Xero was always to address the "pain points" of small business. The company found that due to the inherent difficulties with the nature of the accounting system, small business owners were not motivated to undertake accounting tasks by themselves, especially regarding compliance work. Therefore, small business owners reached out to accounting professionals for services ranging from bookkeeping to tax compliance.

By and large, most small business owners don't like accounting and they're not comfortable doing it. They think they can do it but they're not good at it. [Manager 3- Xero]

I think the reality is that a lot of small business owners have no interest or desire in being their own accountant. [*Manager 5 - Xero*]

Small businesses hate tax. They don't want to pay tax. They don't want to have to do accounts. [*Manager 1- Xero*]

Therefore, Xero seeks opportunities to achieve easier accounting for small business owners by ensuring software is “smart” and “easy to use”. The company is committed to the journey toward automation accounting which aims to directly give small business owners “up-to-the-minute” figures [*Manager 5 - Xero*]; a “clean accurate ledger” [*Manager 3 - Xero*] and an access to SMEs financial web. Drury (2017) believes the key to achieving this goal is to utilize AI and machine learning. Xero’s adoption of AI and machine learning is not a recent decision. The pre-existing cloud platform built by Xero from 2006 is a critical pre-condition for these advanced technologies to take full effect. Cloud technology enables data to be centrally stored and managed, thus creating a valuable central database for Xero. With over 1.3 million subscribers globally, the Xero platform has recorded \$2.15 trillion worth of transactions within 12 months (Xero, 2018a, p7). This massive dataset enables Xero to drive insights into the “pain points” of small business accounting, such as wrongly coded transactions as mentioned earlier. Therefore, Xero shifted its R&D focus to AI and machine learning and initiated its development in an AI-based product. Furthermore, in Drury’s view, the primary accounting tasks such as Accounts Receivable and Accounts Payable are easy to identify patterns from through “learning” from large scale transactions, making it easier to create a model for categorizing (Watson, 2016). When the company started modelling using machine learning, it gets incredibly high value. As a result, the company created its prototype AI-based feature - “Account-code suggestions”.

Incumbents, such as Intuit and Sage who are Xero’s major competitors, are releasing their AI integrated products as a response. Sage developed *Pegg*, an accounting chatbot who can automatically record finance transactions by processing natural language (Cave, 2016). The product aims to help streamline customer support, increase employee productivity and improve recruitment efficiency (Financial IT, 2018). Intuit launched its updated Quickbook online with AI features for transaction automation purposes (Sayer, 2018). MYOB also launches its MYOB Advisor based on

the AI feature, and aims to expand the use of its software in business advisory services (MYOB, 2018). Comparing these products, AI technology has been mainly used in two areas of accounting services, one being the processing of natural language and the other being automated transaction coding. There is an increasing trend for the adoption of AI in the accounting software market.

#### 4.6.3.2 *A prediction of AI-centered disruption*

Given that the AI-based product that meets the expectations of Xero does not as yet exist in its full form, this study can only hypothesize its possible impact on the accounting services market based on insights from key managers involved in the R&D and commercialization of the Xero product. Drawn from insights from Xero's perspective, this study identified two possible scenarios after the launch of accounting automation and discusses its disruption potential. First, for small business owners who are willing and capable of undertaking accounting by themselves, Xero will provide a *"clean accurate ledger automatically coded by the software"* [Manager 1 - Xero] and offer the option that enables those smart people to "skip" bookkeeping services. It will then be possible for these small business owners to address tax issues by themselves.

There are a lot of really really smart small business owners out there and as an accountant, I learn all the time from smart small business operators. They are the ones that probably could do without an accountant who's just doing their tax, because they go well "I don't need you to do my tax if the ATO gets to single touch payroll, which it will". [Manager 1 - Xero]

Second, for those small business owners who rely on accounting professionals for the accounting aspects of their business, the impact of the accounting automation is more complicated. Accounting professionals are the most trusted and important professional services providers to small business owners, and thus are important

influencers in the SME ecosystem. Xero is fully aware of the dependency between small business owners and their accountants and bookkeepers. Xero specifically established the partner program to manage its relationship with accounting professionals in the accounting services market for SMEs. The relationship between Xero and accounting professionals are deeply entwined, commencing from the mutual benefits of the partnership. At the very beginning of Xero, the company promulgated its phrase being “the world’s simplest accounting” (Manager 1- Xero). During that period, Xero tried to differentiate itself from competitors by arguing there was no need for accountants and bookkeepers. As one manager at Xero mentioned,

[...] there was a period when Xero was saying you don't need a bookkeeper. All it was doing was pissing off the bookkeeping community. Because bookkeeping does a fantastic job. And for some time, there were some marketing, just before I started, it was about you might never need your accountant anymore. I was like "hang on, you can't say that". You know, sometimes it's always a bit of a misalignment between messaging. But that was a way to try differentiating from competitors, right? So MYOB, people complain it's too hard to use, so we come out with Xero, which is easy to use. People complain about accountants or bookkeepers and it costs too much. Use Xero, you don't need a bookkeeper, so we differentiate based on that. It's got rid of that now, thank heavens! [Manager 1 - Xero]

But soon, the company faced difficulties in gaining market share in direct sales to small business and realized accountants and bookkeepers are the main influencers for the adoption of accounting software in the SME sector. According to a blog posted by Xero in 2008 (Xero, 2008), the company took 18 months to get the first 1,000 customers through a direct sale strategy. Small business owners tend to seek advice from their accountant when adopting new software. This “completely changed the whole sales and distribution focus for Xero back in the early days” and the company realized “they then had to create distribution channels through the accounting partner channel” [Manager 3 - Xero]. Accordingly, Xero shifted its sales strategy and used accounting



professionals as an effective channel to boost sales. Furthermore, the company set up the Partner Program to establish a partnership with accounting professionals.

With a growing number of partners engaging with Xero, the company saw greater value in this approach. Accounting partners constituted a strong database enabling Xero to receive feedback on existing products, test new products, as well as identifying opportunities for innovative ideas. Outstanding performing partners also enabled thought leadership, allowing Xero to explore the possible future for accounting (Manager 5 - Xero). Reflected in Figure 4, the company embraced accounting partners into its business strategy and considered accounting professionals as being a key element in completing its ecosystem for SME accounting. Its new tagline “Beautiful Accounting Software” developed during this period, reflected the company’s strategy of being a “valuable tool to support the relationship” (Manager 1 - Xero) between accountants and bookkeepers, and their clients. To assist accounting partners grow their practice, Xero set up a separate product line for practice management tools including Xero Practice Manager, Xero projects, and Xero HQ. Furthermore, Xero also provides third-party add-ons integrated with its management tools for small accounting practices in the cloud. This strategy turned out to be a great success with the company gaining the favour of accounting professionals, with one of the managers in Xero even describing the admiration for Xero as a “cult following” (Manager 1 - Xero). Based on the report presented during Xero Roadshow, 80% of logins to Xero are by accountants and bookkeepers (Xero, 2018c).

Accounting professionals, on the other hand, also see the opportunity to better service their clients using Xero as a tool to improve service efficiency. From an accountant’s perspective, the accounting partner interviewed in this study explained that the Xero platform “can integrate and pull out the information needed [...] directly from the blue screen (referring to Xero) to the green screen (referring to Practice Manager) for the activity statement and tax returns” [Partner 1- Accounting Firm]. Due to Xero’s cloud nature, the accountant can access the small business owners files simultaneously and remotely. Based on Partner 1 experience, Xero indeed helped his practice improve efficiency. With the time saved using Xero, the company had the capacity to look after more clients. He also pointed out that the main income source

for the practice still included tax-related services such as tax returns and tax planning. For bookkeepers, the collaboration between Xero and its integrated apps improve service efficiency and effectiveness. The manager at Xero who also runs his own bookkeeping business stated that;

one of the problems that we need to solve was how do we get the source document, like an invoice, a receipt of purchase, or information about a particular transaction from a small business owner, to a bookkeeper. Now traditionally two things would have happened. One, the bookkeeper would have traveled to the client's premises [...] or the bookkeeper would have got a courier to pick up the information [...]. Most of the bookkeepers time would have been on travel.

So Xero has got to the extent now, where you can take a photo on your smartphone and upload it into the Xero app and it will then be available in the Xero file from wherever the bookkeeper is in the world to actually look at that photo and code it. Now add an app outside of Xero onto that equation. If you look at something like Receipts Bank or Hubdoc, it takes it to the next level. It actually uses OCR technology to screen scrape the information off that and then allocate it automatically for the bookkeeper. It will read information on that source document and know 'Oh okay it's Telstra. It's a Telephone expense'. [*Manager 4 - Xero*]

However, recent developments in Xero's intention to make accounting easier poses a threat to its mutually beneficial relationship with customers. This study found that Xero, as a disruptor, has enabled three possible changes within the accounting services market. First, Xero will change the small business owners' demand for accounting services. On one side, Xero potentially eliminates the traditional bookkeeping service as it aims to completely remove the human element in the primary data entry and bank reconciliation process in SME accounting. As discussed in the previous section, small business owners normally have limited knowledge for undertaking professional judgment regarding accounting tasks and rely to a large degree on accountants and

bookkeepers to complete daily bookkeeping, tax compliance and business advisory services. If “no-coding accounting” is achieved, small business owners could then use accounting software to compensate their lack of expertise and the need to self-serve the daily bookkeeping of their business. As described by the Manager at Xero,

[...] there are these small business clients [who] might like access to their own books [...] and might be able to get access to data in real time. This is the certain [kind of] thing that accountants did that makes no sense for them to manually do and it makes no sense for them to be the only person with access to be able to do that. [*Manager 1 - Xero*]

In this circumstance, the professional knowledge required for bookkeeping services will be commoditized by the computing model and algorithms within the accounting software. As a consequence, the demand for bookkeeping services in the SME accounting market will reduce and accountants and bookkeepers will no longer be the preferred service providers, at least from a bookkeeping service perspective. Demands for accounting services by SMEs are changing, as one Xero manager has explained,

So essentially Xero is trying not to step on the accountants shoes, but it will get to a point where it's going to go "well, we're just giving the end user, which is the small business owner, what they want which is self-service to a degree and then they want to have really good discussions with people that will help them make more money". [*Manager 1 - Xero*]

In the end, we [accountants] are here to service needs. If we're not servicing the needs of our small business clients or big business clients or whatever it is, if we're just giving them the same stuff, eventually they're going to find someone else. If we're not delivering value they're going to find someone that does deliver value. [*Manager 1 -Xero*]

The traditional compliance-driven accounting professional is likely to feel threatened because technology is automating whatever can be automated (Manager 1 - Xero), and eliminates “the mundane human stuff in accounting” (Manager 5 - Xero).

Second, Xero challenges accounting professionals with regard to providing higher value services for SMEs. From Xero’s point of view, accounting professionals should “be doing more for their clients since Xero has taken away the manual staff” (Manager 1 - Xero).

You've got the oldest profession, well the second oldest profession in the world, which has been doing the same thing you know, balancing the ledgers up until now. [This has been the same] all [of the] time just in different ways. [*Manager 1 - Xero*]

For bookkeepers, the company suggested they can redeploy their skills and turn themselves into management accountants responsible for cloud integration or system design and implementation for small business (Manager 4 - Xero). For accountants, business advisory work is top of the list. As the sales manager at Xero emphasized, “accountants and bookkeepers are selling on value not on time and not on compliance” (Manager 4 - Xero). The fee model also should change accordingly from “an hourly rate” to “the percentage of increased profits” (Manager 1 - Xero). However, for small accounting practices, it is challenging for them to shift their main focus from compliance to advisory due to the lack of expertise in advisory services and the existing business model.

Third, Xero might also be the catalyst for the transformation of accounting professionals to business people with more diverse business skills. According to the product design manager at Xero, accounting professionals are “conservative” (Manager 5- Xero), and “like to feel quite special and unique” in the business world. As Xero directly provides information to small business owners, accounting professionals are losing their privilege in being able to control accounting data in their relationship with clients.

It probably forced accountants to face the fact that these small business clients might like access to their own books and accounting data, and they might be able to get access to that data in real time (because of Xero).

These [are the] things that accountants did that makes no sense for them to manually do and it makes no sense for them to be the only person with access to be able to do that. [*Manager 5 - Xero*]

Furthermore, accountants and bookkeepers are losing their privilege of being a profession that focuses on compliance-based accounting work. According to one interviewee from Xero, accounting professionals are transforming into sales people (Manager 1-Xero). However, it seems difficult for some accountants and bookkeepers to admit that “we are business people” and “we are just selling a service” (Manager 1-Xero).

So that's probably the big change in the industry that accountants traditionally are not salespeople. But we've always sold our services. Accountants don't like to think that they are salespeople too. They have a bit of ...We're professionals. But in Reality, we're just selling a service. A lot of them can't get their head around that. But the only way to make money I think in accounting these days is to sell what you do and if you do well you've got to sell that to clients. So it's funny how it's all sort of judging. [*Manager 1 - Xero*].

#### 4.6.3 Security issue in Xero's disruption

While the whole accounting software market is moving toward cloud and customers are relying more on cloud-based accounting software, phishing attacks<sup>29</sup> in the Xero

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<sup>29</sup> Phishing attacks includes fake Xero Two-Step Authentication confirmation emails, Invoice remittance advice phishing emails, fake General Data Protection Regulation (GDPR) confirmation emails and fake billing notification.

platform can alter the security concerns of the cloud-based system. On 23 October 2015, *The Australian* reported Xero's security breach that Xero users received fake email asking them to reset password. Xero quickly responded to the news saying, "only a small number of customers has been affected" (Swan, 2015) and sent out email to remind its users about the breach. However, no effective solution was provided by Xero since a password should be the ultimate safeguard to account security<sup>30</sup>. On 22 September 2017, *Business Insider* (Yoo, 2017) reported another security breach that scammers were sending out fake invoices pretending to be from accounting software firms, such as Xero, MYOB and Sage. This event raised security concerns for not only small business owners but also authorities, including the Australian Taxation Office (ATO). In February 2018, the ATO released a Digital Service Provider (DSP) Operational Framework implementation approach which mandates a two-step authentication process when accounting professionals are accessing Australian taxpayer information through the DSP.

Another concern in using cloud technology is data ownership. In Xero's case, all related parties including third-party developers, AWS, Xero, small business owners, accountants, and bookkeepers have access to the data. The question is who owns the data. On one side, users face the choice of whether they can trust third-party developers for data security and privacy issues. Xero claims explicitly on its website that "Although Xero reviews each of the apps listed, we can't give any guarantees. It's up to you to assess the performance, quality, and suitability of any app before going ahead" (Xero, 2018b). Furthermore, whilst users can easily switch their accountant by shutting down access to Xero via one mouse click, accountants and bookkeepers can also shut down the users' access to their data easily. This can pose a major dilemma should there be a breakdown in relations between the accountant and their client. In 2017, Xero established a Code of Conduct<sup>31</sup> for its partners to address this issue. Using

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<sup>30</sup> Xero has a security notice board showing any known security breaches that have happened on the platform.

<sup>31</sup> The Code of Conduct issued by Xero aims to provide practical and concise guidance to Xero partners on "how to operate in the cloud when it comes to the issue of shared data and client projects". It was developed by consulting with major accounting and bookkeeping associations in Australia, as well as the International Association of Qualified Cloud Accountants, the Tax Practitioners Board (TPB) and the Xero Partner Advisory

this Code of Conduct as a framework, both Xero partners and their clients now have clearer communication regarding ownership of the shared data (Xero, 2017c).

#### **4.7 Conclusion**

This case study of Xero explores the emergence of Xero, a SaaS company and its disruptive impact within the accounting services market. The study firstly identified Xero's initial disruption through cloud technology within the accounting software market. As traditional accounting software is based on an on-premises deployment model (desktop model), which requires physical software installation and registration of a user license per computer, Xero challenged this model by providing a cloud-based accounting software service (further developed into platform) that permits its users to access, update and synchronize data anywhere, anytime, through a webpage or app via the internet. This study identified two elements that indicated a disruption by Xero. First is that a disruption occurred within the accounting software market that resulted in a rise of the SaaS model within the accounting software market for SMEs.

Second, as Xero's cloud platform became more mature, the company introduced AI and machine learning into its product aiming to advance their services in 2016. This study predicts that a second disruption empowered by AI will occur and spread from the accounting software market to the accounting services market. However, due to the limitation of AI technology, the current utilization of AI at this stage is restricted to embedding within Xero, efficiency improvements in an accountant's work by removing repetitive tasks such as transaction coding. Technology is not advanced enough to lead a complete replacement of human activity, especially in tasks requiring judgement by humans that involve an emotional element. The ongoing impact of disruption shows its sign in 1) concern regarding the ownership of data among software vendors, accounting professionals, small business owners and cloud computing servers, and 2) the security issue of protection of data and ATO requirements for two-step authentication.

This paper found that technological advancements such as cloud computing and AI, have shaped but not as yet fundamentally disrupted, the accounting profession. Although technology has gradually changed client expectations regarding the provision of accounting services, core aspect of these services has not completely changed. Only when technology outperforms the human capability to analyse and predict, and accounting knowledge becomes a commodity for non-professionals, will real disruption happen. Accounting professionals should continuously adjust their skills to find “professional quotients for success” (ACCA, 2016, p27). Accounting education should also play a role in enabling accounting students to become professionals who have the required skills to both harness the power and shape the direction of technology (Guthrie & Murthy, 2009). Education institutions including vocational providers, colleges, universities and professional bodies should also be aware of the urgency of their responsibilities (Tingey-Holyoak & Burritt, 2009), in order to ensure that future accounting professionals are best positioned to both adapt to, and lead, ongoing technological transformations within the accounting profession.



## 4.8 References

- ASX. (2019, February 22). Xero Ltd. Stock quote. ASX website. Available at: <https://www.asx.com.au/asx/share-price-research/company/XRO>
- Blumberg, B., Cooper, D. R., & Schindler, P. S. (2008). *Business research methods* (Vol. 2). London: McGraw-Hill Higher Edu
- Brescia, R. H., McCarthy, W., McDonald, A., Potts, K., & Rivais, C. (2014). 'Embracing disruption: how technological change in the delivery of legal services can improve access to justice. *Alb. L. Rev.*, 78, 553
- Brynjolfsson, E., & McAfee, A. (2011). The big data boom is the innovation story of our time. *The Atlantic*, 21.
- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.
- Caglio, A. (2003). Enterprise Resource Planning systems and accountants: towards hybridization? *European Accounting Review*, 12(1), 123-153. doi:10.1080/0963818031000087853.
- Canstar (2015), *Accounting Software Compared*. Available at: <https://www.canstarblue.com.au/stores-services/accounting-software/>. [Accessed on 1 May 2015].
- Canstar (2016), *Accounting Software Compared*. Available at: <https://www.canstarblue.com.au/stores-services/accounting-software/>. [Accessed on 1 September 2016].
- Canstar (2017), *Accounting Software Compared*. Available at: <https://www.canstarblue.com.au/stores-services/accounting-software/>. [Accessed on 20 May 2017].
- Cave, A. (2016, July 31). Meet Pegg, The Bot That will File Your Expenses, *Forbes*. Available at: <https://www.forbes.com/sites/andrewcave/2016/07/31/meet-pegg-the-bot-that-will-file-your-expenses/#6445ad2b5e6f> [Accessed on 01 February 2018].
- Chopra, M., Mungi, J., & Chopra, K. (2013). A survey on use of cloud computing in various fields. *International Journal of Science, Engineering and Technology Research*, 2(2), 480-488.
- Christensen, C. M. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, Massachusetts: Harvard Business School Press.
- Christensen, C., & Raynor, M. (2003). *The Innovation's Solution*. Harvard Business School Press, Boston, Massachusetts.
- Christensen, C. M. (2006). The ongoing process of building a theory of disruption. *Journal of Product innovation management*, 23(1), 39-55.
- Christensen, C. M., Horn, M. B., Caldera, L., & Soares, L. (2011). *Disrupting College: How Disruptive Innovation Can Deliver Quality and Affordability to Postsecondary Education*. Innosight Institute.
- Christensen, C. M., Wang, D. & Van Bever, D. (2013). Consulting on the cusp of disruption. *Harvard Business Review*, 91, 106-14.
- Christensen, C. M., Raynor, M. & McDonald, R. (2015). What is disruptive innovation?. *Harvard Business Review*, 93, 44-53.
- Christensen, C. M., McDonald, R., Altman, E. J., & Palmer, J. E. (2018). Disruptive Innovation: An Intellectual History and Directions for Future Research. *Journal of Management Studies*. 55 (7), 1043-1078.

- Cohill, A. M., Gilfoil, D. M., & Pilitsis, J. V. (1986). *A methodology for evaluating application software*. In Proceedings of the Human Factors Society Annual Meeting (Vol. 30, No. 1, pp. 14-18). September Sage CA: Los Angeles, CA: SAGE Publications.
- Danneels, E. (2004). Disruptive technology reconsidered: A critique and research agenda. *Journal of product innovation management*, 21(4), 246-258.
- Datanyze, 2018. Xero available at: <https://www.datanyze.com/market-share/accounting/xero>.
- Davenport, T. (2000). Putting the enterprise into the enterprise system. *Harvard Business Review*, 121-131.
- Delaney, A. (2018). *Embrace the magic of machine learning and you'll reap the rewards in no time*. Xero Blog. Available at: <https://www.xero.com/blog/2017/10/embrace-magic-machine-learning-reap-rewards/>. [Accessed on 13 May 2018].
- Dijk, M., Wells, P., & Kemp, R. (2016). Will the momentum of the electric car last? Testing an hypothesis on disruptive innovation. *Technological Forecasting and Social Change*, 105, 77-88. doi:10.1016/j.techfore.2016.01.013.
- Drury, R. (2016a). Transcript from Keynotes: *Accounting 2020 - A vision for where our industry is going*. Available at: <https://www.youtube.com/watch?v=kUJGdUkVeQ&t=21s>
- Drury, R. (2016b). Transcript from *Reinventing Productivity*. Available at: <https://www.youtube.com/watch?v=vSmaQoPjUO0&t=292s>.
- Drury, R. (2017). *The Missing Millions*. Available at: <https://www.linkedin.com/pulse/missing-millions-rod-drury>. [Accessed on: 13 Jun 2018].
- Drury, R. (2018). Transcript from keynotes presented by Rod Drury at 2018 Xerocon. Available at: [https://www.youtube.com/watch?v=gu-e4uk\\_zbE&t=251s](https://www.youtube.com/watch?v=gu-e4uk_zbE&t=251s).
- El Sayed, H. (2006). ERPs and accountants' expertise: the construction of relevance. *Journal of Enterprise Information Management*, 19(1), 83-96. doi:10.1108/17410390610636896
- Elbanna, A., & Newman, M. (2016). Disrupt the Disruptor: Rethinking 'Disruption' in Digital Innovation. In *MCIS* (p. 58).
- Fawcett, T. (2015), "The digital disruption", *Academic Leadership Series*, Vol. 6, pp. 34-40.
- Financial IT, (2018). *Sage Delivers 40 per cent reduction potential queries with AI-powered chatbot*, Pegg. Available at: <https://financialit.net/news/infrastructure/sage-delivers-40-cent-reduction-potential-queries-ai-powered-chatbot-pegg>.
- Freeman, M., & Wells, P. (2015). *Reducing the expectation gap: using successful early career graduates to identify the capabilities that count*. Future Proofing the Profession: Preparing Business Leaders and Finance Professionals for, 2025, 67-78.
- Frey, C. B., & Osborne, M. A. (2017). The future of employment: how susceptible are jobs to computerisation?. *Technological forecasting and social change*, 114, 254-280.
- Gartner. (2018), IT Glossary, Available at: <https://www.gartner.com/it-glossary/cloud-computing/>. [Accessed at: 17 September 2018].
- Gartner. (2018), IT Glossary, Available at: <https://www.gartner.com/it-glossary/artificial-intelligence/>. [Accessed at: 17 September 2018].
- Galarza, M. (2017 February 1), The changing nature of accounting. *Strategic Finance*. Available at: <https://sfmagazine.com/post-entry/february-2017-the-changing-nature-of-accounting/> [Accessed on: 24 May 2018]

- Grabski, S. V., Leech, S. A., & Schmidt, P. J. (2011). A Review of ERP Research: A Future Agenda for Accounting Information Systems. *Journal of Information Systems*, 25(1), 37-78. doi:10.2308/jis.2011.25.1.37
- Granlund, M., & Malmi, T. (2002). Moderate impact of ERPS on management accounting: a lag or permanent outcome? *Management Accounting Research*, 13(3), 299-321. doi:https://doi.org/10.1006/mare.2002.0189
- Gray, G., Chiu, V., Liu, Q., Li, P., (2014). The expert systems life cycle in AIS research: what does it mean for future AIS research? *Int. J. Account. Inf. Syst.* 15, 423-451.
- Guthrie, J., & Murthy, V. (2009). Past, present and possible future developments in human capital accounting: a tribute to Jan-Erik Gröjer. *Journal of Human Resource Costing & Accounting*, 13(2), 125-142
- Guthrie, J., Evans, E., & Burritt, R. (2015). Work: past, present and future. *Academic leadership series*, 6, 9-22.
- Guthrie, J., & Parker, L. D. (2016). Whither the accounting profession, accountants and accounting researchers? Commentary and projections. *Accounting, Auditing & Accountability Journal*, 29(1), 2-10.
- Guttentag, D. (2015). Airbnb: disruptive innovation and the rise of an informal tourism accommodation sector. *Current issues in Tourism*, 18(12), 1192-1217.
- Hoch, F., Kerr, M., & Griffith, A. (2001). *Software as a service: Strategic background*. Software & Information Industry Association (SIIA).
- Hopp, C., Antons, D., Kaminski, J. and Salge, T. O. (2018a). Virtual Issue Editorial: Disruptive Innovation: Conceptual Foundations, Empirical Evidence, and Research Opportunities in the Digital Age, *Journal of Product Innovation Management*. 35(3), 446-457.
- Hwang, J., & Christensen, C. M. (2008). Disruptive innovation in health care delivery: a framework for business-model innovation. *Health Aff (Millwood)*, 27(5), 1329-1335. doi:10.1377/hlthaff.27.5.1329
- Hyvönen, T., Järvinen, J., & Pellinen, J. (2006). The role of standard software packages in mediating management accounting knowledge. *Qualitative Research in Accounting & Management*, 3(2), 145-160.
- IBM, (2015). *Benefit of Cloud Computing*. Available at: <https://www.ibm.com/au-en/cloud/learn/benefits-of-cloud-computing>.
- Järvenpää, M. (2007). Making business partners: a case study on how management accounting culture was changed. *European Accounting Review*, 16(1), 99-142.
- Kanellou, A., & Spathis, C. (2013). Accounting benefits and satisfaction in an ERP environment. *International Journal of Accounting Information Systems*, 14(3), 209-234.
- Keller, A., & Hüsig, S. (2009). Ex ante identification of disruptive innovations in the software industry applied to web applications: The case of Microsoft's vs. Google's office applications. *Technological Forecasting and Social Change*, 76(8), 1044-1054. doi:10.1016/j.techfore.2009.03.005
- Kilkki, K., Mäntylä, M., Karhu, K., Hämmäinen, H., & Ailisto, H. (2018). A disruption framework. *Technological Forecasting and Social Change*, 129, 275-284.
- Lepore, J. (2014). *The disruption machine*. The New Yorker, 23, 30-36.
- Lo, B (2018). *IBISWorld Industry Report J5420-Software Publishing in Australia*, Available at: <https://www.ibisworld.com.au/industry-trends/market-research-reports/information-media-telecommunications/except-internet-music-publishing/software-publishing.html> [Accessed on 20 September 2018]

- Markides, C. (2006). Disruptive innovation: In need of better theory. *Journal of product innovation management*, 23(1), 19-25.
- Macpherson, S. (2016 October 1). *How will the cloud disrupt practice management software*. Available at: <https://www.intheblack.com/articles/2016/10/01/how-will-cloud-disrupt-practice-management-software>. [Accessed on 10 May 2018].
- Macpherson, P. (2018 August 7). New Accounting software heads to the cloud. *The Acuity*. Available at: <https://www.acuitymag.com/technology/new-accounting-software-heads-to-the-cloud>. [Accessed on 12 December 2018].
- McGinnis, J. O., & Pearce, R. G. (2014). The great disruption: How machine intelligence will transform the role of lawyers in the delivery of legal services. *Fordham L. Rev.*, 82, 3041.
- McLoughlin, L. (2014). IMHO: The revamped Xero Program. Available at: <https://www.e-bas.com.au/bookkeeping-blog/imho-the-revamped-xero-partner-program>.
- McClelland, C. (2017). The Difference Between Artificial Intelligence, Machine Learning, and Deep Learning. Available at: <https://medium.com/iotforall/the-difference-between-artificial-intelligence-machine-learning-and-deep-learning-3aa67bff5991>. [Accessed on 5 December 2018]
- MYOB. (2015). *Annual report*. Available at: <https://investors.myob.com.au/Investors/?page=financial-reports>.
- MYOB. (2016). *Annual report*. Available at: <https://investors.myob.com.au/Investors/?page=financial-reports>
- MYOB. (2017). *Annual report*. Available at: <https://investors.myob.com.au/Investors/?page=financial-reports>.
- MYOB. (2018 March 12). *MYOB Leads the Way with AI; Lauches MYOB Advisor*. Available at: <https://www.myob.com/au/about/news/2018/myob-leads-the-way-with-ai>.
- O'Leary, D. E. (2004). Enterprise resource planning (ERP) systems: an empirical analysis of benefits. *Journal of emerging Technologies in Accounting*, 1(1), 63-72.
- O'Loughlin, E. (2015). *Consumer Confidence in Cloud-based Accounting – 2015*. Software Advise. Available at: <https://www.softwareadvice.com/resources/cloud-based-accounting-confidence/>. [Accessed on 16 August 2018].
- Power, B. (2018), Xero Goes Global. List@ASX. Available at: <https://www.xero.com/blog/wp-content/uploads/2018/05/Xero.pdf>.
- PricewaterhouseCoopers, (2015), *A smart move - future-proofing Australia's workforce by growing skills in science, technology, engineering and maths*, Available at: <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>. [Accessed 28 Nov 2017]
- Qu, S. Q., & Dumay, J. (2011). The qualitative research interview. *Qualitative research in accounting & management*, 8(3), 238-264.
- Redrup, Y. (2018 March 5). Ex-Microsoft Australia Boss Steve Vamos to replace Rod Drury as Xero CEO. *The Australian Financial Review*. Available at: <https://www.afr.com/technology/exmicrosoft-australia-boss-steve-vamos-to-replace-rod-drury-as-xero-ceo-20180305-h0wzfr>.
- Richins, G., Stapleton, A., Stratopoulos, T. C., & Wong, C. (2017). Big Data analytics: Opportunity or threat for the accounting profession?. *Journal of Information Systems*, 31(3), 63-79.

- Rom, A., & Rohde, C. (2006). Enterprise resource planning systems, strategic enterprise management systems and management accounting. *Journal of Enterprise Information Management*, 19(1), 50-66. doi:10.1108/17410390610636878
- Rom, A., & Rohde, C. (2007). Management accounting and integrated information systems: A literature review. *International Journal of Accounting Information Systems*, 8(1), 40-68. doi:10.1016/j.accinf.2006.12.003
- Rose, S., Hair, N., & Clark, M. (2011). Online customer experience: A review of the business-to-consumer online purchase context. *International Journal of Management Reviews*, 13(1), 24-39.
- Sayer, P. (2018 October 17). Intuit adds AI, enterprise features to Quickbooks online, Available at: <https://www.cio.com/article/3314536/intuit-adds-ai-enterprise-features-to-quickbooks-online.html>.
- Scapens, R. W., & Jazayeri, M. (2003). ERP systems and management accounting change: opportunities or impacts? A research note. *European Accounting Review*, 12(1), 201-233. doi:10.1080/0963818031000087907
- Seethamraju, R. (2015). Adoption of software as a service (SaaS) enterprise resource planning (ERP) systems in small and medium sized enterprises (SMEs). *Information systems frontiers*, 17(3), 475-492.
- Sorenson, O., & Fleming, L. (2004). Science and the diffusion of knowledge. *Research policy*, 33(10), 1615-1634.
- Susskind, R. E., & Susskind, D. (2015). *The future of the professions: How technology will transform the work of human experts*. Oxford University Press, USA.
- Sutton, S. G., Holt, M., & Arnold, V. (2016). "The reports of my death are greatly exaggerated" – Artificial intelligence research in accounting. *International Journal of Accounting Information Systems*, 22, 60-73.
- Swan, D. (2015 October 23). Xero denies security breach, *The Australian*, Available at: <https://www.theaustralian.com.au/business/technology/xero-denies-security-breach/news-story/60bc4631570d1dbde26eee16f1d0eddf>. [Accessed on 20 September 2018].
- Tan, F.C., Tan, B. & Land, L. (2015). *The Affordance of Gamification in Enabling a Digital Disruptor: A Case Study of the goCatch Taxi Booking App*, 48th Hawaii International Conference on System Sciences, Hawaii.
- Thomson, J. & Drummond, S. (2016 May 12). Xero claims on "pathway" to profit as cash burns slows. *The Australian Financial Review*. Available at: <https://www.afr.com/business/accounting/xero-still-hunts-maiden-profit-but-revenue-soars-20160512-got38h>. [Accessed on 15 Jun 2018].
- Thomond, P., & Lettice, F. (2002). Understanding and enabling disruptive innovation. In *Proceedings of the British Academy of Management Annual Conference* (pp. 9-11).
- The Association of Chartered Certified Accountants (ACCA), (2016), *Professional accountants – the future: Drivers of Change and Future Skills*, Available at: <https://www.accaglobal.com/an/en/technical-activities/technical-resources-search/2016/june/professional-accountants-the-future-report.html>. [Accessed on 13 May 2017].
- The Australian Taxation Office, (2018), *Operational Framework for Digital Service Providers-version 1*. Available at: [https://softwaredevelopers.ato.gov.au/sites/default/files/resource-attachments/Operational\\_Framework\\_Final\\_Implementation\\_Approach\\_v1.0.pdf](https://softwaredevelopers.ato.gov.au/sites/default/files/resource-attachments/Operational_Framework_Final_Implementation_Approach_v1.0.pdf). [Accessed on 10 December 2018].



- Tingey-Holyoak, J. L., & Burritt, R. (2009). *The sustainability agenda: a preliminary investigation of accountancy firm managers' perceptions of support from the professional bodies* (Doctoral dissertation, University of South Australia).
- VanWynsberghe, R., & Khan, S. (2007). Redefining case study. *International Journal of Qualitative Methods*, 6(2), 80-94.
- Wallbank, P. (2016). Xero will focus on cloud and the world. *The Australian*. Available at: <https://www.theaustralian.com.au/business/technology/xero-will-focus-on-cloud-and-the-world/news-story/6d6bc8c302185be8448cc3fa122df5ae>.
- Watson, A. (2016 December 1). From Accounting Practice to Professional Service Firm. *The Acuity*. Available at: <https://www.acuitymag.com/finance/from-accounting-practice-to-professional-services-firm>. [Accessed on 15 December 2018].
- Weeks, M (2015) Is disruption theory wearing new clothes or just naked? Analyzing recent critiques of disruptive innovation theory, *Innovation*, 17:4, 417-428, DOI: 10.1080/14479338.2015.1061896
- Xero Ltd. (2008). *2000 Customers*. Available at: <https://www.xero.com/blog/2008/08/2000-customers/>. [Accessed on 13 June 2018].
- Xero Ltd. (2015). *Annual report*. Available at: <https://www.xero.com/au/about/investors/>
- Xero Ltd. (2016). *Annual report*. Available at: <https://www.xero.com/au/about/investors/>
- Xero Ltd. (2017a). *How artificial intelligence and machine learning will transform accounting*. Xero Blog. Available at: <https://www.xero.com/blog/2017/02/artificial-intelligence-machine-learning-transform-accounting/>
- Xero Ltd. (2017b). *Xero's SWA superpower*. Available at: <https://www.xero.com/blog/2016/12/xeros-aws-superpowers/>.
- Xero Ltd. (2017c). *Introducing the Xero Partner Code of Conduct*. Available at: <https://www.xero.com/blog/2017/03/xero-partner-code-conduct/>. [Accessed on 20 June 2018].
- Xero Ltd. (2017d). *Annual report*. Available at: <https://www.xero.com/au/about/investors/>
- Xero Ltd. (2017e). *Teaching a robot accounting*. Xero Blog. Available at: <https://www.xero.com/blog/2017/03/teaching-robot-accounting/>
- Xero Ltd. (2018a). *Annual report*. Available at: <https://www.xero.com/au/about/investors/>
- Xero Ltd. (2018b). *Xero Market Place*. Available at: <https://www.xero.com/au/marketplace/>
- Xero Ltd. (2018c). *Xero 2018 Roadshow*.
- Yin, R. K. (2017). *Case study research and applications: Design and methods*. Sage publications.
- Yoo, T. (2017 September 22). Scammers are sending out fake invoices that look exactly like they're from Xero, MYOB, and Sage, *Business Insider*, Available at: <https://www.businessinsider.com.au/xero-myob-scam-accounting-emails-2017-9>. [Accessed on 14 Jun 2018].
- Yu, D., and C. C. Hang. (2010). A reflective review of disruptive innovation theory. *International Journal of Management Reviews*, 12 (4). 435-52.

## **5. Conclusion**

### **5.1 Overview**

This chapter presents a summary of this thesis, including 1) an overview of its main findings, 2) a reflection on the application of Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) to these findings and its potential for the accounting profession, 3) the implications of the thesis for the broader Accounting IT field, 4) specific recommendations for SMEs for strategies to deal with the digital disruption to their accounting services, and 5) the limitations of the thesis and possible future avenues for research. An overall summary is presented at the end of this chapter.

This thesis comprises three papers that aim to deliver an understanding of the disruptive effects that technological advances have on the accounting profession. The study adopts Christensen's Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) as a framework and explores the nature of digital disruption and the potential transformative shift in the accounting profession by identifying candidates for disruptive innovation, explaining the disruption process and predicting the possible consequences of disruption. The study firstly conducts a systematic literature review of prior studies on how ICTs impact the role of accounting professionals and professionalism and then evaluates the potential for Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) to provide a lens by which to assess the impact of ICTs on the accounting profession (Chapter 2 – Research Paper 1).

Then, this study explores whether ICTs can be viewed as disruptive innovation to the accounting profession and to what extent, accounting professionals have identified and coped with digital disruption in their daily practice (Chapter 3 – Research Paper 2). Finally, this study examines the case of Xero Ltd, a New Zealand domiciled public accounting software company which has recently embedded AI technology into its cloud-based accounting software (Chapter 4 – Research Paper 3).

Following Christensen's Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003), this study finds that ICTs in general have disruptive potential within the professional accounting services market by enabling more accessible and affordable services to society. In particular, Artificial Intelligence (AI) promises a greater degree of disruptiveness to the accounting profession by commodifying professional knowledge into models and functions within accounting software. However, this thesis argues that although ongoing disruption appears to be inevitable within the accounting field, based on the evidence from this study it has still to date not yet fully transpired for two reasons.

First, AI and related technologies, do not have the current capability to transform all elements of professional knowledge into algorithms. Its lack of creativity, reflectiveness and insight when making moral judgments, which are essential human traits in decision making, impedes its ability to completely replace the human element of accounting professionals. Second, compared to the "trust" and "bond" that exists between accounting professionals and their customers, client faith in technology is still relatively weak. On the contrary, a client's reliance on accounting professionals for interpreting and making sense of the increasing complexity of data and results generated by accounting software is now more profound than ever.

This thesis comprises three papers. This thesis follows a PhD by Publication format (peer reviewed papers ready for publication, but not necessarily having been published in journals), consisting of three papers. The following table illustrates the summary of the contribution of each paper.

AN EXPLORATORY STUDY OF DIGITAL DISRUPTION IN THE ACCOUNTING PROFESSION THROUGH THE LENS OF DISRUPTIVE INNOVATION THEORY		
<b>Paper 1:</b> Data in Search of a Theory: Understanding the Potential of Digital Disruption in the Accounting Profession through a Structured Literature Review	<b>Paper 2:</b> Identifying and Managing Digital Disruption in the Accounting Profession through Disruptive Innovation Theory – a View from Accounting Professionals	<b>Paper 3:</b> On Cloud Nine: A Case Study on the Disruptive Innovation Effects of Accounting Software as a Service in Accounting Domain



## AN EXPLORATORY STUDY OF DIGITAL DISRUPTION IN THE ACCOUNTING PROFESSION THROUGH THE LENS OF DISRUPTIVE INNOVATION THEORY

<p><b>Purpose:</b></p> <ul style="list-style-type: none"> <li>• This paper constructs an understanding of the extent to which current academic research in the accounting field has explored the impact of ICTs on the role of the accounting profession through a structured literature review.</li> <li>• This paper introduced Disruptive Innovation Theory to enhance current accounting research within digital disruption.</li> </ul>	<p><b>Purpose:</b></p> <ul style="list-style-type: none"> <li>• This paper examines whether ICTs can be considered as disruptive innovation to accounting professionals by applying two criteria drawn from Christensen' Disruptive Innovation Theory.</li> <li>• This paper explores to what extent accounting professionals have coped with digital disruption.</li> </ul>	<p><b>Purpose:</b></p> <ul style="list-style-type: none"> <li>• This paper investigates the case of Xero, a SaaS accounting software embedded with AI technology, and identifies its disruptive potential to accounting professional services within the SME market.</li> </ul>
<p><b>Research Questions:</b></p> <ul style="list-style-type: none"> <li>• To what extent has accounting research examined ICTs' impact on the role of accounting professionals?</li> <li>• Can Disruptive Innovation Theory contribute to future research in digital disruption within the accounting profession?</li> </ul>	<p><b>Research Questions:</b></p> <ul style="list-style-type: none"> <li>• Are ICTs a disruptive innovation in accounting?</li> <li>• To what extent have accounting professionals coped with digital disruption?</li> </ul>	<p><b>Research Questions:</b></p> <ul style="list-style-type: none"> <li>• To what extent has Xero disrupted accounting services within the SME sector?</li> </ul>
<p><b>Design/methodology/approach:</b></p> <ul style="list-style-type: none"> <li>• Structured Literature Review (Broadbent &amp; Guthrie, 2008).</li> <li>• Disruptive Innovation Theory (Christensen, 1997; Christensen &amp; Raynor, 2003).</li> <li>• Primary data material is obtained through a review of prior academic literature.</li> </ul>	<p><b>Design/methodology/approach:</b></p> <ul style="list-style-type: none"> <li>• Disruptive Innovation Theory (Christensen, 1997; Christensen &amp; Raynor, 2003).</li> <li>• Primary data material is obtained through interviews with experienced accounting professionals in industry.</li> <li>• Secondary data material is from reports and documentation by government bodies and other organizations, and independent newspapers and academic literature.</li> </ul>	<p><b>Design/methodology/approach:</b></p> <ul style="list-style-type: none"> <li>• Disruptive Innovation Theory (Christensen, 1997; Christensen &amp; Raynor, 2003).</li> <li>• Primary data material is obtained through interviews with senior managers from Xero Ltd.</li> <li>• Secondary data material is from documents and media releases from Xero Ltd and from reports and documentations by governmental bodies and other organizations, and independent newspapers and academic literature.</li> </ul>
<p><b>Findings:</b></p> <ul style="list-style-type: none"> <li>• Current accounting studies have yet to distinguish between the impact of ICTs on accounting professionals with that of accounting practice.</li> <li>• The implementation of ICTs within professional accounting services, has broadened the responsibility of accountants to</li> </ul>	<p><b>Findings:</b></p> <ul style="list-style-type: none"> <li>• ICTs are a potential disruptive innovation to accounting professionals, but disruption has yet to be fully realized with respect to Artificial Intelligence.</li> </ul>	<p><b>Findings:</b></p> <ul style="list-style-type: none"> <li>• Identifies the first wave of disruption with Xero's cloud accounting software entering the traditional desktop market. Initially, Xero built its disruptive innovation product cored with cloud technology</li> </ul>

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<p>include advanced IT/IS management skills within their job description.</p> <ul style="list-style-type: none"> <li>• A lack of theoretical constructs and focus has resulted in an inability to understand the systematic relationships and patterns between variables that drive digital disruption across the accounting profession.</li> <li>• Disruptive Innovation Theory can introduce a new perspective upon which to analyze and understand the relationship between ICTs and accounting professionals by providing an ex-ante prediction of technological disruptiveness to the accounting profession. Furthermore, the theory also provides guidance to solving problems regarding digital disruption.</li> </ul>	<ul style="list-style-type: none"> <li>• Accounting professionals have learnt to collaborate with ICTs as tools to achieve high value services. They also adapt different strategies to enhance their capability to innovate.</li> </ul>	<p>and created a SaaS business model which created a vertical diffusion of disruption across the entire accounting software industry.</p> <ul style="list-style-type: none"> <li>• The first wave of disruption is drawing to a close, and cloud-based accounting software is becoming the mainstream in the accounting software market across the SME sector.</li> <li>• The second wave of disruption identified in this study starts with the application of machine learning and AI in accounting software. This study argues that the potential effects of this disruption has spread from the accounting software market to the accounting services market.</li> </ul>
<p><b>Research limitations:</b></p> <ul style="list-style-type: none"> <li>• As a keyword search is adopted in this study for identifying articles, possible literature omissions may have occurred due to inconsistent terminology applied to ICTs. For example, some scholars use data mining to represent big data while others might use the term big data itself.</li> </ul>	<p><b>Research limitations:</b></p> <ul style="list-style-type: none"> <li>• Interviews were conducted with a small number of respondents from executive level positions and, thus, it is difficult to generalize results across broader stakeholder groupings.</li> <li>• The voice of respondents is based on their individual opinion.</li> </ul>	<p><b>Research limitations:</b></p> <ul style="list-style-type: none"> <li>• As with most case studies, the results are only valid for the subject in question and the ability to replicate the case study is limited. There is also the risk of researcher bias when interpreting data. A small number of interviewees selected in this study might contribute toward any possible bias.</li> </ul>
<p><b>Originality/value:</b></p> <ul style="list-style-type: none"> <li>• This study clarifies a field by focusing solely on the impact of ICTs on accounting professionals and professionalism, thereby creating a foundation for advancing knowledge in this specific sub-field.</li> <li>• This study presents a re-contextualization of Disruptive Innovation Theory (Christensen, 1997; Christensen &amp; Raynor, 2003), arguing the theory provides a new angle for analyzing to what extent accounting professionals recognize ICTs</li> </ul>	<p><b>Originality/value:</b></p> <ul style="list-style-type: none"> <li>• Introduces Disruptive Innovation Theory into the accounting field. The theory provides an alternate approach to explaining the impact of ICTs on accounting professionals: highlighting how accounting firms have taken precautions to cope with disruptive innovation.</li> <li>• Contributes to disruptive innovation studies by clarifying its concept and enhancing its theoretical underpinning.</li> </ul>	<p><b>Originality/value:</b></p> <ul style="list-style-type: none"> <li>• From a theoretical perspective, this study adopts a disruptor's point of view when assessing how disruption occurs between technology and the accounting profession.</li> <li>• Contributes to extending the application of Disruptive Innovation Theory in understanding how disruption can permeate across different industries.</li> <li>• Highlights the importance of recognizing the disruptiveness of technology</li> </ul>

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either as opportunities or threats in their daily practice.

- Addresses a gap in previous studies on accounting professionals, and the impact of ICTs on their knowledge and skill sets within a business context.

by accounting researchers and providing potential solutions for accounting professionals to overcome digital disruption.

### 5.2 Findings

This section presents the findings from 3 research papers:

#### **Paper 1 - Data in Search of a Theory: Understanding the Potential of Digital Disruption in the Accounting Profession through a Structured Literature Review**

identifies the influence of technological changes in the accounting profession and professionalism which has not yet been subject to attention by accounting scholars as prior related research has focused on the influence of technological changes in accounting practice. Current research on this topic has been limited and has been dispersed across the management, information systems and accounting fields. However, the literature review conducted in this study identifies certain themes and trends regarding the topic. This study finds that accounting research has recognized that ICTs have shifted the role of accounting professionals from one of “record-keeper” to “internal consultant”, responsible for more analytical-based tasks (Grunland & Malmi, 2002; Caglio, 2003; Scapens & Jazayeri, 2003). Furthermore, accounting research has also drawn attention to the shift in skills and knowledge held by accounting professionals from pure financial personnel to a hybrid of accounting and IT expertise within business. This review also reveals the lack of any significant theoretical framework to explain and support any systematic analysis of the relationship between accounting professionals and technological changes. This study introduces Christensen’s Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003) as a basis for understanding the correlation between technological change and professional accounting responses to this change.

**Paper 2 - Identifying and Managing Digital Disruption in the Accounting Profession through Disruptive Innovation Theory - a View from Accounting Professionals** examines the disruptiveness of ICTs in the accounting profession by applying two criteria drawn from Christensen's Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003). This paper argues that ICTs challenge the value of accounting services by shortening the time for service delivery and transferring ownership of professional knowledge from accountants to smart systems. ICTs can be seen as disruptive innovation to professional accounting services. Although ICTs are currently an ongoing threat to accounting professionals, full disruption has yet to occur, partly due to the accounting profession embracing technology and adapting to changing needs. The value of "trust" in any relationship between an accounting professional and his/her client is still a major factor in evaluating accounting services: a factor that technology cannot fully supplant. A client's demand for human interaction and emotional engagement in the deliverance of accounting services, is another reason impeding full disruption within the accounting profession. However, accounting professionals themselves have not fully realised the disruptive potential of ICTs and view it as a tool to assist their work, rather than a possible replacement to their current job function. Current response strategies adopted by individual accounting professionals to cope with ICTs' influence include the expansion of skills and knowledge in technologies through ongoing training and education. At a firm level, large accounting firms have responded by acquiring technology firms to develop their own service package, combining technology and a varied skill base of human expertise.

**Paper 3 On Cloud Nine: A Case Study on the Disruptive Innovation Effects of Accounting Software as a Service in Accounting Domain** undertakes a case study on Xero Ltd, an accounting software company whose cloud-based product recently adopted AI technology that promises "code-free" accounting for the SME market. This study firstly finds that Xero with its Software as a Service (SaaS) model enabled by cloud computing, has disrupted the accounting software market which has traditionally valued the on-premise model. This study then makes an *ex ante* prediction of Xero's disruptive threat to the accounting services market beginning

from the adoption of AI features in its software but draws a conclusion that disruption has yet to occur. This study finds that technology's current capability constraints, in addition to small business owners' preference for human engagement with their accountant, coupled with their hesitancy in putting full faith in new and often complex technology, are three barriers hindering disruption. Furthermore, this study also finds that the AI technology itself might not be the central aspect of disruption in the case of Xero. Instead, what technology provides is a diffusion: a way that allows professional knowledge to be democratized, from accounting professionals as the traditional sole proprietor, to software modules which are more accessible, affordable and increasingly user-friendly to small business owners. Therefore, disruption will reach its full effect at a future point if both the commoditization and liberation of accounting knowledge occurs.

### **5.3 Implications of the Study**

This thesis has sought to explore disruptive phenomenon within the accounting field and the transformative changes that have occurred in the role of accounting professionals. Adopting the perspective of Disruptive Innovation Theory (Christensen, 1997; Christensen & Raynor, 2003), this thesis responds to the research questions related to how digital disruption emerges within the accounting domain and how it is understood, recognized and managed by accounting professionals. In particular, this study provides a case study focus on Xero Ltd to explore how its disruptive potential diffuses from the accounting software industry to the accounting services market for SMEs. Enlightened by the findings of this study, this section presents implications for 1) theory development; and 2) the overall accounting profession.

#### *5.3.1 Implications for the ongoing discussion of Disruptive Innovation Theory*

This study has examined the nature of "transformative change" that has taken place in the accounting profession through the lens of Disruptive Innovation Theory. Whilst there has been prior accounting research reflecting upon the influence of technological advancements in the role of accounting professionals for future business, overall this particular topic has received relatively limited academic attention. It is interesting to

find that although the term “disruption” is regularly used as part of the business lexicon to describe how dramatic changes have occurred in the accounting profession, there is no study that has attempted to clarify what “disruption” means within an accounting context, explore how disruption occurs, or identify who the disruptors are? Based on the literature review, this study is the first to examine this transformative change in the accounting profession from the aspect of Disruptive Innovation Theory, which originated within the management field. Therefore, the first implication of this study from a theory perspective is to extend the application of Disruptive Innovation Theory within an accounting context. This study argues that this extension is applicable because, first, there is an established incumbency consisting of accounting professionals who have not been prepared for the significant possibility that technology can eliminate their professional privilege. Second, many clients no longer require basic compliance services, but instead seek more value-added advice from accounting professionals to help them grow their business. Thirdly, there is also a growing opportunity for new entrants in the accounting services market, be they technology companies or non-professionals, who have the ability to acquire the technology that can commoditize and democratize accounting knowledge. The current accounting environment is therefore ready for examination from a disruptive innovation theory perspective.

The second implication of this study toward the ongoing discussion of Disruptive Innovation Theory is that it provides an empirical example (being the case of Xero Ltd) of how a technology firm can be a ‘disruptor’ by innovating through technological advances that in turn influences the accounting services model for SMEs. This finding reinforces Christensen’s statement that “disruption is a process” (Christensen et al., 2015, p48), not based on the performance of a product or service at a fixed point of time. Disruptive Innovation takes time to germinate and propagate in order to eventually disrupt incumbents. Furthermore, the findings of this study show how a product innovation in the accounting software market, like *Xero*, can change accounting services and ultimately transform itself into an innovation or phenomenon that challenges the value, and possibly the very existence of, the accounting profession.

This provides an insight as to how disruptive innovation can take a variety of forms when permeating across different industries.

### *5.3.2 Implications for the accounting profession*

As the findings of this study indicate a transformative change in the role of accounting professionals, it also provides implications for the future development of the accounting profession. This study recommends that accounting practitioners develop a more collaborative relationship with technology. Instead of viewing technology as an external tool to improve work efficiency, accounting professionals should consider technology as an integral part, or extension of, their own work function. Accounting professionals should be prepared to devolve low level tasks to technology, whilst at the same time collaborate and embrace its ability to enable the accountant to achieve higher level and more value-added outcomes for clients. However, this in large part depends on whether accounting professionals have the necessary technical proficiency and knowledge to be able to perceive which aspects of work-related tasks can be devolved solely to technology; and how the data the technology generates, can identify trends, patterns and associations that provide a leverage by which accountants elevate their job function.

This study further recommends that ongoing education and training is essential for accounting professionals to be able to prepare for digital disruption, achieve an elevation in job function, and identify areas of opportunity and strategic advantage for clients. The pre-eminent position of the professions is not sacrosanct. The role of university and professional associations are crucial in order to develop the skill sets needed for accounting students and practitioners. For universities, there is an even greater need to integrate ICT related topics across all major subfields of accounting, with consideration given to offering ICTs more widely as a major within undergraduate and postgraduate accounting degrees, or as interdisciplinary dual degrees incorporating STEM related subjects. Traditionally these topics have been taught distinctly as separate accounting information systems (AIS) units within the existing accounting curriculum (Lawson et al., 2014; Sledgianowski et al., 2017). Technology instead, needs to be embedded across the accounting syllabi, and seen as

an extended function of core aspects of accounting (financial accounting, management accounting, taxation, audit etc) as opposed to being separate from it. Accounting educators should increase accounting student awareness of the necessity of AIS knowledge to their future career, which requires a reduction in the barriers to, and difficulties in learning AIS subjects (Vatanasakdakul & Aoun, 2011).

For professional associations, there is a need to update professional development offerings, that include technology as an essential part of the training and development process. Incentives can include higher credits for workshops that address key strategic areas for members with known skill deficiencies, such as coding, programming or data mining. These skills provide both a vanguard and buffer against the effects of digital disruption. Both universities and professional associations can exam ways to partner with technology companies in order to ensure that training packages for accounting practitioners are both contemporary, practical, and inherently technology based as opposed to being booklet and paper-based.

#### **5.4 Limitations and Future Research**

This thesis delivers an understanding of the digital disruption phenomenon in the accounting profession and provides guidance for accounting professionals to develop response strategies. However, this study is not without its limitations. For the first research paper (Research Paper 1), a keyword search was adopted to identify articles that were tailored to the purpose of the study. This may have resulted in an omission of articles due to the inconsistency in ICT terminology. For example, some scholars use “data mining” to represent big data whilst others might use only “big data”. This limitation might also provide a basis upon which future research can be undertaken to consolidate and clarify terminology for ICTs in accounting-oriented research. For the second research paper (Research Paper 2), interviews were conducted with a small number of respondents at the executive level in large accounting firms, large organizations and a professional association. Thus, it is difficult to generalize the results within the context of small business. However, interviewees were familiar with the needs of SMEs as clients. Furthermore, the third research paper sought to address this limitation by providing a small business case. For the third research paper



(Research Paper 3), the case study method is adopted provide an in-depth insight into Xero's disruption of the accounting services market. This methodology is usually criticized by the generality of its results. In this case, it is argued that the study of Xero enables analytical generalization in which Disruptive Innovation Theory is used as a framework with which to compare the empirical results of the case study (Rowley, 2002). It is acknowledged that bias might occur among interviewees as they could possibly tell their versions of the story only. However, the study has attempted to minimize this potential bias through the process of validation of data using information from various data sources to triangulate perspectives and positions on specific issues.

Being a pioneering study in disruption with an accounting context, this thesis provides some directions for future research. Whilst the pace of technological change is now faster than ever, the number of technologies that have the potential to be disruptive is ever-growing. This study has only examined the influence of cloud computing and AI in the accounting domain. AI itself is in its relative infancy. Future studies can be extended to other technologies, some of which have yet to develop or evolve. Blockchain is a promising technology that, given its recent inception, has yet to be the subject of rigorous accounting research. Grigg's (2005) paper argues that blockchain has potential to transform double-entry accounting to "triple entry accounting" (p 6), whereby three parties involved in a transaction will each have an accurate copy of records in a shared database, improving both transparency and reducing the chances for fraud.

Furthermore, this study has largely focused on disruption within the accounting profession from an Australian context. Future studies can extend the scope of the research to different geographical and cultural contexts. The accounting profession, and in that respect other professions, may respond differently to technological change and advancements in certain contexts over others. This may depend on factors such as infrastructure, government policy, degree of competitiveness, apathy and educational availability, as well as the pre-disposition and ability of a society, and the institutions that constitute it, to embrace change as opposed to remaining inflexible.

## 5.5 Overall Conclusion

In summary, this study adopts an academic approach to explore the disruption phenomenon in accounting profession and identifies that although “disruption” is commonly used to describe the current technological challenges faced by accounting practitioners, the disruption is yet to fully occur from a theoretical perspective. Using Christensen’s Disruptive Innovation Theory as a framework to analyse the current situation of accounting profession, this study finds that ICTs can provide disruptive innovation as they will eventually take on activities and responsibilities that currently are the “exclusive realm of the professions” (Susskins & Susskind, 2015). Until such a point is achieved, the accounting profession still occupies a position of preeminence, and continues to maintain their often monopolistic advantage when applying specialist knowledge to address and solve accounting requests and problems for their clients. However, accounting professionals cannot be complacent, and must be responsive to ongoing disruptions, including the increasing emergence of artificial intelligence, to be able to respond strategically.

As identified in this study, the value of “trust” and empathy generated in human interactions between accounting professionals and their clients are difficult to ignore, despite technological advancements. However, as history has shown, trust between professionals and their clients can easily be eroded if professional advice is not seen as adding value to business relationships. ICTs liberate professionals from mundane and routine based activities. They provide the ability for professionals to adapt their value-based strategies and harness technology to deliver more strategic business insights to their client base. Whether technology is embraced and provides the basis for a new value-added relationship between a professional and his/her client, or whether new technological entrants cannibalize traditional accounting service markets, will depend to a large degree on the response strategies of incumbent accounting professionals, and their ability to evolve and embrace new skills.

## 5.6 References

- Caglio, A. 2003. 'Enterprise Resource Planning systems and accountants: towards hybridization?' *European Accounting Review*, 12(1), 123-153. doi:10.1080/0963818031000087853
- Christensen, C. 1997. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, MA: Harvard Business School Press.
- Christensen, C., & Raynor, M. 2003. *The Innovation's Solution*. Harvard Business School Press, Boston, Massachusetts.
- Christensen, C. M., Raynor, M. E., & McDonald, R. 2015. Disruptive innovation. *Harvard Business Review*, 93(12), 44-53.
- Granlund, M., & Malmi, T. 2002. 'Moderate impact of ERPS on management accounting: a lag or permanent outcome?' *Management Accounting Research*, 13(3), 299-321. doi:https://doi.org/10.1006/mare.2002.0189.
- Grigg, I. 2005. 'Triple Entry Accounting'. *Systemics Inc.*
- Lawson, R. L., Blocher, E., Brewer, P. C., Cokins, G., Sorensen, J. E., Stout, D. E., Wouters, M. J. F. 2014. Focusing accounting curricula on students' long-run careers: Recommendations for an integrated competency-based framework for accounting education. *Issues in Accounting Education*, 29(2), 295-317.
- Rowley, J. 2002. 'Using case studies in research'. *Management research news*, 25(1), 16-27.
- Scapens, R. W., & Jazayeri, M. 2003. 'ERP systems and management accounting change: opportunities or impacts? A research note'. *European Accounting Review*, 12(1), 201-233. doi:10.1080/0963818031000087907.
- Sledgianowski, D., Gomaa, M., & Tan, C. 2017. 'Toward integration of Big Data, technology and information systems competencies into the accounting curriculum'. *Journal of Accounting Education*, 38, 81-93.
- Susskind, R. E., & Susskind, D. 2015. *The future of the professions: How technology will transform the work of human experts*. Oxford University Press, USA.
- Vatanasakdakul, S., & Aoun, C. 2011. 'Why don't accounting students like AIS?'. *International Journal of Educational Management*, 25(4), 328-342.

## 6. Full Reference List

- Abdelsalam, O. H., & Street, D. L. 2007. Corporate governance and the timeliness of corporate internet reporting by UK listed companies. *Journal of International Accounting, Auditing and Taxation*, 16(2), 111-130.
- Ahmed, A. 2003. The level of IT/IS skills in accounting programmes in British universities. *Management Research News*, 26(12), 20-58. doi:10.1108/01409170310783709
- Alles, M. 2015. Drivers of the Use and Facilitators and Obstacles of the Evolution of Big Data by the Audit Profession. *Accounting Horizons*, 29(2), 439-449. doi:10.2308/acch-51067
- Akroyd, C, Askarany, D & O'Grady, W, & Spraakman, G, 2013, 'Requirements for Information Technology with Newly Hired Management Accounting Graduates'. CAAA Annual Conference 2013. June 13. Available at SSRN: <https://ssrn.com/abstract=2200104>.
- Alvesson, M. 2003. Beyond neopositivists, romantics, and localists: A reflexive approach to interviews in organizational research. *Academy of management review*, 28(1), 13-33.
- Ashrafi, R., & Murtaza, M. 2008. 'Use and impact of ICT on SMEs in Oman'. *Electronic Journal of Information Systems Evaluation*, 11(3) 125-138.
- Asli Basoglu, K., & Hess, T. J. 2014. Online Business Reporting: A Signaling Theory Perspective. *Journal of Information Systems*, 28(2), 67-101. doi:10.2308/isys-50780
- Assink, M. 2006. Inhibitors of disruptive innovation capability: a conceptual model. *European Journal of Innovation Management*, 9(2), 215-233. doi:10.1108/14601060610663587.
- ASX. 2019, February 22. Xero Ltd. Stock quote. ASX website. Available at: <https://www.asx.com.au/asx/share-price-research/company/XRO>
- Barrett, M., Davidson, E., Prabhu, J., & Vargo, S. L. 2015. Service innovation in the digital age: key contributions and future directions. *MIS Quarterly*, 39(1), 135-154.
- Belfo, F., & Trigo, A. 2013. 'Accounting Information Systems: Tradition and Future Directions'. *Procedia Technology*, 9, 536-546.
- Bergek, A., Berggren, C., Magnusson, T., & Hobday, M. 2013. Technological discontinuities and the challenge for incumbent firms: Destruction, disruption or creative accumulation? *Research Policy*, 42(6), 1210-1224.
- Blumberg, B., Cooper, D. R., & Schindler, P. S. 2008. *Business research methods* (Vol. 2). London: McGraw-Hill Higher Edu
- Booth, P., Matolcsy, Z., & Wieder, B. 2000. The impacts of enterprise resource planning systems on accounting practice—the Australian experience. *Australian Accounting Review*, 10(22), 4-18.
- Bouwman, H., Carlsson, C., Carlsson, J., Nikou, S., Sell, A., & Walden, P. 2014. *How Nokia failed to nail the Smartphone market*. Paper presented at 25th European Regional Conference of the International Telecommunications Society (ITS), Brussels, Belgium, 22-25 June.
- Bower, J. L., & Christensen, C.M. 1995 'Disruptive technologies: catching the wave'.

43-53.

- Brazel, J. F., & Agoglia, C. P. 2004. The effects of computer assurance specialist competence and auditor AIS expertise on auditor planning judgments. Available at SSRN 497287.
- Brescia, R. H. 2015. 'What we know and need to know about disruptive innovation'. *SCL Rev.*, 67, 203.
- Brescia, R. H., McCarthy, W., McDonald, A., Potts, K., & Rivais, C. 2014. 'Embracing disruption: how technological change in the delivery of legal services can improve access to justice'. *Alb. L. Rev.*, 78, 553.
- Broadbent, J. & Guthrie, J. 2008, "Public sector to public services: 20 years of "contextual" accounting research", *Accounting, Auditing & Accountability Journal*, 21(2). 129 – 169.
- Brown-Liburd, H., Issa, H., & Lombardi, D. 2015. Behavioral implications of Big Data's impact on audit judgment and decision making and future research directions. *Accounting Horizons*, 29(2), 451-468.
- Bryman, A. 2001. *Social research methods*. Oxford University Press.
- Brynjolfsson, E., & McAfee, A. 2011. The big data boom is the innovation story of our time. *The Atlantic*, 21.
- Brynjolfsson, E., & McAfee, A. 2014. *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.
- Burns, J., Hyvönen, T., Järvinen, J., & Pellinen, J. 2006. The role of standard software packages in mediating management accounting knowledge. *Qualitative Research in Accounting & Management*, 3(2), 145-160. doi:10.1108/11766090610670677
- Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. 2009. 'Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility'. *Future Generation computer systems*, 25(6), 599-616.
- Caglio, A. 2003. Enterprise Resource Planning systems and accountants: towards hybridization? *European Accounting Review*, 12(1), 123-153. doi:10.1080/0963818031000087853
- Cao, M., Chychyla, R., & Stewart, T. 2015. Big Data analytics in financial statement audits. *Accounting Horizons*, 29(2), 423-429.
- Canstar 2015, *Accounting Software Compared*. Available at: <https://www.canstarblue.com.au/stores-services/accounting-software/>. [Accessed on 1 May 2015].
- Canstar 2016, *Accounting Software Compared*. Available at: <https://www.canstarblue.com.au/stores-services/accounting-software/>. [Accessed on 1 September 2016].
- Canstar 2017, *Accounting Software Compared*. Available at: <https://www.canstarblue.com.au/stores-services/accounting-software/>. [Accessed on 20 May 2017].
- Cave, A. 2016, July 31. Meet Pegg, The Bot That will File Your Expenses, *Forbes*. Available at: <https://www.forbes.com/sites/andrewcave/2016/07/31/meet-pegg-the-bot-that-will-file-your-expenses/#6445ad2b5e6f> [Accessed on 01 February 2018].

- Chan, S. H., & Wright, S. 2007. Feasibility of More Frequent Reporting: A Field Study Informed Survey of In-Company Accounting and IT Professionals. *Journal of Information Systems*, 21(2), 101-115.
- Chang, C. J., & Hwang, N. R. 2003. Accounting education, firm training and information technology: a research note. *Accounting Education*, 12(4), 441-450. doi:10.1080/0963928032000065557.
- Charitou, C. D., & Markides, C. C. 2002. Responses to disruptive strategic innovation. *MIT Sloan Management Review*, 44(2), 55-64.
- Chen, H. J., Huang, Y., Chiu, A. A., & Pai, F. C. 2011. The ERP system impact on the role of accountants. *Industrial Management & Data Systems*, 112(1), 83-101. doi:10.1108/02635571211193653.
- Chopra, M., Mungi, J., & Chopra, K. 2013. A survey on use of cloud computing in various fields. *International Journal of Science, Engineering and Technology Research*, 2(2), 480-488.
- Christensen, C. 1997. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Harvard Business School Press.
- Christensen, C. M. and Tedlow, R. S. 2000. 'Patterns of disruption in retailing'. *Harvard Business Review*, 78, 42-45.
- Christensen, C.M. & Raynor, M.E. 2003. *The Innovators Solution: Creating and Sustaining Successful Growth*, Harvard Business Press.
- Christensen, C., Aaron, S., & Clark, W. 2003. Disruption in Education. *Education Review*, 38, 44-55.
- Christensen, C. M., Scott, D. A., & Erik, A. R. 2004. *Seeing What's Next: Using the Theories of Innovation to Predict Industry Change*. Boston: Harvard Business School Press.
- Christensen, C. M. 2006. 'The ongoing process of building a theory of disruption'. *Journal of Product innovation management*, 23(1), 39-55.
- Christensen, C., Baumann, H., Ruggles, R., & Sadtler, T. M. 2006. Disruptive innovation for social change. *Harvard Business Review*, 84(12), 94.
- Christensen, C., Horn, M. B., & Johnson, C. W. 2008. *Disrupting class: How disruptive innovation will change the way the world learns* (Vol. 98). New York: McGraw-Hill.
- Christensen, C. M., Alton, R., Rising, C. & Waldeck, A. 2011. 'The new M&A playbook'. *Harvard Business Review*, 89, 48-57.
- Christensen, C., & Eyring, H. J. 2011. *The innovative university: Changing the DNA of higher education from the inside out*. John Wiley & Sons.
- Christensen, C. M., Wang, D. & Van Bever, D. 2013. 'Consulting on the cusp of disruption'. *Harvard Business Review*, 91, 106-14.
- Christensen, C. M., Raynor, M. & McDonald, R. 2015. 'What is disruptive innovation?'. *Harvard Business Review*, 93, 44-53.
- Christensen, C. M., McDonald, R., Altman, E. J., & Palmer, J. E. 2018. 'Disruptive Innovation: An Intellectual History and Directions for Future Research'. *Journal of Management Studies*. 55 (7), 1043-1078.
- Cohill, A. M., Gilfoil, D. M., & Pilitsis, J. V. (1986). *A methodology for evaluating application software*. In Proceedings of the Human Factors Society Annual

- Meeting (Vol. 30, No. 1, pp. 14-18). September Sage CA: Los Angeles, CA: SAGE Publications.
- Coyne, J. G., Coyne, E. M., & Walker, K. B. 2015. 'Accounting Architecture: The new Face of AIS', (Working paper).
- Curtis, M. B., & Viator, R. E. 2000. 'An investigation of multidimensional knowledge structure and computer auditor performance'. *Auditing: A Journal of Practice & Theory*, 19(2), 83-103.
- Curtis, M. B., Jenkins, J. G., Bedarad, J. C., & Deis, D. R. 2009. 'Auditors' Training and Proficiency in Information Systems: A research Synthesis'. *Journal of Information Systems*, 23(1), 79-96.
- Damasiotis, V., Trivellas, P., Santouridis, I., Nikolopoulos, S., & Tsifora, E. 2015. 'IT Competences for Professional Accountants. A Review'. *Procedia - Social and Behavioral Sciences*, 175, 537-545. doi:10.1016/j.sbspro.2015.01.1234.
- Danneels, E. 2004. 'Disruptive technology reconsidered: A critique and research agenda'. *Journal of product innovation management*, 21(4), 246-258.
- Datanyze, 2018. Xero available at: <https://www.datanyze.com/market-share/accounting/xero>.
- Davenport, T. (2000). Putting the enterprise into the enterprise system. *Harvard Business Review*, 121-131.
- Delaney, A. (2018). *Embrace the magic of machine learning and you'll reap the rewards in no time*. Xero Blog. Available at: <https://www.xero.com/blog/2017/10/embrace-magic-machine-learning-reap-rewards/>. [Accessed on 13 May 2018].
- Deshmukh, A. 2006. *Digital Accounting: The Effects of the Internet and ERP on Accounting*. Hershey, PA: Idea Group Publishing; IIRM Press.
- Den Hertog, P. 2000. 'Knowledge – intensive business services as co-producers of innovation', *International Journal of Innovation Management*. 4(4). 491-528.
- Dijk, M., Wells, P., & Kemp, R. 2016. 'Will the momentum of the electric car last? Testing an hypothesis on disruptive innovation'. *Technological Forecasting and Social Change*, 105, 77-88.
- Dixon, T., Eames, M., Britnell, J., Watson, G. B., & Hunt, M. 2014. 'Urban retrofitting: Identifying disruptive and sustaining technologies using performative and foresight techniques'. *Technological Forecasting and Social Change*, 89, 131-144.
- Dimitriu, O., & Matei, M. 2014. 'A new paradigm for accounting through cloud computing'. *Procedia Economics and Finance*, 15, 840-846.
- Do, K. 2018. *IBISWorld Industry Report M6932- Accounting Services in Australia*. Available at: <https://www.ibisworld.com.au/industry-trends/market-research-reports/professional-scientific-technical-services/accounting-services.html>
- Dowling, C. 2009. 'Appropriate audit support system use: The influence of auditor, audit team, and firm factors'. *The Accounting Review*, 84(3), 771-810.
- Dowling, C., & Leech, S. 2007. 'Audit support systems and decision aids: Current practice and opportunities for future research'. *International Journal of Accounting Information Systems*, 8(2), 92-116.
- Drejer, I. 2004. 'Identifying innovation in surveys of services: a Schumpeterian perspective'. *Research Policy*, 33(3), 551-562. doi:10.1016/j.respol.2003.07.004
- Drury, R. (2016a). Transcript from Keynotes: *Accounting 2020 - A vision for where our*

- industry is going. Available at: <https://www.youtube.com/watch?v=kU-JGdUkVeQ&t=21s>
- Drury, R. 2016b. Transcript from *Reinventing Productivity*. Available at: <https://www.youtube.com/watch?v=vSmaQoPjUO0&t=292s>.
- Drury, R. 2017. *The Missing Millions*. Available at: <https://www.linkedin.com/pulse/missing-millions-rod-drury>. [Accessed on: 13 Jun 2018].
- Drury, R. 2018. Transcript from keynotes presented by Rod Drury at 2018 Xerocon. Available at: [https://www.youtube.com/watch?v=gu-e4uk\\_zbE&t=251s](https://www.youtube.com/watch?v=gu-e4uk_zbE&t=251s).
- El Sayed, H. 2006. 'ERPs and accountants' expertise: the construction of relevance'. *Journal of Enterprise Information Management*, 19(1), 83-96. doi:10.1108/17410390610636896
- Elbanna, A., & Newman, M. 2016. Disrupt the Disruptor: Rethinking 'Disruption' in Digital Innovation. In *MCIS* (p. 58).
- Ettredge, M., Richardson, V. J., & Scholz, S. 2001. 'The presentation of financial information at corporate Web sites'. *International Journal of Accounting Information Systems*, 2(3), 149-168.
- Fawcett, T. 2015, "The digital disruption", *Academic Leadership Series*, Vol. 6, pp. 34-40.
- Financial IT, 2018. *Sage Delivers 40 per cent reeduction potential queries with AI-powered chatbot*, Pegg. Available at: <https://financialit.net/news/infrastructure/sage-delivers-40-cent-reduction-potential-queries-ai-powered-chatbot-pegg>.
- Freeman, M., & Wells, P. 2015. *Reducing the expectation gap: using successful early career graduates to identify the capabilities that count*. Future Proofing the Profession: Preparing Business Leaders and Finance Professionals for, 2025, 67-78.
- Frey, C. B., & Osborne, M. A. 2017. 'The future of employment: how susceptible are jobs to computerisation?'. *Technological forecasting and social change*, 114, 254-280.
- Ferguson, C., & Seow, P. S. 2011. 'Accounting information systems research over the past decade: Past and future trends'. *Accounting & Finance*, 51(1), 235-251.
- Ganguly, A., Nilchiani, R., & Farr, J.V., 2010. 'Defining a set of metrics to evaluate the potential disruptiveness of a technology'. *Eng.Manage.J.* 22(1), 34-44.
- Gartner. 2018, IT Glossary, Available at: <https://www.gartner.com/it-glossary/cloud-computing/>. [Accessed at: 17 September 2018].
- Gartner. 2018, IT Glossary, Available at: <https://www.gartner.com/it-glossary/artificial-intelligence/>. [Accessed at: 17 September 2018]
- Galarza, M. 2017 February 1, The changing nature of accounting. *Strategic Finance*. Available at: <https://sfmagazine.com/post-entry/february-2017-the-changing-nature-of-accounting/> [Accessed on: 24 May 2018]
- Geerts, G. L., Graham, L. E., Mauldin, E. G., McCarthy, W. E., & Richardson, V. J. 2013. 'Integrating Information Technology into Accounting Research and Practice'. *Accounting Horizons*, 27(4), 815-840. doi:10.2308/acch-50573
- Gemici, E., & Alpan, L. 2015. *Disruptive Innovation Theory in Light of Practical Implications*. Paper presented at the Conference on Engineering And Technology Management GCETM-2015.
- Ghasemi, M., Shafeiepour, V., Aslani, M., Barvayeh, E. 2011. 'The impact of Information Technology (IT) on modern accounting systems'. *Procedia – Social and Behavioral Sciences*, 28, 112-116



- Giddens, A. 1984. *The constitution of society: Outline of the theory of structuration*: Univ of California Press.
- Govindarajan, V., & Kopalle, P. K. 2006a. 'Disruptiveness of innovations: measurement and an assessment of reliability and validity'. *Strategic Management Journal*, 27(2), 189-199.
- Govindarajan, V., & Kopalle, P. K. 2006b. 'The usefulness of measuring disruptiveness of innovations ex post in making ex ante predictions'. *Journal of product innovation management*, 23(1), 12-18.
- Grabski, S. V., Leech, S. A., & Schmidt, P. J. 2011. 'A Review of ERP Research: A Future Agenda for Accounting Information Systems'. *Journal of Information Systems*, 25(1), 37-78. doi:10.2308/jis.2011.25.1.37
- Granlund, M. 2007. *On the interface between management accounting and modern information technology-A literature review and some empirical evidence*. Working Paper.
- Granlund, M. 2011. 'Extending AIS research to management accounting and control issues: A research note'. *International Journal of Accounting Information Systems*, 12(1), 3-19. doi:10.1016/j.accinf.2010.11.001
- Granlund, M., & Malmi, T. 2002. 'Moderate impact of ERPS on management accounting: a lag or permanent outcome?' *Management Accounting Research*, 13(3), 299-321. doi:https://doi.org/10.1006/mare.2002.0189
- Gray, G., Chiu, V., Liu, Q., Li, P., 2014. The expert systems life cycle in AIS research: what does it mean for future AIS research? *Int. J. Account. Inf. Syst.* 15, 423-451.
- Green, B. N., Johnson, C. D., & Adams, A. 2006. 'Writing narrative literature reviews for peer-reviewed journals: secrets of the trade'. *Journal of chiropractic medicine*, 5(3), 101-117.
- Griffin, P. A., & Wright, A. M. 2015. 'Commentaries on Big Data's Importance for Accounting and Auditing'. *Accounting Horizons*, 29(2), 377-379. doi:10.2308/acch-51066.
- Grigg, I. 2005. 'Triple Entry Accounting'. *Systemics Inc.*
- Guthrie, J., & Murthy, V. 2009. 'Past, present and possible future developments in human capital accounting'. *Journal of Human Resource Costing & Accounting*, 13(2), 125-142.
- Guthrie, J., Evans, E., & Burritt, R. 2015. Work: past, present and future. *Academic leadership series*, 6, 9-22.
- Guthrie, J., & Parker, L. D. 2016. 'Whither the accounting profession, accountants and accounting researchers? Commentary and projections'. *Accounting, Auditing & Accountability Journal*, 29(1), 2-10.
- Guthrie, J., Ricceri, F., & Dumay, J. 2012. 'Reflections and projections: a decade of intellectual capital accounting research.' *The British Accounting Review*, 44(2), 68-82.
- Guttentag, D. 2015. 'Airbnb: disruptive innovation and the rise of an informal tourism accommodation sector'. *Current issues in Tourism*, 18(12), 1192-1217.
- Hang, C. C., Chen, J., & Yu, D. 2011. 'An assessment framework for disruptive innovation'. *Foresight*, 13(5), 4-13.
- Haddara, M., & Zach, O. 2011. *ERP Systems in SMEs: A Literature Review*. Paper

- presented at the The 44th Hawaii International Conferences on System Sciences, Hawaii.
- Hamel, G. 2000. *Leading the Revolution*. Boston, Massachusetts: Harvard Business School Press.
- Hassall, T., Joyce, J., Arquero Montaña, J. L., & Donoso Anes, J. A. 2005. Priorities for the development of vocational skills in management accountants: A European perspective. *Accounting Forum*, 29(4), 379-394. doi:10.1016/j.accfor.2005.03.002
- Hastings, C. I., & Solomon, L. 2005. Technology and the accounting curriculum: Where it is and where it needs to be. *Advances in Accounting*, 21, 275-296.
- Hoch, F., Kerr, M., & Griffith, A. 2001. *Software as a service: Strategic background*. Software & Information Industry Association (SIIA).
- Holtzman, Y. 2004. The transformation of the accounting profession in the United States. *Journal of Management Development*, 23(10), 949-961. doi:10.1108/02621710410566856.
- Hopp, C., Antons, D., Kaminski, J. and Salge, T. O. 2018a. 'Virtual Issue Editorial: Disruptive Innovation: Conceptual Foundations, Empirical Evidence, and Research Opportunities in the Digital Age', *Journal of Product Innovation Management*. 35(3), 446-457.
- Hopp, C., Antons, D., Kaminski, J. and Salge, T. O. 2018b. 'Virtual Issue Perspective: The topic landscape of disruption research: A call for consolidation, reconciliation, and generalization'. *Journal of Product Innovation Management*. 35(3), 458-487.
- Horn, M. B. & Pistone, M. R. 2016. *Disrupting Law School: How disruptive innovation will revolutionize the legal world*. Clayton Christensen Institute. Available at: <https://www.christenseninstitute.org/publications/disrupting-law-school/> [Accessed 20 Nov 2018]
- Howieson, B. 2003. Accounting practice in the new millennium: is accounting education ready to meet the challenge? *The British Accounting Review*, 35(2), 69-103. doi:10.1016/s0890-8389(03)00004-0.
- Hunton, J. E. 2002. Blending Information and Communication Technology with Accounting Research. *Accounting Horizons*, 16(1), 55-67.
- Hunton, J., Wright, A., & Wright, S. 2004. Are Financial Auditors Overconfident in Their Ability to Assess Risks Associated with Enterprise Resource Planning Systems?(Retracted). *Journal of Information Systems*, 18(2), 7-28.
- Hunton, J. E., & Rose, J. M. 2010. 21st Century Auditing: Advancing Decision Support Systems to Achieve Continuous Auditing. *Accounting Horizons*, 24(2), 297-312. doi:10.2308/acch.2010.24.2.297
- Hüsig, S., Hipp, C. & Dowling, M. 2005. 'Analysing disruptive potential: The case of wireless local area network and mobile communications network companies'. *R&D Management*, 35, 17-35.
- Hwang, J., & Christensen, C. M. 2008. Disruptive innovation in health care delivery: a framework for business-model innovation. *Health Aff (Millwood)*, 27(5), 1329-1335. doi:10.1377/hlthaff.27.5.1329.
- Hyvönen, T., Järvinen, J., & Pellinen, J. 2006. The role of standard software packages in mediating management accounting knowledge. *Qualitative Research in*

- Accounting & Management*, 3(2), 145-160.
- IBM, 2015. *Benefit of Cloud Computing*. Available at: <https://www.ibm.com/au-en/cloud/learn/benefits-of-cloud-computing>.
- International Bar Association (IBA), 2016. 'Times are a-changin': disruptive innovation and the legal profession, *IBA Legal Policy & Research Unit*, May.
- Jack, L., & Kholeif, A. 2008. Enterprise Resource Planning and a contest to limit the role of management accountants: A strong structuration perspective. *Accounting Forum*, 32(1), 30-45. doi:10.1016/j.accfor.2007.11.003
- Järvenpää, M. 2007. Making business partners: a case study on how management accounting culture was changed. *European Accounting Review*, 16(1), 99-142.
- Jones, M., & Xiao, J. 2004. *Financial reporting on the Internet by 2010: a consensus view*. Paper presented at the Accounting Forum.
- Jung, C., & Padman, R. 201. *Disruptive digital innovation in healthcare delivery: The case for patient portals and online clinical consultations The Handbook of Service Innovation* (pp. 297-318): Springer.
- Kanellou, A., & Spathis, C. 2013. 'Accounting benefits and satisfaction in an ERP environment'. *International Journal of Accounting Information Systems*, 14(3), 209-234. doi:10.1016/j.accinf.2012.12.002
- Kee, R. 1993. 'Data Processing Technology and Accounting: A Historical Perspective' *The Accounting Historians Journal*, 20(2), 187-216.
- Keller, A., & Hüsig, S. 2009. Ex ante identification of disruptive innovations in the software industry applied to web applications: The case of Microsoft's vs. Google's office applications. *Technological Forecasting and Social Change*, 76(8), 1044-1054. doi:10.1016/j.techfore.2009.03.005
- Kilkki, K., Mäntylä, M., Karhu, K., Hämmäinen, H., & Ailisto, H. 2018. 'A disruption framework'. *Technological Forecasting and Social Change*, 129, 275-284.
- King, A. 2015. *Ernst & Young buys data firm C3 Business Solutions*. *The Australian Financial Review*. Available at: <https://www.afr.com/business/accounting/ernst-and-young-buys-data-firm-c3-business-solutions-20150223-13ltkf>. [Accessed 14 Jan 2017].
- King, A. 2016. PwC's new 'hybrids' are a hot commodity. *The Australian Financial Review*.
- King, A. A., & Baartartogtokh, B. 2015. 'How useful is the theory of disruptive innovation?', *MIT Sloan Management Review* 57 (1), 77-90.
- Kostoff, R., Boylan, R., & Simons, G. 2004. Disruptive technology roadmaps. *Technological Forecasting and Social Change*, 71(1-2), 141-159. doi:10.1016/s0040-1625(03)00048-9.
- KPMG, 2016. Annual Report, Available at: <https://home.kpmg/au/en/home/media/press-releases/2016/08/fy16-results-8-aug-2016.print.html>.
- Krahel, J. P., & Vasarhelyi, M. A. 2014. AIS as a Facilitator of Accounting Change: Technology, Practice, and Education. *Journal of Information Systems*, 28(2), 1-15. doi:10.2308/isys-10412
- Kumaraswamy, Arun, Raghu Garud, & Shahzad Ansari. 2018. 'Perspectives on disruptive innovations'. *Journal of Management Studies* 55 1025-42.
- Lawson, R. L., Blocher, E., Brewer, P. C., Cokins, G., Sorensen, J. E., Stout, D. E.,

- Wouters, M. J. F. 2014. Focusing accounting curricula on students' long-run careers: Recommendations for an integrated competency-based framework for accounting education. *Issues in Accounting Education*, 29(2), 295–317.
- Liamputtong, P. 2013. *Qualitative research methods* (4 ed.). South Melbourne, VIC: Oxford University Press.
- Lepore, J. 2014. 'The disruption machine'. *The New Yorker*. June 23, 30–36.
- Lodh, S. C., & Gaffikin, M. J. 2003. Implementation of an integrated accounting and cost management system using the SAP system: a field study. *European Accounting Review*, 12(1), 85-121.
- Lo, B. 2018. *IBISWorld Industry Report J5420-Software Publishing in Australia*, Available at: <https://www.ibisworld.com.au/industry-trends/market-research-reports/information-media-telecommunications/except-internet-music-publishing/software-publishing.html> [Accessed on 20 September 2018]
- Lucas Jr, H.C., & Goh, J.M. 2009. 'Disruptive Technology: How Kodak Missed the Digital Photography Revolution', *The Journal of Strategic Information Systems*, 18(1), 46-55.
- Lv, P. 2017. 'Study on the Influence of Accounting Computerization on Accounting Development', *Advances in Social Science, Education and Humanities Research*, 101, 1022-1024.
- Macher, J. T., & Richman, B. D. 2004. Organisational responses to discontinuous innovation: a case study approach. *International Journal of Innovation Management*, 8(1), 87-114.
- Macpherson, S. 2016 October 1. *How will the cloud disrupt practice management software*. Available at: <https://www.intheblack.com/articles/2016/10/01/how-will-cloud-disrupt-practice-management-software>. [Accessed on 10 May 2018].
- Macpherson, P. 2018 August 7. New Accounting software heads to the cloud. *The Acuity*. Available at: <https://www.acuitymag.com/technology/new-accounting-software-heads-to-the-cloud>. [Accessed on 12 December 2018].
- Markides, C. 2006. 'Disruptive innovation: In need of better theory'. *Journal of Product Innovation Management*, 23, 19-25.
- Markides, C., & Geroski, P. A. 2004. *Fast second: How smart companies bypass radical innovation to enter and dominate new markets* (Vol. 325): John Wiley & Sons.
- Marvasti, A. 2004. *Qualitative Research in Sociology*. Sage
- McGinnis, J. O., & Pearce, R. G. 2014. 'The great disruption: How machine intelligence will transform the role of lawyers in the delivery of legal services'. *Fordham L. Rev.*, 82, 3041.
- McClelland, C. 2017. The Difference Between Artificial Intelligence, Machine Learning, and Deep Learning. Available at: <https://medium.com/iotforall/the-difference-between-artificial-intelligence-machine-learning-and-deep-learning-3aa67bff5991>. [Accessed on 5 December 2018]
- McLoughlin, L. 2014. IMHO: The revamped Xero Program. Available at: <https://www.e-bas.com.au/bookkeeping-blog/imho-the-revamped-xero-partner-program>
- MYOB. 2015. *Annual report*. Available at: <https://investors.myob.com.au/Investors/?page=financial-reports>.
- MYOB. 2016. *Annual report*. Available at: <https://investors.myob.com.au/Investors/?page=financial-reports>

- MYOB. 2017. *Annual report*. Available at: <https://investors.myob.com.au/Investors/?page=financial-reports>.
- MYOB. 2018 March 12. MYOB Leads the Way with AI; Lauches MYOB Advisor, Available at: <https://www.myob.com/au/about/news/2018/myob-leads-the-way-with-ai>.
- Nagy, D., Schuessler, J., & Dubinsky, A. 2016. Defining and identifying disruptive innovations. *Industrial Marketing Management*, 57, 119-126. doi:10.1016/j.indmarman.2015.11.017
- Newman, M., & Westrup, C. 2005. Making ERPs work: accountants and the introduction of ERP systems. *European Journal of Information Systems*, 14(3), 258-272. doi:10.1057/palgrave.ejis.3000539
- Norfleet, N. 2017, April 18 Robotic Software Sweeping Large Accounting Firms and Clients, *The Australian Financial Review*, Available at: <https://www.afr.com/business/accounting/robotic-software-sweeping-large-accounting-firms-and-clients-20170418-gvmkap>. [Accessed 20 May 2018].
- O'Leary, D. E. 2004. Enterprise resource planning (ERP) systems: an empirical analysis of benefits. *Journal of emerging Technologies in Accounting*, 1(1), 63-72.
- O'Loughlin, E. 2015. *Consumer Confidence in Cloud-based Accounting – 2015*. Software Advise. Available at: <https://www.softwareadvice.com/resources/cloud-based-accounting-confidence/>. [Accessed on 16 August 2018].
- O'Mahony, A., & Doran, J. 2009. The changing role of management accountants; Evidence from the implementation of ERP Systems in large organisations. *International Journal of Business and Management*, 3(8), 109.
- Omoteso, K., Patel, A., & Scott, P. 2010. 'Information and communications technology and auditing: current implications and future directions'. *International Journal of Auditing*, 14(2), 147-162.
- Paap, J., & Katz, R. 2004. 'Anticipating disruptive innovation'. *Research-Technology Management*, 47(5), 13-2.
- Parker, M. 2002. *Against management: Organization in the age of managerialism*: Polity Press in association with Blackwell.
- Pegoraro, A. 2014. 'Twitter as Disruptive Innovation in Sport Communication'. *Communication & Sport*. 2 (2). 132-137
- Pepe, A. A. 2011. The evolution of technology for the accounting profession. *CPA Practice Advisor (April)*. Available at: <http://www.cpapracticeadvisor.com/article/10263076/the-evolution-of-technology-forthe-accounting-profession> [Accessed 13 Dec 2018]
- Petticrew, M., & Roberts, H. 2008. *Systematic reviews in the social sciences: A practical guide*: John Wiley & Sons.
- Poston, R., & Grabski, S. 2000. Accounting Information Systems Research: Is it Another QWERTY. *International Journal of Accounting Information Systems*, 1(1), 9-53.
- Poston, R., & Grabski, S. 2001. Financial impacts of enterprise resource planning implementations. *International Journal of Accounting Information Systems*, 2(4), 271-294.

- Power, B. 2018, Xero Goes Global. List@ASX. Available at: <https://www.xero.com/blog/wp-content/uploads/2018/05/Xero.pdf>.
- PricewaterhouseCoopers, 2015, *A smart move - future-proofing Australia's workforce by growing skills in science, technology, engineering and maths*, Available at: <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>. [Accessed 28 Nov 2017]
- Qu, S., & Dumay, J. 2011. The qualitative research interview. *Qualitative Research in Accounting & Management*, 8(3), 238-264.
- Rackliffe, R. U., & Ragland, L. 2016. 'Excel in the accounting curriculum: perceptions from accounting professors'. *Accounting Education*, 25(2), 139-166.
- Ramachandran Rackliffe, U., & Ragland, L. 2016. 'Excel in the accounting curriculum: perceptions from accounting professors'. *Accounting Education*, 25(2), 139-166.
- Rao, B., Angelov, B. and Nov, O. 2006. 'Fusion of disruptive technologies: Lessons from the skype case'. *European Management Journal*, 24, 174-88.
- Ray Morgan, 2017. *Image of Professions Survey 2017*. Available at : <http://www.roymorgan.com/findings/7244-roy-morgan-image-of-professions-may-2017-201706051543>. [Accessed at 15 Jan 2018]
- Redrup, Y. 2015. Deloitte acquires Cloud Solutions Group. *The Australian Financial Review*. Available at <https://www.afr.com/technology/deloitte-acquires-cloud-solutions-group-20151106-gksfde>. [Accessed at 15 Jan 2016]
- Richins, G., Stapleton, A., Stratopoulos, T. C., & Wong, C. 2017. Big Data analytics: Opportunity or threat for the accounting profession?. *Journal of Information Systems*, 31(3), 63-79.
- Rikhardsson, P., & Kræmmergaard, P. 2006. 'Identifying the impacts of enterprise system implementation and use: Examples from Denmark'. *International Journal of Accounting Information Systems*, 7(1), 36-49.
- Robertson, C. B. 2012. 'The Facebook Disruption: How Social Media May Transform Civil Litigation and Facilitate Access to Justice'. *Ark. L. Rev.*, 65, 75.
- Rom, A., & Rohde, C. 2006. Enterprise resource planning systems, strategic enterprise management systems and management accounting. *Journal of Enterprise Information Management*, 19(1), 50-66. doi:10.1108/17410390610636878.
- Rom, A., & Rohde, C. 2007. 'Management accounting and integrated information systems: A literature review'. *International Journal of Accounting Information Systems*, 8(1), 40-68. doi:10.1016/j.accinf.2006.12.003.
- Rose, S., Hair, N., & Clark, M. 2011. Online customer experience: A review of the business-to-consumer online purchase context. *International Journal of Management Reviews*, 13(1), 24-39.
- Rowley, J. 2002. 'Using case studies in research'. *Management research news*, 25(1), 16-27.
- Ruan, Y., Hang, C. C., & Wang, Y. M., 2014. 'Government's role in disruptive innovation and industry emergence: the case of the electric bike in China'. *Technovation*. 34 (12), 785-796.
- Ryan, E. 2012. 'The evolution of accounting software: past, present, future'. *The Journal of the Global Accounting Alliance*. Available at: <http://www.gaaaccounting.com/the-evolution-of-accounting-software-past-present-and-future/>. [Accessed 10 Jan 2019]



- Sánchez-Rodríguez, C., & Spraakman, G. 2012. 'ERP systems and management accounting: a multiple case study'. *Qualitative Research in Accounting & Management*, 9(4), 398-414. doi:10.1108/11766091211282689
- Sangster, A., Leech, S. A., & Grabski, S. V. 2009. 'ERP Implementations and Their Impact upon Management Accountants'. *Journal of Information Systems and Technology Management*, 6(2), 125-142.
- Sayer, P. 2018 October 17. Intuit adds AI, enterprise features to Quickbooks online, Available at: <https://www.cio.com/article/3314536/intuit-adds-ai-enterprise-features-to-quickbooks-online.html>.
- Scapens, R. W., & Jazayeri, M. 2003. 'ERP systems and management accounting change: opportunities or impacts? A research note'. *European Accounting Review*, 12(1), 201-233. doi:10.1080/0963818031000087907
- Scarbrough, & Corbett, J. M. 1992. *Technology and Organization: Power, Meaning, and Design*: Routledge.
- Schmidt, G. M., & Druehl, C. T. 2008. When Is a Disruptive Innovation Disruptive? *Journal of product innovation management*, 25(4), 347-369.
- Seethamraju, R. 2015. Adoption of software as a service (SaaS) enterprise resource planning (ERP) systems in small and medium sized enterprises (SMEs). *Information systems frontiers*, 17(3), 475-492.
- Shaikh, J. M. 2005. 'E-commerce impact: Emerging technology–electronic auditing'. *Managerial Auditing Journal*, 20(4), 408-421.
- Sheppard, B. 2015. 'Incomplete innovation and the premature disruption of legal services'. *Mich. St. L. Rev.*, 1797.
- Silverman, D. 2013. *Doing qualitative research: A practical handbook*. SAGE Publications Limited.
- Sledgianowski, D., Gomaa, M., & Tan, C. 2017. 'Toward integration of Big Data, technology and information systems competencies into the accounting curriculum'. *Journal of Accounting Education*, 38, 81-93.
- Smith, P. 2015. KPMG buys Australian tech firm Hands-on Systems as Big Four tech push continues. The Australian Financial Review. (September 1). Available at: <https://www.afr.com/technology/kpmg-buys-australian-tech-firm-handson-services-as-big-four-tech-push-continues-20150828-gj9o4r>. [Accessed at 23 Jan 2017].
- Sood, A. and Tellis, G. J. 2011. 'Demystifying disruption: A new model for understanding and predicting disruptive technologies'. *Marketing Science*, 30, 339-54.
- Sorenson, O., & Fleming, L. 2004. Science and the diffusion of knowledge. *Research policy*, 33(10), 1615-1634.
- Spathis, C., & Ananiadis, J. 2005. 'Assessing the benefits of using an enterprise system in accounting information and management'. *Journal of Enterprise Information Management*, 18(2), 195-210.
- Spraakman, G., O'Grady, W., Askarany, D., & Akroyd, C. 2015. 'Employers' Perceptions of Information Technology Competency Requirements for Management Accounting Graduates'. *Accounting Education*, 24(5), 403-422.

doi:10.1080/09639284.2015.1089177

- Stein, D., Chen, C., & Ackerly, D. C. 2015. 'Disruptive innovation in academic medical centers: balancing accountable and academic care'. *Academic Medicine*, 90(5), 594-598.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research techniques*. Thousands Oaks: Sage publications.
- Subramanian, A. M., Chai, K., & Mu S, 2011. 'Capability reconfiguration of incumbent firms : Nintendo in the video game industry', *Technovation*, 31, 228-239.
- Susskind, R. 2013. Tomorrow's Lawyers. *Law Prac.*, 39, 34.
- Susskind, R. E., & Susskind, D. 2015. *The future of the professions: How technology will transform the work of human experts*. Oxford University Press, USA.
- Susskind, R. E. 2017. *Tomorrow's lawyers: An introduction to your future*. Oxford University Press.
- Sutton, G. 2006. 'Enterprise systems and the re-shaping of accounting systems: A call for research'. *International Journal of Accounting Information Systems*, 7(1), 1-6. doi:10.1016/j.accinf.2006.02.002.
- Swan, D. 2015 October 23. Xero denies security breach, *The Australian*, Available at: <https://www.theaustralian.com.au/business/technology/xero-denies-security-breach/news-story/60bc4631570d1dbde26eee16f1d0eddf>. [Accessed on 20 September 2018].
- Tam, T. 2013. What IT Knowledge and Skills do Accounting Graduates Need? *New Zealand Journal of Applied Business Research*, 11(2), 23-42.
- Tan, F.C., Tan, B. & Land, L. 2015. *The Affordance of Gamification in Enabling a Digital Disruptor: A Case Study of the goCatch Taxi Booking App*, 48th Hawaii International Conference on System Sciences, Hawaii.
- Taylor, B. M. 2015. 'The integrated dynamics of motivation and performance in the workplace'. *Performance Improvement*, 54(5), 28-37.
- Tan, F.C., Tan, B. & Land, L. 2015. 'The Affordance of Gamification in Enabling a Digital Disruptor: A Case Study of the goCatch Taxi Booking App', 48th Hawaii International Conference on System Sciences, Hawaii.
- Tellis, G. J., Prabhu, J. C., & Chandy, R. K. 2009. Radical innovation across nations: The preeminence of corporate culture. *Journal of marketing*, 73(1), 3-23.
- The Committee for Economic Development of Australia (CEDA), 2015, *Australia's future workforce?* Available at: <http://www.ceda.com.au/Research-and-policy/All-CEDA-research/Research-catalogue/Australia-s-future-workforce> [Accessed 18 Jan 2017]
- Thomson, J. & Drummond, S. 2016 May 12. Xero claims on "pathway" to profit as cash burns slows. *The Australian Financial Review*. Available at: <https://www.afr.com/business/accounting/xero-still-hunts-maiden-profit-but-revenue-soars-20160512-got38h>. [Accessed on 15 Jun 2018].
- Thomond, P., & Lettice, F. 2002. Understanding and enabling disruptive innovation. In *Proceedings of the British Academy of Management Annual Conference* (pp. 9-11).
- Thomond, P., Herzberg, T., & Lettice, F. 2003. *Disruptive innovation: Removing the innovators dilemma*. Paper presented at the British Academy of Management Annual Conference: 'Knowledge into Practice'.



- The Association of Chartered Certified Accountants (ACCA), 2016, *Professional accountants – the future: Drivers of Change and Future Skills*, Available at: <https://www.accaglobal.com/an/en/technical-activities/technical-resources-search/2016/june/professional-accountants-the-future-report.html>. [Accessed on 13 May 2017].
- The Australian Taxation Office, 2018, *Operational Framework for Digital Service Providers-version 1*. Available at: [https://softwaredevelopers.ato.gov.au/sites/default/files/resource-attachments/Operational\\_Framework\\_Final\\_Implementation\\_Approach\\_v1.0.pdf](https://softwaredevelopers.ato.gov.au/sites/default/files/resource-attachments/Operational_Framework_Final_Implementation_Approach_v1.0.pdf). [Accessed on 10 December 2018].
- Tingey-Holyoak, J. L., & Burritt, R. 2009. *The sustainability agenda: a preliminary investigation of accountancy firm managers' perceptions of support from the professional bodies* (Doctoral dissertation, University of South Australia).
- Vakalofotis, N., Ballantine, J., & Wall, A. 2011. *A Literature Review on the Impact of Enterprise Systems on Management Accounting*. Paper presented at the The 8th International Conference on Enterprise Systems, Accounting and Logistics, Thassos Island, Greece.
- VanWynsberghe, R., & Khan, S. 2007. Redefining case study. *International Journal of Qualitative Methods*, 6(2), 80-94.
- Vatanasakdakul, S., & Aoun, C. 2011. 'Why don't accounting students like AIS?'. *International Journal of Educational Management*, 25(4), 328-342.
- Vecchiato, R. 2017. Disruptive innovation, managerial cognition, and technology competition outcomes. *Technological Forecasting and Social Change*, 116, 116-128. doi:10.1016/j.techfore.2016.10.068
- Velcu, O. 2007. 'Exploring the effects of ERP systems on organizational performance: Evidence from Finnish companies'. *Industrial Management & Data Systems*, 107(9), 1316-1334.
- Vesti, H., Nielsen, C., Rosenstand, C. A. F., Massaro, M., & Lund, M. 2017. *Structured Literature Review of disruptive innovation theory within the digital domain*. In *ISPIM Innovation Symposium* (pp. 1-19). The International Society for Professional Innovation Management (ISPIM) in December.
- Wagner, M. 2016. Managing disruptive innovation with technology acquisitions: the informing case of software-based high-technology industries. *Technology Analysis & Strategic Management*, 28(8), 979-991. doi:10.1080/09537325.2016.1181736.
- Wallbank, P. 2016. Xero will focus on cloud and the world. *The Australian*. Available at: <https://www.theaustralian.com.au/business/technology/xero-will-focus-on-cloud-and-the-world/news-story/6d6bc8c302185be8448cc3fa122df5ae>
- Wan, F., Williamson, P. J., & Yin, E. 2015. Antecedents and implications of disruptive innovation: Evidence from China. *Technovation*, 39, 94-104.
- Watson, A. 2016 December 1. From Accounting Practice to Professional Service Firm. *The Acuity*. Available at: <https://www.acuitymag.com/finance/from-accounting-practice-to-professional-services-firm>. [Accessed on 15 December 2018].
- Webster, J., & Watson, R. T. 2002. 'Analyzing the past to prepare for the future: Writing a literature review'. *MIS quarterly*, xiii-xxii
- Weeks, M 2015. Is disruption theory wearing new clothes or just naked? Analyzing

- recent critiques of disruptive innovation theory, *Innovation*, 17:4, 417-428, DOI: 10.1080/14479338.2015.1061896
- Wessels, P. L. 2005. 'Critical information and communication technology (ICT) skills for professional accountants'. *Meditari Accountancy Research*, 13(1), 87-103. doi:10.1108/10222529200500006.
- Williams, T. 2015. *IBISWorld Industry Report M6932- Accounting Services in Australia*. Available at: <https://www.ibisworld.com.au/industry-trends/market-research-reports/professional-scientific-technical-services/accounting-services.html>
- Windle, P. 2017. *IBISWorld Industry Report M6932- Accounting Services in Australia*. Available at: <https://www.ibisworld.com.au/industry-trends/market-research-reports/professional-scientific-technical-services/accounting-services.html>
- World Economic Forum. 2018. *The Future of Jobs Report*. Available at: <https://www.weforum.org/reports/the-future-of-jobs-report-2018>. [Accessed 15 Jan 2019].
- Wright, S., & Wright, A. M. 2002. 'Information system assurance for enterprise resource planning systems: unique risk considerations'. *Journal of Information Systems*, 16(s-1), 99-113.
- Xero Ltd. 2008. *2000 Customers*. Available at: <https://www.xero.com/blog/2008/08/2000-customers/>. [Accessed on 13 June 2018].
- Xero Ltd. 2015. *Annual report*. Available at: <https://www.xero.com/au/about/investors/>
- Xero Ltd. 2016. *Annual report*. Available at: <https://www.xero.com/au/about/investors/>
- Xero Ltd. 2017a. *How artificial intelligence and machine learning will transform accounting*. Xero Blog. Available at: <https://www.xero.com/blog/2017/02/artificial-intelligence-machine-learning-transform-accounting/>
- Xero Ltd. 2017b. *Xero's SWA superpower*. Available at: <https://www.xero.com/blog/2016/12/xeros-aws-superpowers/>.
- Xero Ltd. 2017c. *Introducing the Xero Partner Code of Conduct*. Available at: <https://www.xero.com/blog/2017/03/xero-partner-code-conduct/>. [Accessed on 20 June 2018].
- Xero Ltd. 2017d. *Annual report*. Available at: <https://www.xero.com/au/about/investors/>
- Xero Ltd. 2017e. *Teaching a robot accounting*. Xero Blog. Available at: <https://www.xero.com/blog/2017/03/teaching-robot-accounting/>
- Xero Ltd. 2018a. *Annual report*. Available at: <https://www.xero.com/au/about/investors/>
- Xero Ltd. 2018b. *Xero Market Place*. Available at: <https://www.xero.com/au/marketplace/>
- Xero Ltd. 2018c. *Xero 2018 Roadshow*.
- Yin, R. K. 2017. *Case study research and applications: Design and methods*. Sage publications.
- Yoo, T. 2017 September 22. *Scammers are sending out fake invoices that look exactly like they're from Xero, MYOB, and Sage*, *Business Insider*, Available at:

- <https://www.businessinsider.com.au/xero-myob-scam-accounting-emails-2017-9>. [Accessed on 14 Jun 2018].
- Yoon, K., Hoogduin, L., & Zhang, L. 2015. 'Big data as complementary audit evidence'. *Accounting Horizons*, 29(2), 431-438.
- Yu, D., and C. C. Hang. 2010. 'A reflective review of disruptive innovation theory'. *International Journal of Management Reviews*, 12 (4). 435-52.

## 7. Appendices

### Appendix A: ICTs based accounting research paper classification scheme

<b>A. Journal category</b>	A1. Accounting Journal
	A2. Information System Journal
	A3. Other Journals
<b>B. Research Method</b>	B1. Literature Review/Synthesis
	B2. Case/Field Study
	B3. Survey/Questionnaire
	B4. Analytical
	B5. Experiment
	B6. Model Building
<b>C. Underlying Theory</b>	C1. Organizational behavior
	C2. Social Psychology
	C3. Cognitive psychology
	C4. Literature Review/Synthesis
	C5. Computer Science
	C6. No theory
<b>D. Research Topics</b>	D1. ICTs & Accounting professionals' activities and responsibilities
	D2. ICTs & Accounting professionals' skills and knowledge
	D3. ES & Accounting professionals' activities and responsibilities
	D4. ES & Accounting professionals' skills and knowledge
	D5. Others

## Appendix B. The List of Journals and number of papers

Accounting Journal	Journal of accounting Education	1
	Accounting Education	1
	Management accounting research	1
	European Accounting Review	3
	The British Accounting Review	1
	Accounting Forum	2
	Meditari Accountancy Research	1
	Managerial Auditing Journal	1
	Qualitative Research in Accounting & Management	2
	International Journal of Accounting Information System	4
	Journal of Accounting & Organizational Change	2
	Audit Financial	1
	International Journal of Auditing	1
	JAMAR	1
	Accounting Horizon	6
<b>Total</b>		<b>28</b>
IS Journals	Journal of Information System	8
	European Journal of Information system	1
	Journal of Enterprise Information Management	1
	Journal of Information Systems and Technology Management	1
	Industrial Management & Data Systems	1
<b>Total</b>		<b>12</b>
Management Journals	Management Research News	1
	European Journal of Management and Public Policy	1
	Journal of Management Development	1
	Management Systems in Production Engineering	1
	International Journal of Business & Management	1
Others	Journal of Education for Business	1
	International Journal of Economic Sciences and Applied Research	1
	New Zealand Journal of Applied Business Research	1
<b>Total</b>		<b>8</b>
<b>In Total</b>		<b>48</b>

***Journal Code:***

AF:	Accounting Forum
AH:	Accounting Horizon
AFr:	Audit Financiar
AOS:	Accounting, Organization and Society
AE:	Accounting Education
BAR:	The British Accounting Review
EAR:	European Accounting Review
EBR:	European Business Review
IJA:	International Journal of Auditing
IJAIS:	International Journal of Accounting Information System
IMDS:	Industrial Management and Data Systems
JAOC:	Journal of Accounting and Organization Change
JAE:	Journal of Accounting Education
JEIM:	Journal of Enterprise Information Management
JIS:	Journal of Information System
JISTM:	Journal of Information Systems and Technology Management
MAR:	Management Accounting Research
MF:	Managerial Finance
MRN:	Management Research News
MSPE:	Management Systems in Production Engineering
PSBS:	Pociedia-Social Behavioral Sciences
QRAM:	Qualitative Research in Accounting and Management

## Appendix C. Categories for Classification: 2000-2016

Journal Type	No.	% of Total	Research Method	No.	% of Total	Underlying Theory	No.	% of Total
Accounting	28	58	Literature Review & Synthesis	18	38	Literature Review & Synthesis	18	38
IS	12	25	Case study & Field	13	27	Organization Behavior	5	10
Management	5	10	Survey	9	19	Social Psychology	3	7
Others	3	7	Analytical	2	4	Cognitive Psychology	7	14
			Experiment	1	2	Computer Science	6	12
			Model	5	10	None	9	19
<b>Total paper categorized</b>	48			48			48	

### Appendix D: List of selected articles

No.	Year	Author(s)	Title	Journal	Underlying Theory	Research Method	General Theme
1	2000	Olivier	Challenges facing the accountancy profession	EAR	Literature Review & Synthesis	Literature Review & Synthesis	Topics: Business reporting on the internet and general accounting professionals Focus: The lost of identify and specialization issues
2	2000	Hunton	Blending Information and Communication Technology with Accounting Research	AH	Computer Science	Model building	Topics: ICTs and general accounting professionals Focus: new role of accountants to add value to business
3	2002	Granlund & Malmi	Moderate impact of ERPs on management accounting: a lag or permanent outcome?	MAR	None	Field Study	Topics: ERP and management accountants Focus: New role of accountants in ERP environment
4	2002	Banker et al	Impact of Information Technology on Public Accounting Firm Productivity	JIS	Organizational behavior	Analytical	Topics: ICTs and auditor Focus: IT has positive impact on auditor performance at different level
5	2003	Ahmed	The level of IT/IS skills in accounting programmes in British Universities	MRN	None	Survey	Topics: ICTs and skills/knowledge in accounting Focus: Hybrid accountants and gaps between employer's expectation and current skills of accounting students
6	2003	Caglio	Enterprise Resource Planning systems and accountants: towards hybridization?	EAR	Social Psychology (Structuration Theory)	Case Study	Topics: ICTs and general accounting professionals



							Focus: Hybridization of accounting and other professionals
7	2003	Scapen & Jazayer	ERP systems and management accounting change: Opportunities or impacts? A research note	EAR	Organizational behavior	Case Study	Topics: ERPs and management accountants Focus: Changes in roles of management accountants
8	2003	Howieson	Accounting practice in the new millennium: is accounting education ready to meet the challenge?	BAR	Literature Review & Synthesis	Literature Review / Synthesis	Topics: ICTs and new requirements in general accounting skill/knowledge
9	2004	Holtzman	The transformation of the accounting profession in the United States: From information processing to strategic business advising	JMD	Literature Review & Synthesis	Literature Review & Synthesis	Topics: ICTs and changing role of general accounting professionals
10	2004	Hunton et al.	Are Financial Auditors Overconfident in Their Ability to Assess Risks Associated with Enterprise Resource Planning Systems?	JIS	Cognitive Psychology	Experiment	ERPs and auditors' knowledge of system
11	2005	Newman & Westrup	Making ERPs work: accountants and the Introduction of ERP systems	EJIS	Computer Science (Technology power loop Model)	Model Building	ERPs and changing responsibilities of management accountants
12	2005	Hassall et al.	Priorities for the development of vocational skills in management accountants: A European perspective	AF	Cognitive Psychology	Survey	ICTs and skills/knowledge changes in management accountants
13	2005	Wessel	Critical information and communication technology (ICT) skills for professional accountants	MED	Literature Review & Synthesis	Literature Review & Synthesis	ICTs and skills/knowledge changes in general accounting professionals
14	2005	Khadaroo	Corporate reporting on the internet: some implications for the auditing profession	MAJ	None	Analytical	Online reporting and auditor
15	2005	Lamberton et al	Tolerance for Ambiguity and IT Competency among Accountants	JIS	None	Survey	IT skills and general accounting professional
16	2006	Hyvönen et al	The role of standard software packages in mediate Management accounting knowledge	QRAM	None	Case Study	ESs and management accounting knowledge

17	2006	Jackling & Spaakmen	The Impact of Enterprise Resource Planning Systems on Management Accounting: an Australian Study	EJMPP	Organizational behavior	Survey	ERPs and role of management accountants
19	2006	El Sayed	ERPs and accountants' expertise: the construction of relevance	JEIM	Organizational behavior	Case Study	ERPs and role of accountants
20	2006	Sutton	Enterprise systems and the re-shaping of accounting systems: A call for research	IJAIS	Literature Review & Synthesis	Literature Review & Synthesis	ICTs impact on general accounting professionals
21	2007	Rom & Rhodes	Management accounting and integrated information systems: a literature review	IJAIS	Literature review & synthesis	Literature Review & Synthesis	IIS and management accountant
22	2007	Arnold & Sutton	The Impact of enterprise Systems on Business and audit Practice and the Implications for University accounting education	IJEIS	Literature review & synthesis	Literature review & synthesis	ICTs and skills/knowledge changes in accounting professionals
23	2008	Jack & Kholeif	Enterprise resource planning and a contest to limit the role of management accountants: a strong structuration perspective	AF	Social Psychology (Structuration Theory)	Case Study	ERPs and role of management accountants
24	2008	Mahony & Doran	The changing role of management accountants; evidence from the implementation of ERP systems in large organizations	IJBM	Organization Behavior	Case study	ERPs and role of managements accountants
25	2009	Madni	The role of internal auditors in ERP-based organizations	JAOC	Literature Review and synthesis	Literature Review and synthesis	ERPs and internal auditors
26	2009	Sangster et al.	ERP Implementations and Their Impact Upon Management Accountants	JISTM	Computer science	Questionnaire	ERPs and management accountants
27	2009	Curtis et al.	Auditors' Training and Proficiency in Information Systems: A Research Synthesis	JIS	Literature Review & synthesis	Literature Review & synthesis	ICTs and auditors' skills/knowledge
28	2010	Hunton & Rose	21st Century Auditing: Advancing Decision Support Systems to Achieve Continuous Auditing	AH	Literature Review & synthesis	Literature Review & synthesis	DSS and auditors
29	2010	Kuhn & Sutton	Continuous Auditing in ERP System Environments: The Current State and Future Directions	JIS	Computer Science	Model Building	ERPs and auditors

30	2010	Omoteso et al	Information and Communications Technology and Auditing: Current Implications and Future Directions.	IJA	Social Psychology (Structuration Theory)	Field study Interview & Questionnaire	ICTs and auditors
31	2011	Granlund	Extending AIS research to management accounting and control issues: A research note	IJAIS	Literature review & Synthesis	Literature review & Synthesis	ICTs and management accountants
32	2011	Grabski et al.	A review of ERP research: a future agenda For accounting information systems	JIS	Literature review & Synthesis	Literature review & Synthesis	ERPs and management accountants
33	2012	Chen et al.	The ERP system impact on the role Of accountants	IMDS	None	Questionnaire	ERPs and role of general accountants
34	2012	Maruszewska	Implementation of enterprise resource planning system and change in accountant's Role - Polish perspective	MSPE	Literature review & Synthesis	Literature review & Synthesis	ERPs and role of general accountants
35	2012	Balzli & Morard	The impact of an integrated financial system Implementation on accounting profiles in a public administration	JAOC	Cognitive Psychology	Case Study	ISF and skills/knowledge of general accountants
36	2012	Sánchez-rodríguez, & spraakman	ERP systems and management accounting: a Multiple case study	QRAM	None	Case Study	ERPs and management accountants
37	2013	Kanellou & Spathis	Accounting benefits and satisfaction in an ERP environment	IJAIS	Cognitive Psychology	Questionnaire	ERPs and general accountants
38	2013	Gullkvist	Drivers of Change in Management Accounting Practices in an ERP Environment	IJESAR	Computer Science	Model Building	ERPs and management accountants
39	2013	Tam	What IT knowledge and skills do accounting graduates need?	NZJAB R	Cognitive psychology	Filed study	ICTs and skills/knowledge of general accountants
39	2014	Ragland & Ramachandran	Towards an understanding of excel functional skills needed for a career in public accounting:	JAE	Cognitive psychology	Survey	Excels and skills/knowledge of accountants

			perceptions from public accountants and accounting students				
41	2014	Singh et al.	Continuous Auditing and Continuous Monitoring in ERP Environments: Case Studies of Application Implementations	JIS	None	Case Study	ERPs and auditors
42	2015	Alles	Drivers of the Use and Facilitators and Obstacles of the Evolution of Big Data by the Audit Profession	AH	Literature review & synthesis	Literature review & synthesis	Big data and auditor
43	2015	Brown-Liburd et al	Behavioral Implications of Big Data's Impact on Audit Judgment and Decision Making and Future Research Directions	AH	Literature Review & Synthesis	Literature Review & Synthesis	Big data and Auditors
44	2015	Spraakman et al.	Employers' Perceptions of Information Technology Competency Requirements for Management Accounting Graduates.	AE	Cognitive Psychology	Field Study	ICTs and skills/knowledge of management accountants
45	2015	Pickard & Cokins	From Bean Counters to Bean Growers: Accountants as Data Analysts-A Customer Profitability example	AH	Computer Science	Model Building	Data analytical tools and role of accountants
46	2015	Ratnatunga	The Impact of New Technologies on the Management accountant	JAMAR	Literature Review & Synthesis	Literature Review & Synthesis	ICTs and management accountant
47	2015	Brown-Liburd et al.	Behavioral implications of Big Data's impact on audit judgment and decision making and future research directions	AH	Literature Review & Synthesis	Literature Review & Synthesis	Big data and auditors activities
48	2016	Pan & Seow	Preparing Accounting Graduates for Digital Revolution: A Critical Review of Information Technology Competencies and Skills Development	JEB	Literature Review & Synthesis	Literature Review & Synthesis	ICTs and skills/knowledge in general accountants

## Appendix E. Brief Summary of Definitions of Disruption in Previous Literature

Authors & Years	Definition/Description
Bower & Christensen (1996)	The innovation <i>disrupts an established trajectory of performance improvement</i> , or <i>re-defines</i> what performance means in the industry.
Christensen (1997)	A process by which a product or service takes root initially in simple applications at the bottom of a market or in a new market, and then relentlessly moves up market, eventually displacing established competitors.
Thomond <i>et al.</i> (2003)	A successfully exploited product, service or business model that <i>significantly transforms</i> the demands and needs of an existing market and disrupts its former key players.
Danneels (2004)	Disruptive technology...changes the basis of competition by <i>changing the performance metrics</i> along which firms compete.
Govindarajan and Kopalle (2006)	A disruptive innovation introduces <i>a different set of features and performance attributes</i> relative to the existing products and being offered at a lower price, a combination unattractive to mainstream customers at the time the product is introduced due to inferior performance on the attributes mainstream customers value. However, a new customer segment (or the more price-sensitive mainstream market) sees value in the innovation's new attributes and the lower price. Over time, subsequent developments raise the new product's attributes to a level sufficient to satisfy mainstream customers, thus potentially attracting more of the mainstream market.
Keller and Hüsigg (2009)	<p>(1) The innovation allows for a product with <i>a new combination of performance attributes</i> (including the price).</p> <p>(2) The resulting product misses main market expectations in one or more established attributes and therefore targets only a niche.</p> <p>(3) Incumbents ignore the niche because of incompatible processes or values.</p> <p>(4) Entrants develop the innovation further and resulting products start to satisfy main market expectations in established performance attributes.</p> <p>(5) Incumbents lack necessary competencies in innovation. They cannot provide new performance attributes and fail.</p>

## Appendix F: Key Finance figures of Xero and its competitor

Year	Subscribers (online)		Revenue		Research & Development Investment	
	<i>Xero</i>	<i>MYOB</i>	<i>Xero</i>	<i>MYOB</i>	<i>Xero</i>	<i>MYOB</i>
2015	500,000	170,999	NZ \$123.9 million	\$327.8 million	NZ \$67.258 million	\$46.6 million
2016	717,000	249,000	\$207.1 million	\$370.4 million	\$99 million	\$56 million
2017	1.035* million	399,000	\$295.4 million	\$416 million	\$120.2 million	\$68 million
2018	1.386** million		\$460.6 million		\$143.1 million	

\* 1.035 million subscribers include: Australia & NZ market – 692,000

United Kingdom market – 212,000

North America market – 92,000

Rest of world – 39,000

\*\* 1.386 million subscribers include: Australia & NZ market – 884,000

United Kingdom market – 312,000

North America market – 132,000

Rest of world – 58,000

Source: *Financial Report* 2015- 2018 Financial Year ended: MYOB 31/12; Xero 31/03

### Appendix G: Credited customers' review of Xero (access on 20/01/2019)

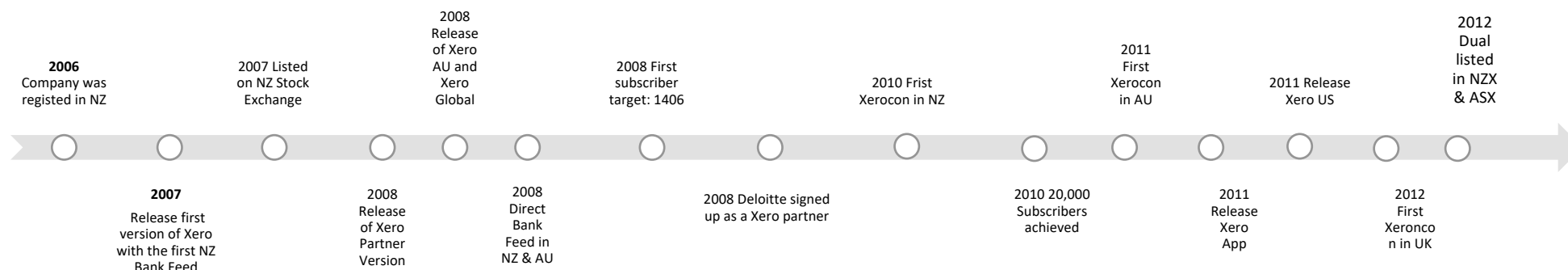
Customer Review Website	Total reviews	Scores	Details for	Positive Reviews Rate
<i>GetApp</i> ( <a href="https://www.getapp.com/finance-accounting-software/a/xero/">https://www.getapp.com/finance-accounting-software/a/xero/</a> )	1546	4.3/5	Value for money 4.2/5 Features 4.1/5 Ease of Use 4.2/5 Customer Support 3.9/5	Positive reviews: 84%
<i>TrustRadius</i> ( <a href="https://www.trustradius.com/products/xero/reviews">https://www.trustradius.com/products/xero/reviews</a> )	226	8.5/10	Usability 8.3/10 Availability 9/10 Performance 10/10 Support 8.7/10	Positive reviews: 89%
<i>G2Crowd</i> ( <a href="https://www.g2crowd.com/products/xero/reviews">https://www.g2crowd.com/products/xero/reviews</a> )	216	4.2/5	Ease of Use 8.7/10 Quality of Support 7.7/10 Ease of Doing Business with 8.4/10 Meets Requirements 8.5/10	Positive reviews: 87%

### Customers' review of Xero App (access on 20/01/2018)

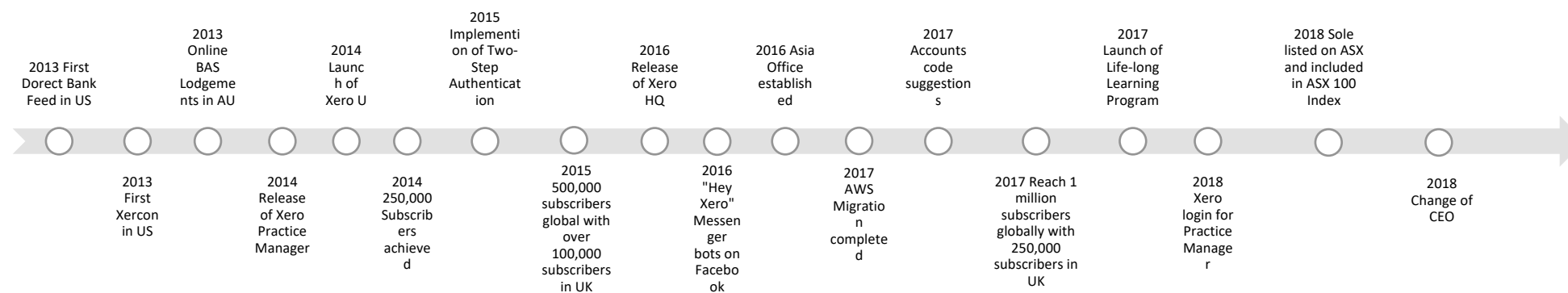
Customer Review Website	Total Rating	Scores
Apple App Store	157	2.2/5
Google Play	2223	3.5/5

## Appendix H: A Timeline of significant events in Xero during 2006-2018

### Early Development Stage: 2006-2012



### Expanding Market Stage: 2013-2018



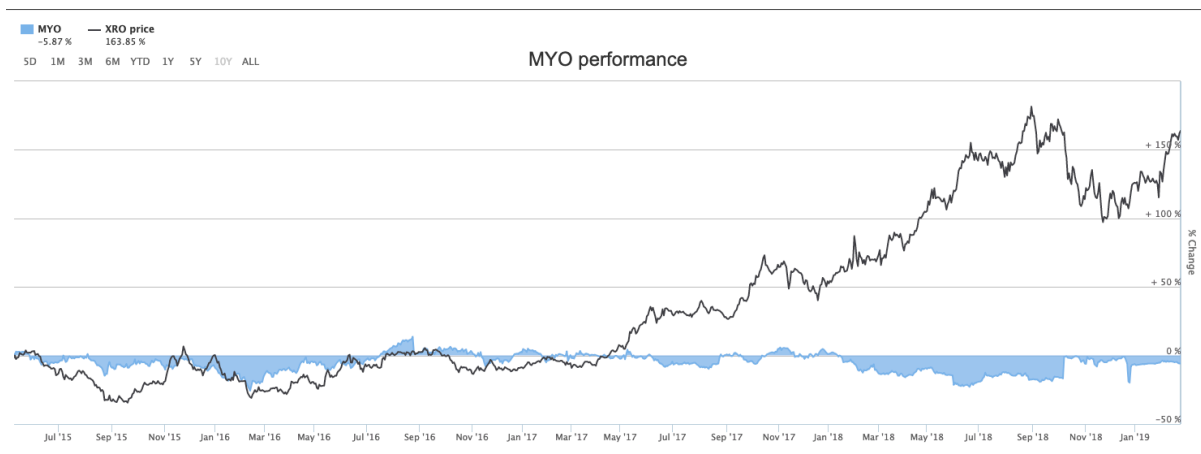


## Appendix I: Xero and its competitor stock price changes

A diagram of Xero Ltd Stock price during 2013 to 2019 on ASX



A diagram of comparison between Xero and MYOB stock price during 2015-2019 on ASX



*Note: MYOB was publicly listed on ASX since May 2015*

## Appendix J: Patents obtained by Xero and MYOB

### *Patents obtained by Xero in US and Australia*

Number	ID	Title	Assignee	Inventor/ Author	Filing Date	Publication Date	Grant Date
1	US-2015088707-A1	Systems and methods of access control and system integration (Direct Bank Feed)	Rodney Drury, Matthew Vickers	Rodney Drury, Matthew Vickers	23/09/2014	26/03/2015	N/A
	2015100409-2015100411	Systems and methods of access control and system integration (Direct Bank Feed)	Xero Limited	Rodney Drury, Matthew Vickers	31/03/2015	30/04/2015	Certified by IP Australia
2	US-D806740-S	Display screen with a transitional graphical user interface	Xero Limited	Jamie Sutherland, Nazarin Hamid, Harold Emsheimer	19/07/2016	2/01/2018	2/01/2018
3	US-2015220889-A1	Systems and methods of direct account transfer	Xero Limited	Rodney Drury, Matthew Vickers	17/04/2015	6/08/2015	N/A
	2015100161; 2015100163; 2015100164; 2015100166	Systems and methods of direct account transfer	Xero Limited	Rodney Drury, Matthew Vickers	13/02/2105	09/04/2015	Certified by IP Australia
4	US-9591066-B1	Multiple server automation for secure cloud reconciliation	Xero Limited	Dinesh Katyal, Matthew Vickers	29/01/2016	7/03/2017	7/03/2017
5	US-2018040064-A1	Network-based automated prediction modeling	Xero Limited	Alastair Grigg, Martin Kemka	2/08/2017	8/02/2018	N/A
6	US-2015324930-A1	Systems and methods of mobile banking reconciliation	Xero Limited	Brock Stephen Abernethy	6/05/2015	12/11/2015	N/A

Number	ID	Title	Assignee	Inventor/ Author	Filing Date	Publication Date	Grant Date
7	US-2015302530-A1	Systems and methods of automatic accounting of leave liability	Xero Limited	Stuart MCLEOD, John Freeman	16/04/2014	22/10/2015	N/A in US Ceased in Australia
8	US-2016314423-A1	Benchmarking through data mining	Xero Limited	Tim Mole, Grant Anderson	27/04/2015	27/10/2016	N/A in US Ceased in Australia
9	US-2016335673-A1	Smart lists	Xero Limited	Craig Walker	12/05/2015	17/11/2016	N/A
	2015100777-2015100778	Smart Lists	Xero Limited	Craig Walker	04/06/2015	09/07/2015	Certified by IP Australia

*Patents obtained by MYOB in US and Australia*

ID	Title	Assignee	Inventor/Author	Filing/Creation Date	Publication Date	Grant Date
2003204059	A Payment System	MYOB Technology Pty Ltd	Winkler, Andrew Craig; Finnin, John Trevor; Mikho, Viktor Vladimirovich; Pardy, Michael; Antanovskii, Leonid	07/05/2003	27/11/2003	Certified by IP Australia

## Appendix K: Factiva Search for news relating to Xero and its competitor M

**Key word:** Xero Limited

**Date Range:** 01/01/2006 – 30/06/2018

<b>Region</b>	<b>Key Newspaper</b>	<b>Number</b>
New Zealand	The New Zealand Herald	69
Total: 1394	Scoop.co.nz	141
	New Zealand Exchange	652
Australia	The Australian – all source	45
Total: 861	The Australian Financial Review	37
	ASX ComNews	277
	ASX Company Announcement	204
US		<b>213</b>
UK		<b>127</b>
Dow Jones		121

**Key word:** MYOB Group Limited

**Date Range:** 01/01/2006 – 30/06/2018

<b>Region</b>	<b>key Newspaper</b>	<b>Number</b>
New Zealand	The New Zealand Herald	5
	Scoop.co.nz	61
Australia	ASX ComNews (Text version of ASX Company Announcements) (Australia)	418
	Australian Stock Exchange Company Announcements	310
	The Australian - All sources	77
	The Sydney Morning Herald (Australia)	7
US		49
UK		66
Dow Jones		58

## Appendix L: Interview Guide for Research Paper 2

### Questions for Clients

#### TOPIC: Background

1. What is your designated employment role at your organization?
2. How many years have you been employed in your organization?
3. From your perspective, what impacts have ICTs had in accounting services?  
Please frame your answer around the following 4 areas;
  - Service concepts
  - Client interface
  - Intra-organizational service
  - Inter-organizational services
4. Are there any current ICTs that you believe will result in a significant impact on the nature and delivery of accounting services both now and into the future?  
If so, why?
  - Machine-learning software
  - Fintech (blockchain)

#### TOPIC: Recognising Disruptive Innovation

##### Value in services concept

1. What are the most ‘in-demand’ accounting-based services that your organization is in demand of at this time?
2. What measures of performance does your organization use to evaluate the accounting services provided by your accounting firms?
3. Are you satisfied with the content of accounting services currently provided by your accounting firm? Why or Why not?

##### Value in client interface (including accounting-based services and customer services)

4. How does your accounting firm deliver accounting-based services to your organization? What ICTs are used in the service delivery process, and for what purpose are they used?
5. What measures of performance does your organization use to evaluate the methods of accounting-based service delivery provided by accounting firms?
6. Are you satisfied with the methods of accounting-based service delivery currently provided by your accounting firm? Why or why not?
7. How do you communicate with your accounting firm over the life cycle of a project? What ICTs are used in this process?
8. What measures of performance does your organization use to evaluate the extent of customer service provided by your accounting firm?
9. Are you satisfied with the level of customer service currently provided by your accounting firm? Why or why not?

## **TOPIC: Impact of Disruptive Innovation**

### **Value in service concept**

1. What accounting related services do you envisage needing in the future that are not already being provided now?
2. Do you think ICTs enrich the various types of accounting-based services? If yes, how is this so?
3. Do you think ICTs change how performance is measured when evaluating service concepts?

### **Value in clients interface**

4. What do you expect the methods of accounting-based service delivery to be between your organization and your accounting firm in the future?
5. Do you think ICTs potentially alter the methods of accounting-based service delivery?
6. Do you think ICTs change how performance is measured with respect to the methods of accounting-based service delivery?
7. How do you expect customer service to be provided by accounting firms in the future?
8. Do you think ICTs change how performance is measured when evaluating customer service?

## **TOPIC: Managing Disruptive Innovation**

1. What type of organization/s are you intending to look to, for the provision of accounting based services in the future? Why?
  - Software organization
  - Consultant organization
  - Accounting firms
  - Others, please indicate
2. Do you have any training programs relating to the technologies that you currently employ, or will employ, to conduct accounting based services?
  - Training programs provided internally (onsite)
  - Training programs provided by a third party (offsite)
3. What is the key features/functions of ICTs that will significantly alter the content of accounting services and the methods of delivery?
4. To what extent do you think ICTs will completely replace human labor in the accounting services market?

## Questions for Accounting Firms

### **TOPIC: Background**

1. What is your designed employment role in your organization?
2. How many years have you been employed in your organization?
3. From your perspective, what impacts have ICTs had in accounting services?  
Please frame your answer around the following 4 areas;
  - Service concept
  - Client interface
  - Intra-organizational services
  - Inter-organizational services
4. Are there any current ICTs that you believe will result in a significant impact on the nature and delivery of accounting services both now and into the future?  
If so, why?
  - Machine-learning software
  - Fintech (blockchain)

### **TOPIC: Recognition of Disruptive Innovation - creating new value in professional services**

#### **Value in services concept**

1. What are the most 'in-demand' accounting-based services that your firm provides at this time?
2. Do you think your clients are satisfied with the accounting based services you provide?
3. Have you noticed any change in your clients' demands/expectations for accounting-based services since 2015?

#### **Value in client interface (including accounting-based services and customer services)**

4. How does your firm deliver accounting-based services to your clients? What are the ICTs used in the service delivery process and for what purpose are they used? Please give an example.
5. From a customer service standpoint, how do you communicate with your clients over a life cycle of a project?
6. Do you think your clients are satisfied with the method of accounting-based service delivery that you are currently using?
7. Do you think your clients are satisfied with the level of customer service you provide?
8. Have you noticed any change in your clients' demands/expectations in the method of delivery for accounting based services since 2015?
9. Have you noticed any change in your clients' demands/expectations particularly for customer services?

### **TOPIC: Impact of Disruptive Innovation**

#### **Value in services concept**

1. Do you think ICTs enrich the type of services you provide? Please, give an example.

2. Do you think ICTs enhance your understanding of your clients' needs?
3. Do you think ICTs enhance your client's understanding of what they need in future professional services?

**Value in clients' interface**

4. Do you think using ICTs will result in different measurements of performance compared to human labor in delivering certain functions of accounting based services?
5. Do you think using ICTs will result in different measurements of performance compared to human labor in providing customer services?
6. Taking into account the development of ICTs since 2015, has your firm considered any adjustment to the nature of the services provided to your clients moving forward with respect to?
  - New services or products
  - New clients
  - Cessation or modification of existing services
7. How do ICTs currently affect, and to what extent do you think they will affect, the market share of services that you provide?
8. Do you notice any new companies in to the accounting services market? Who are they? Do you perceive them as a threat?

**TOPIC: Managing Disruptive Innovation**

1. Does your firm have any innovation management strategy to deal with the wider adoption of technological innovation in the accounting services market?
  - Internal venture
  - Joint venture
  - Acquisition of organization's
2. How does this strategy/strategies affect the management of your firm?
  - Human resource management
  - Organizational culture
  - Customer management
3. Have there been any employee retrenchments or relocations in your organization due to the impact of technological innovation?
4. If you firm has already acquired/created an independent firm/s to develop an ICT related new product/service, what are the strategies for these new firm/s for increasing market share and gaining the attention of mainstream customers?
5. What accounting related services do you think might be in demand in the future?
6. Is your firm currently developing any new ICT related service/products?
7. What resources do you think are necessary to ensure the development of new services/products?
  - Human resources
  - Finance & infrastructure?



## **Appendix M: Interview Guide for Research Paper 3**

### **Interview Themes – Xero Employee**

#### **Background Information**

1. What is your employment role at Xero?
2. How many years have you been employed at Xero?

#### **Theme 1: Product Value Proposition**

**Interviewee: Sales manager & CEO**

##### **Topic: Value Proposition**

1. What customer needs are Xero aiming to address?
2. How does Xero differentiate its products from competitor products in the market?
3. How do Xero products address customer problems better than those of competitor products?
4. How do Xero products create better value than that of competitor products?
5. To what extent can Xero software replace the services of accounting professionals?
6. How does Xero identify the next innovation in the accounting services market?
7. Compared to other software companies, how does Xero create value through its software as a service (SaaS) strategy?

#### **Theme 2: Resources**

**Interviewees: R&D manager and CEO**

##### **Topic: Key resources**

1. What human, financial, physical and intellectual resources are employed by Xero when developing a new product?

##### **Topic: Key partners**

2. Who are Xero's key partners and what resources are you requiring from them?
3. What key activities do partners perform?
4. How effective is the 'Xero Developer Community' in developing partnerships with Xero?
5. How does Xero construct its ecosystem to reach out both accountants and app developers?

## **Theme 3: Process**

**Interviewees: Customer manager, R&D Manager and Marketing manager**

### **Topic: Customer Segments**

1. Who are Xero's targeted customers?
2. How does Xero identify customer needs?

### **Topic: Customer Relationship**

3. What communication channels does Xero use to communicate to its customers?
4. How are customer relationships managed by Xero through its 'Xero Business Community'?
5. How are Xero better able to satisfy customer needs better than that of competitors?

### **Topic: Channels**

6. How do Xero attract NEW customers?
7. How do Xero attract EXISTING customers away from competitors?
8. What sales channels does Xero use to distribute its product/s?
9. What marketing channels does Xero use to attract customers?

### **Topic: Key activities**

10. What key activities do Xero undertake to achieve value proposition for customers?
11. How are Xero's key activities different from other software companies?

## **Theme 4: Profit Formula**

**Interviewees: Sales manager and CEO**

### **Topic: Revenue Streams**

1. How are subscription fees and revenue streams set by Xero, and how do they differ from competitor fee models?
2. What value are our customers really willing to pay for Xero's services?

### **Topic: Cost Structure**

3. What is unique about Xero's cost structure and how is it distinguishable to that of its competitors?
4. What are the most important costs inherent in Xero's business model?

Are there any other questions or comments that you would like to make?

### **Background Information**

1. Can you briefly introduce the nature of your company?
2. What services are you using from Xero and how long have you been using these services?

### **Theme 1: Product Value Proposition**

3. Compared to other accounting software, why did you choose/switch to Xero?
4. What's the most attractive feature of Xero's products?
5. For your organization, to what extent can Xero software replace the services of accounting professionals?
6. Is there any function that could be improved or added to Xero and why?

### **Theme 2: Resources**

7. In what way do you think Xero's 'partner program' benefits your organization?

### **Theme 3: Process**

8. How did you first come to know about Xero before using their software?
9. What channels does Xero use to communicate to you?
10. Does the 'Xero business community' fulfil your needs and requirements regarding software maintainance and upgrades?
11. Has Xero software changed how you utilize or analyse other products and services in your company?

### **Theme 4: Profit Formula**

12. Is there a particular pricing plan that is more suited to your business and why?
13. Have there been any financial benefits in using Xero compared to what you had previously?
14. Do you see any problems or limitations in using Xero ?

Are there any other questions or comments that you would like to make?

## Appendix N: Information and Consent Letter – Research Paper 2

### FACULTY OF BUSINESS AND ECONOMICS

Macquarie University  
NSW 2109 Australia  
T: +61 (2) 9850 8531  
M: 0418 468 082  
Lorne.Cummings@mq.edu.au  
ABN 90 952 801 237  
CRICOS Provider No 00002J



Chief Investigator's / Supervisor's Name: Professor Lorne Cummings

### Participant Information and Consent Form

Name of Project: **A Qualitative Study of Information and Communication Technologies' (ICT's) Disruption within the Accounting Services Market.**

You are invited to participate in a study of the recognition of ICTs as disruptive innovation in the accounting services market, and how accounting firms manage this disruptive innovation using various strategies. The purpose of the study is to obtain a better understanding of how accounting professionals and their clients both respond to, and are effected by ICTs in the delivery of accounting related services.

The study is being undertaken by Tianyuan Feng (e-mail: [tian-yuan.feng@students.mq.edu.au](mailto:tian-yuan.feng@students.mq.edu.au)) to meet the requirements of a Doctor of Philosophy under the supervision of Professor Lorne Cummings [Ph: (02) 9850 8531 e-mail: [Lorne.Cummings@mq.edu.au](mailto:Lorne.Cummings@mq.edu.au)] and Dr. Dale Tweedie [Ph: (02) 9850 8462, e-mail: [Dale.Tweedie@mq.edu.au](mailto:Dale.Tweedie@mq.edu.au)] in the Faculty of Business and Economics at Macquarie University.

If you decide to participate, you will be asked to participate in an interview of approximately 60 minutes. Subject to your approval, interviews will be audio-recorded for the purposes of an accurate transcription of the interview only. No remuneration will be provided, but the findings of the study will be available to all participants on request.

Any information or personal details gathered in the course of the study are confidential, except as required by law. No individual will be identified in any publication of the results. Only the Chief, Co-investigators and a reputable transcription service will have access to the interview recording and transcripts. A summary of the results of the data can be made available to you on request through e-mail or telephone contact.

Participation in this study is entirely voluntary: you are not obliged to participate, and if you decide to participate, you are free to withdraw at any time without having to provide a reason and without consequence.

I, *(participant's name)* have read *(or, where appropriate, have had read to me)* and understand the information above and any questions I have asked have been answered to my satisfaction. I agree to participate in this research, knowing that I can withdraw from further participation in the research at any time without consequence. I have been given a copy of this form to keep.

Participant's Name: \_\_\_\_\_  
(Block letters)

Participant's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Investigator's Name: \_\_\_\_\_  
(Block letters)

Investigator's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email [ethics@mq.edu.au](mailto:ethics@mq.edu.au)). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

**(INVESTIGATOR'S [OR PARTICIPANT'S] COPY)**

## Appendix O: Information and Consent Letter – Research Paper 3

### FACULTY OF BUSINESS AND ECONOMICS

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Lorne.Cummings@mq.edu.au

ABN 90 952 801 237

CRICOS Provider No 00002J



Chief Investigator's / Supervisor's Name: Professor Lorne Cummings

### Participant Information and Consent Form

Name of Project: **A Qualitative Study of Information and Communication Technologies' Disruption in the Accounting Services Market.**

You are invited to participate in a study on how Xero has disrupted the market for accounting services. The purpose of the study is to obtain a better understanding of the extent, nature and process by which disruption occurs through accounting software and services, across all areas of the accounting services market.

The study is being undertaken by Tianyuan (Sherry) Feng (e-mail: [tianyuan.feng@hdr.mq.edu.au](mailto:tianyuan.feng@hdr.mq.edu.au)) to meet the requirements of a Doctor of Philosophy under the supervision of Professor Lorne Cummings [Ph: (02) 9850 8531 e-mail: [Lorne.Cummings@mq.edu.au](mailto:Lorne.Cummings@mq.edu.au)] and Dr. Dale Tweedie [Ph: (02) 9850 8462, e-mail: [Dale.Tweedie@mq.edu.au](mailto:Dale.Tweedie@mq.edu.au)] in the Faculty of Business and Economics at Macquarie University.

If you decide to participate, you will be asked to participate in an interview of approximately 40-45 minutes. Subject to your approval, interviews will be audio-recorded for the purposes of an accurate transcription of the interview only. No remuneration will be provided, but the findings of the study will be available to all participants on request.

Any information or personal details gathered in the course of the study are confidential, except as required by law. The name of the company will be disclosed, but no individual will be identified in any publication of the results. Only the Chief and Co-investigators will have access to the interview recording and transcripts. A summary of the results of the data can be made available to you on request through e-mail or telephone contact.

Participation in this study is entirely voluntary: you are not obliged to participate, and if you decide to participate, you are free to withdraw at any time without having to provide a reason and without consequence.

I, *(participant's name)* have read *(or, where appropriate, have had read to me)* and understand the information above and any questions I have asked have been answered to my satisfaction. I agree to participate in this research, knowing that I can withdraw from further participation in the research at any time without consequence. I have been given a copy of this form to keep.

Participant's Name: \_\_\_\_\_  
(Block letters)

Participant's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Investigator's Name: \_\_\_\_\_  
(Block letters)

Investigator's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email [ethics@mq.edu.au](mailto:ethics@mq.edu.au)). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

**(INVESTIGATOR'S [OR PARTICIPANT'S] COPY)**



## Appendix P: An Approval Email of the University Human Ethics Committee

Dear Professor Cummings,

RE: 'A Qualitative Study of Information and Communication Technologies' (ICT's) Disruption within the Accounting Services Market' (Ref: 5201600773)

The above application was reviewed by the Faculty of Business & Economics Human Research Ethics Sub Committee. Approval of the above application is granted, effective "25/10/2016". This email constitutes ethical approval only.

This research meets the requirements of the National Statement on Ethical Conduct in Human Research (2007). The National Statement is available at the following web site:

<http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/e72.pdf>.

The following personnel are authorised to conduct this research:

Professor Lorne Cummings  
Doctor Dale Tweedie  
Miss Tianyuan Feng

NB. STUDENTS: IT IS YOUR RESPONSIBILITY TO KEEP A COPY OF THIS APPROVAL EMAIL TO SUBMIT WITH YOUR THESIS.

Please note the following standard requirements of approval:

1. The approval of this project is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007).
2. Approval will be for a period of five (5) years subject to the provision of annual reports.

Progress Report 1 Due: 25th October 2017  
Progress Report 2 Due: 25th October 2018  
Progress Report 3 Due: 25th October 2019  
Progress Report 4 Due: 25th October 2020  
Final Report Due: 25th October 2021

NB. If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report for the project.



Progress reports and Final Reports are available at the following website:  
[http://www.research.mq.edu.au/for/researchers/how\\_to\\_obtain\\_ethics\\_approval/human\\_research\\_ethics/forms](http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/forms)

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).

4. All amendments to the project must be reviewed and approved by the Committee before implementation. Please complete and submit a Request for Amendment Form available at the following website:

[http://www.research.mq.edu.au/for/researchers/how\\_to\\_obtain\\_ethics\\_approval/human\\_research\\_ethics/forms](http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/forms)

5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that affect the continued ethical acceptability of the project.

6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at the following websites:

<http://www.mq.edu.au/policy/>  
[http://www.research.mq.edu.au/for/researchers/how\\_to\\_obtain\\_ethics\\_approval/human\\_research\\_ethics/policy](http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/policy)

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide the Macquarie University's Research Grants Management Assistant with a copy of this email as soon as possible. Internal and External funding agencies will not be informed that you have approval for your project and funds will not be released until the Research Grants Management Assistant has received a copy of this email.

If you need to provide a hard copy letter of approval to an external organisation as evidence that you have approval, please do not hesitate to contact the FBE Ethics Committee Secretariat, via [fbe-ethics@mq.edu.au](mailto:fbe-ethics@mq.edu.au) or 9850 4826.

Please retain a copy of this email as this is your official notification of ethics approval.

Yours sincerely,

Dr. Nikola Balnave  
Chair, Faculty of Business and Economics Ethics Sub-Committee

## An Approval Email for Amendment Request

Dear [Professor Cummings](#)

Re: Project entitled: [A Qualitative Study of Information and Communication Technologies' \(ICT's\) Disruption within the Accounting Services Market](#)

Reference No.: [5201600773](#)

Thank you for your recent correspondence. The following amendment has been approved:

- Extension of the original ethics approval into a case study of an accounting software firm, Xero

[The attached participant information and consent form has also been approved.](#)

If you have any questions or concerns, please contact the FBE Ethics Secretariat on 9850 4826 or at the following email [fbe-ethics@mq.edu.au](mailto:fbe-ethics@mq.edu.au)

Yours sincerely,

Dr. Nikola Balnave  
Chair, Faculty of Business and Economics Ethics Sub-Committee  
Faculty of Business and Economics  
Level 5, E4A Building  
Macquarie University  
NSW 2109 Australia  
T: +61 2 9850 4826  
F: +61 2 9850 6140