International Journal of Accounting Information Systems 32 (2019) 24–43

Contents lists available at ScienceDirect

International Journal of Accounting Information Systems

journal homepage: www.elsevier.com/locate/accinf

A bibliometric analysis of accounting information systems journals and their emerging technologies contributions

Victoria Chiu[a,*], Qi Liu[b], Brigitte Muehlmann[c], Amelia Annette Baldwin[d]

[a] Department of Accounting, Finance and Law, School of Business, SUNY Oswego, 7060 NY-104, Oswego, NY 13126, United States
[b] University of Rhode Island, 7 Lippitt Road, Kingston, RI 02881, United States
[c] Babson College, 231 Forest Street Babson Park, MA 02457-0310, United States
[d] University of South Alabama, 5811 USA Drive South Mobile, AL 36688, United States

ARTICLE INFO

Keywords:
Accounting information systems
Journals
Emerging technologies
Content analysis
Accounting
Methodologies

ABSTRACT

This study contributes to academic knowledge about methodologies used, accounting areas studied, and emerging technologies examined in scholarship in accounting information systems (AIS) journals. It presents a comprehensive bibliometric and comparative analysis of the 681 accounting articles that were published from 2004, the beginning of serious recognition of emerging technologies research in accounting as well as mandated measuring of research productivity under AACSB accreditation standards, through 2016 in the following six accounting information systems journals: *Journal of Information Systems* (JIS), *International Journal of Accounting Information Systems* (IJAIS), *Journal of Emerging Technologies in Accounting* (JETA), *International Journal of Digital Accounting Research* (IJDAR), *Accounting Information Systems Educator Journal* (AISEJ) and *Intelligent Systems in Accounting, Finance and Management* (ISAFM).

The results suggest these journals do not have a singular focus but range in the breadth of the articles they publish. All accounting articles in ISAFM address emerging technologies, followed by JETA (73.8%), IJDAR (54.6%), IJAIS (40.0%), and JIS (30.5%). The majority (62.3%) of emerging technologies articles apply research methodologies that are Other in the *Brigham Young University* classification scheme. The most frequently applied Other methodology is design science research (21.0%), followed by archival methods (18.7%). Auditing (41.6%), and financial (28.5%) are the most commonly researched accounting areas. AIS (11.1%) is in the third rank. Although called AIS journals, each of the six reflects contemporary accounting and future opportunities for practice more broadly, whether they are published by major international academic publishers (IJAIS and ISAFM), section journals of the American Accounting Association (JIS and JETA) or are open source journals (IJDAR and AISEJ). This study's results are expected to be of interest to scholars, educators, practitioners, and graduate students in relevant accounting, AIS, and emerging technologies fields.

1. Introduction

This study provides a bibliometric and comparative analysis of research articles published in six accounting information systems journals for the recent 13-year period from 2004 through 2016. Building upon the research findings in Muehlmann et al. (2015), it

* Corresponding author.
E-mail addresses: victoria.chiu@oswego.edu (V. Chiu), qiliu@uri.edu (Q. Liu), bmuehlmann@babson.edu (B. Muehlmann), baldwin@southalabama.edu (A.A. Baldwin).

https://doi.org/10.1016/j.accinf.2018.11.003
Received 30 May 2018; Received in revised form 10 September 2018; Accepted 29 November 2018
Available online 20 December 2018
1467-0895/ Published by Elsevier Inc.

broadens the research scope by examining 681 publications in the *Journal of Information Systems* (JIS), *International Journal of Accounting Information Systems* (IJAIS), *Journal of Emerging Technologies in Accounting* (JETA), *International Journal of Digital Accounting Research* (IJDAR), *Accounting Information Systems Educator Journal* (AISEJ), and *Intelligent Systems in Accounting, Finance and Management* (ISAFM) and extending the period of analysis by three years.

Accounting works well when it is in sync with business practice. The prospect of shaping the future of accounting with emerging technologies of recent years is exciting. Offering an overview of the fragmented body of emerging technologies research, this study hopes to serve as a resource for researchers who want to contribute, whether they are new to the field or are returning to emerging technologies research after a break.

The analysis of research content adopts the accounting area and research methodology classification scheme as used in the *Brigham Young University Accounting Research Ranking* (2018). Expanding the traditional accounting classification categories,[1] this study also applies multiple novel technology-oriented categories such as artificial intelligence, XBRL, and other emerging technologies keywords to enhance the classification findings and demonstrate the uniqueness in AIS research. Further insights on cross journal comparison of accounting information systems research are summarized as well.

This comprehensive study contributes to the academic knowledge about scholarship in accounting information systems journals in 2004–2016. Lists of accounting journals have been created as proxies for research relevance and quality since the 2003 AACSB standards started to mandate that research productivity be measured. Scholars may find this information useful in their research and in making decisions about submissions. Administrators and faculty may find this information useful when they consider which scholarship is reflecting currency and relevance of faculty's intellectual capital in accounting in their annual review and reward as well as promotion and tenure processes. They may also consider this information when they are updating their journal lists to reflect research outlets that are consistent with the school's mission, which the 2013 AACSB standards emphasize.

Factors that contribute to the continuing publication of emerging technologies research in accounting are open access to practitioners and educators instead of limited access through academic library subscriptions by IJDAR and AISEJ as well as the widely adopted practice of creating ranked journal lists to measure research productivity, which started in 2004, the year following the promulgation of business school accreditation standards by the Association to Advance Collegiate Schools of Business (AACSB). The AACSB standards did not mention such lists, but they became common practice in the ensuing years. International lists such as those prepared by the British Association of Business Schools (ABS) and the Australian Business Deans Council (ABDC) present convenient resources. Their rankings become potentially dominant in the perception of accounting research quality (Black et al., 2017). As a result, ABS and ABDC rankings may drive the preference for publication outlets over journal focus.

This study showcases a wide range of published research on emerging technologies by presenting an analysis of six accounting information systems journals. It reveals differentiation of the journals' publication foci, offering insights about the scholarship published in these journals and how they contribute to academic knowledge dissemination of a varied range of topical areas and research methodologies. This journal selection builds on prior research studies that examined only one journal (Muehlmann et al., 2015; Baldwin et al., 2000).

The period of analysis starts in 2004, the founding year of JETA, which marks the beginning of major recognition of emerging technologies research in accounting in the American Accounting Association, the world's largest academic community of accountants in academia. JETA focuses on research in emerging technologies and artificial intelligence which are applied or applicable to accounting, broadly defined. Although it is the only journal with this express mission, JETA is, however, not the only publication outlet for emerging technologies research in accounting. Its founding was preceded by ISAFM, published since 1992, and IJDAR, published since 2001, both journals that aim to attract emerging technologies research in accounting, as well as IJAIS and JIS, which broadly cover information technologies research as it relates to accounting. JETA's scope includes the publication of educational research, which is also covered by AISEJ, which has been published since 2006. All six of these journals have an interest in emerging technologies in accounting, whether as a central focus or as part of a much wider view of accounting information systems. Thus, the period of interest in this study begins in 2004, which marks both the founding of JETA and also an important change in AACSB standards as described above.

Section two summarizes the relevant literature. Section three describes the research methodology of this study. Section four provides findings of content analysis on accounting area and research methodology of accounting information systems research. Section five presents an analysis of emerging technologies contributions in the six journals. Lastly, section six offers a summary and future research opportunities.

2. Literature review and research questions

The accounting and accounting information systems literature has established the usefulness of reviewing and analyzing academic research contributions (e.g. Vasarhelyi et al., 1988; Poston and Grabski, 2000; Lindquist and Smith, 2009; Grabski and Leech, 2016). Among the various techniques, content analyses are commonly applied bibliometrics that help quantitatively analyze characteristics, identify patterns, and examine impact of a subject area over time (Garfield, 1979; Weber, 1990). In the extant literature, studies have examined accounting information systems research with foci on a) specific AIS journals and citations ranking (e.g. Hutchinson et al.,

[1] The BYU Accounting Research Ranking Scheme classifies accounting research by topical area and research method. The topical areas include *AIS*, *Audit*, *Financial*, *Managerial*, *Tax* and *Other*. The research methods are classified as *Analytical*, *Archival*, *Experimental*, and *Other*. The detailed classifications definition can be found in Coyne et al. (2010), please see: https://doi.org/10.2308/iace.2010.25.4.631.

2004; O'Leary, 2008, 2009a, 2009b, 2010, 2011; Muehlmann et al., 2015; Barrick et al., 2017), b) research productivity, research themes and critical perspectives (e.g. Stone, 2002; Moffitt et al., 2016), and c) authorships, Ph.D. programs, and institutional rankings using citation analysis (Baldwin et al., 2000; Guffey and Harp, 2014).

Prior literature has examined research characteristics and core themes in AIS subfields, such as management accounting and integrated information systems (Rom and Rohde, 2007), IT governance (Wilkin and Chenhall, 2010), ERP systems (Grabski et al., 2011), expert systems research in AIS (Gray et al., 2014), artificial intelligence research in accounting (Sutton et al., 2016), and continuous auditing (Chiu et al., 2014). Some research studies that conducted periodic analyses of the AIS literature reviewed multiple journals to uncover topical areas, theories, methodologies and trends within a specific time period. Poston and Grabski (2000) conducted an extensive review of AIS research content from 1982 to 1998. The findings are followed up by Ferguson and Seow (2011), which examined AIS research from 1999 to 2009.

Building on the extant literature, this paper includes a broad scope of bibliometric content analysis for six accounting information systems journals for thirteen years by adopting the *Brigham Young Accounting Research Ranking* classification scheme (for research methodology and accounting area) with inclusion of novel classification terms covering emerging technologies, and other research methodology identification. While the analysis steps follow the content analysis in the Muehlmann et al. (2015) article, this research study expands the scope of analysis from one outlet (cf. Muehlmann et al., 2015; Baldwin et al., 2000) to six journals, while also covering additional years of analysis, and performing comparative analyses of findings. The main research questions addressed in this study are:

- RQ1: What are the main research characteristics of articles identified in accounting information systems journals, collectively and individually, over the time period 2004 to 2016?
- RQ2: How do research methodologies change over time, if at all, for accounting information systems journals?
- RQ3: How do accounting areas covered change over time, if at all, for accounting information systems journals?
- RQ4: Specifically, how do the answers change when only emerging technologies research is examined?

These questions are investigated through taxonomic classifications of both research methodology and accounting area, as well as classification by emerging technology terminology.

3. Research methodology

This study applies multiple bibliometric techniques including content analysis and novel development of taxonomic categories to arrive at the characteristics of accounting information systems research in the six journals of interest. Specifically, the analysis of accounting area and research methodology classification scheme used in the *Brigham Young University Accounting Research Ranking* (Coyne et al., 2010) is applied. However, the traditional accounting classification is expanded by including specialized emerging technologies features to improve content analysis findings and demonstrate the uniqueness in AIS research.

Research articles, titles, and abstracts for the six journals were retrieved from academic literature source databases such as ScienceDirect, Ebscohost, Wiley Online, the American Accounting Association's website, and journal websites. Articles were coded by characteristics including article title, abstract, keywords, authors, year, accounting area, research methodologies, and emerging technologies contributions. Articles' contents were also skimmed to help assess their methodology, accounting area,[2] and emerging technology focus. Classifications were done manually and cross checked by multiple authors. When classification results were in doubt, the authors held extensive discussions and mainly arrived at the conclusion by considering which accounting sub-discipline most likely benefits from this research contribution.

Peer-reviewed manuscripts published from 2004 through 2016, inclusive, in all six journals — JIS, IJAIS, JETA, IJDAR, AISEJ and ISAFM were analyzed. For analysis over time, this thirteen-year period is broken down into three successive sub-periods for comparison of the chronological change of research methods and topical areas: the first (2004–2008) and the second (2009–2013) quinquennia, and the latest triennium (2014–2016).

4. Article characteristics

The topical accounting/AIS contents of articles were identified by the authors in accordance with Coyne et al. (2010). Among the total of 817 reviewed research articles, 681 are deemed to be accounting, of which 220 are published in JIS, 210 are published in IJAIS, 103 are published in JETA, 66 are published in IJDAR, 46 are published in AISEJ, and 36 are published in ISAFM. The yearly and sub-period accounting/AIS publication counts as well as the total of non-accounting articles in each journal are provided in Table 1.

[2] Studies that are identified as “non-accounting” suggests that their research contributions could not be appropriately classified as either AIS, auditing, financial, managerial, tax, general or other categories. For example, there are six JIS articles classified as non-accounting as their research findings contribute to IS, Marketing, Supply Chain, and Management fields.

Table 1
The number of articles published per year in JIS, IJAIS, JETA, IJDAR, AISEJ, and ISAFM.

Year	JIS	IJAIS	JETA	IJDAR	AISEJ[a]	ISAFM	Total
2004	11	18	6	6	–	5	46
2005	14	12	5	5	–	3	39
2006	18	15	8	6	6	2	55
2007	15	11	10	6	4	2	48
2008	23	13	13	5	2	0	56
2004–2008	*81*	*69*	*42*	*28*	*12*	*12*	*244*
2009	9	14	4	6	3	3	39
2010	9	18	5	4	5	2	43
2011	14	21	5	4	4	4	52
2012	16	17	6	6	6	3	54
2013	22	19	4	5	4	2	56
2009–2013	*70*	*89*	*24*	*25*	*22*	*14*	*244*
2014	22	20	6	5	4	3	60
2015	23	16	8	4	6	3	60
2016	24	16	23	4	2	4	73
2014–2016	*69*	52	*37*	*13*	*12*	*10*	*193*
Total (accounting)	220	210	103	66	46	36	681
Total (non-accounting)	6	1	0	10	0	119	136
Total (all)	**226**	**211**	**103**	**76**	**46**	**155**	**817**

[a] AISEJ started to publish in 2006.

4.1. Research methodology

The summary statistics of research methods applied in the six journals are provided in Table 2. Four main categories are identified in Table 2. These are based on the methodology classifications in Coyne et al. (2010) — analytical, archival, experimental, and other categories. As the methodologies of more than half of the articles are "Other", these are divided into subcategories: bibliometrics/citation analysis, case study with and without teaching notes, course proposal, field study, interview, simulation, descriptive, design science (DSR), review, and survey.

Table 2
Research methodology - summary of count and distribution.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Analytical	10	*4.1%*	2	*0.8%*	2	*1.0%*	*14*	*2.1%*
Analytical & other - case	1	*0.4%*	–	–	–	–	*1*	*0.1%*
Archival	35	*14.3%*	54	*22.1%*	44	*22.8%*	*133*	*19.5%*
Archival & other - survey	1	*0.4%*	1	*0.4%*	–	–	*2*	*0.3%*
Experimental	44	*18.0%*	33	*13.5%*	18	*9.3%*	*95*	*14.0%*
Experimental & other - field	–	–	–	–	1	*0.5%*	*1*	*0.1%*
Other - bibliometrics - citation analysis	2	*0.8%*	2	*0.8%*	3	*1.6%*	*7*	*1.0%*
Other - case studies	22	*9.0%*	11	*4.5%*	19	*9.8%*	*52*	*7.6%*
Other - case studies teaching notes available & simulation	2	*0.8%*	–	–	–	–	*2*	*0.3%*
Other - case studies with teaching notes	23	*9.4%*	8	*3.3%*	15	*7.8%*	*46*	*6.8%*
Other - classroom development (simulation)	1	*0.4%*	3	*1.2%*	3	*1.6%*	*7*	*1.0%*
Other - course proposal	1	*0.4%*	–	–	–	–	*1*	*0.1%*
Other - descriptive	24	*9.8%*	32	*13.1%*	18	*9.3%*	*74*	*10.9%*
Other - Delphi	–	–	2	*0.8%*	1	*0.5%*	*3*	*0.4%*
Other - DSR	39	*16.0%*	34	*13.9%*	30	*15.5%*	*103*	*15.1%*
Other - education	1	*0.4%*	2	*0.8%*	–	–	*3*	*0.4%*
Other - field	2	*0.8%*	6	*2.5%*	6	*3.1%*	*14*	*2.1%*
Other - framework	–	–	1	*0.4%*	–	–	*1*	*0.1%*
Other - interview	2	*0.8%*	2	*0.8%*	2	*1.0%*	*6*	*0.9%*
Other - methodology	–	–	1	*0.4%*	–	–	*1*	*0.1%*
Other - review	5	*2.0%*	16	*6.6%*	8	*4.1%*	*29*	*4.3%*
Other - review & case study	1	*0.4%*	–	–	–	–	*1*	*0.1%*
Other - review & interview	1	*0.4%*	1	*0.4%*	–	–	*2*	*0.3%*
Other - simulation	1	*0.4%*	–	–	–	–	*1*	*0.1%*
Other - survey	26	*10.7%*	33	*13.5%*	23	*11.9%*	*82*	*12.0%*
Total	*244*	*100.0%*	*244*	*100.0%*	*193*	*100.0%*	*681*	*100.0%*
	35.8%		*35.8%*		*28.3%*		*100.0%*	

Table 2a
Research methodology - summary of count and distribution – JIS.

Methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Analytical	2	*2.5%*	1	*1.4%*	1	*1.5%*	*4*	*1.8%*
Analytical & other - case	1	*1.2%*	–	–	–	–	*1*	*0.5%*
Archival	9	*11.1%*	15	*21.4%*	20	*29.0%*	*44*	*20.0%*
Experimental	19	*23.5%*	10	*14.3%*	9	*13.0%*	*38*	*17.3%*
Experimental & other - field	–	–	–	–	1	*1.5%*	*1*	*0.5%*
Other - bibliometrics - citation analysis	–	–	–	–	3	*4.4%*	*3*	*1.4%*
Other - case studies	8	*9.9%*	3	*4.3%*	7	*10.1%*	*18*	*8.2%*
Other - case studies teaching notes available & simulation	2	*2.5%*	–	–	–	–	*2*	*0.9%*
Other - case studies with teaching notes	17	*21.0%*	1	*1.4%*	–	–	*18*	*8.2%*
Other - course proposal	1	*1.2%*	–	–	–	–	*1*	*0.5%*
Other - DESCRIPTIVE	4	*4.9%*	9	*12.9%*	9	*13.0%*	*22*	*10.0%*
Other - DSR	8	*9.9%*	7	*10.0%*	4	*5.8%*	*19*	*8.6%*
Other - field	1	*1.2%*	4	*5.7%*	4	*5.8%*	*9*	*4.1%*
Other - interview	1	*1.2%*	–	–	–	–	*1*	*0.5%*
Other - review	–	–	10	*14.3%*	2	*2.9%*	*12*	*5.5%*
Other - simulation	1	*1.2%*	–	–	–	–	*1*	*0.5%*
Other - survey	7	*8.6%*	10	*14.3%*	9	*13.0%*	*26*	*11.8%*
Total	*81 (61)*[a]	*100.0%*	*70 (69)*	*100.0%*	*69*	*100.0%*	*220*	*100.0%*
	36.8%		*31.8%*		*31.4%*		*100.0%*	

[a] The number in parenthesis is the count of non-educational articles.

Table 2a summarizes the research methodologies in JIS. Overall, JIS articles applied a wide variety of research methodologies, among which the most widely used three are archival (20.0%), experimental (17.8[3]%), and survey (11.8%) – nearly half (49.6%) of the JIS publications over the thirteen years utilize these three methods. The fourth-ranked research method is the descriptive method, accounting for 10.0% of the studies.

In the first quinquennium, the first-ranked method is experimental research (23.5%) and educational case study development with teaching notes (23.5[4]%). Archival research (11.1%) is ranked third. The relative application frequency of research methods in this period is different from the pattern identified in the overall thirteen-year period, which is mainly due to the large number of educational research published in this period. Effective 2009, JIS stopped publishing educational articles, which changed the ranking of research methods in the following years. In the latter two periods, the ranking of methods applied in JIS articles is similar to those found in the overall thirteen-year period. Specifically, the top three categories – archival, experimental, and survey – account for 50.0 and 56.5% of the articles in the latter two periods, respectively. Archival research ranking has moved to the top ranked method in both the second sub-period (22.1%) and third sub-period (22.8%). Another notable pattern is that the literature review method is not applied in the first period, but it accounts for 14.3% in the second period, which ties for the third place with experimental. It decreases to 2.9% in the third period.

Research methodologies applied in IJAIS are summarized in Table 2b. Similar to JIS, IJAIS also adopts a wide range of research methods; and over the entire thirteen years, the dominant research methodologies applied in IJAIS are also archival (20.0%), descriptive (16.7%), experimental (15.7%), and survey (14.8%). Besides these four methods, design science research (14.3%) is also a commonly applied research methodology in IJAIS publications. Specifically, in the first two periods, the relative application frequency of research methods is consistent with the pattern identified in the overall thirteen-year period; the top four categories – archival, experimental, descriptive, and survey – account for 66.6 and 75.3% of the articles published in these two periods, respectively. In the third period the first-ranked method is design science (26.9%), followed by survey (19.2%), and archival (17.3%). The significantly increased proportion of design science research in the third period may suggest that the design science method is starting to become a dominant research methodology in AIS research.

Table 2c demonstrates the distribution of research methodologies in JETA. The findings in the first two periods have been discussed in the previous literature (Muehlmann et al., 2015). In the latest three years, the number of publications in JETA has significantly increased, which resulted in JETA changing from an annual to a semi-annual journal in 2016. Also, because of a special issue on education in 2016, the publication of instructional case studies surged in the last period. Overall, two research methodologies stand out—design science research (29.1%) and archival (26.2%).

Research methodologies applied in IJDAR are summarized in Table 2d. The top three research methodologies applied in IJDAR throughout the entire thirteen years are survey (25.8%), archival (21.2%), and design science (13.6%). Yet, the ranking in each sub-period is different mainly owing to the change of these three research methodologies over time. For instance, archival studies have significantly increased from 7.1% in the first period to 28.0 and 38.5% in the second and third period, respectively. While the proportion of the survey method continuously decreased in each sub-period from 39.3% in the first period to 16% in the second

[3] This includes the articles applying mixed research methods including experimental method.
[4] This includes the articles applying mixed research methods such as a case study with teaching note.

Table 2b
Research methodology - summary of count and distribution – IJAIS.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Analytical	1	*1.4%*	1	*1.1%*	–	–	*2*	1.0%
Archival	15	*21.7%*	18	*20.2%*	9	*17.3%*	*42*	20.0%
Archival & other - survey	1	*1.4%*	1	*1.1%*	–	–	*2*	1.0%
Experimental	11	*15.9%*	16	*18.0%*	6	*11.5%*	*33*	15.7%
Other - bibliometrics - citation analysis	2	*2.9%*	–	–	–	–	*2*	1.0%
Other - case studies	8	*11.6%*	5	*5.6%*	5	*9.6%*	*18*	8.6%
Other - descriptive	14	*20.3%*	18	*20.2%*	3	*5.8%*	*31*	16.7%
Other - DSR	6	*8.7%*	10	*11.2%*	14	*26.9%*	*30*	14.3%
Other - interview	1	*1.4%*	2	*2.2%*	2	*3.8%*	*5*	2.4%
Other - field study	–	–	1	*1.1%*	1	*1.9%*	*2*	1.0%
Other - review	2	*2.9%*	2	*2.2%*	2	*3.8%*	*6*	2.9%
Other - survey	6	*8.7%*	15	*16.9%*	10	*19.2%*	*31*	14.8%
Other - review & case study	1	*1.4%*	–	–	–	–	*1*	0.5%
Other - review & interview	1	*1.4%*	–	–	–	–	*1*	0.5%
Total	*69*	*100.0%*	*89*	*100.0%*	*52*	*100.0%*	*210*	100.0%
	32.9%		*42.4%*		*24.8%*		*100.0%*	

Table 2c
Research methodology - summary of count and distribution – JETA.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Analytical	7	16.6%	0	0.0%	0	0.0%	*7*	*6.8%*
Archival	8	19.0%	11	45.8%	8	21.6%	*27*	*26.2%*
Experimental	5	11.9%	0	0.0%	2	5.4%	*7*	*6.8%*
Other - bibliometrics - citation analysis	0	0.0%	2	8.3%	1	2.7%	*3*	*2.9%*
Other - case studies	2	4.8%	0	0.0%	3	8.1%	*5*	*5.0%*
Other - case studies with teaching notes	0	0.0%	1	4.2%	8	21.6%	*9*	*8.7%*
Other - classroom development (simulation)	0	0.0%	0	0.0%	1	2.7%	*1*	*1.0%*
Other - descriptive	1	2.4%	3	12.5%	5	13.5%	*9*	*8.7%*
Other - DSR	17	40.5%	6	25%	7	19.0%	*30*	*29.1%*
Other - review	1	2.4%	0	0.0%	2	5.4%	*3*	*2.9%*
Other - survey	1	2.4%	1	4.2%	0	0.0%	*2*	*1.9%*
Total	*42*	*100.0%*	*24*	*100.0%*	*37*	*100.0%*	*103*	*100.0%*
	40.8%		*23.3%*		*35.9%*		*100.0%*	

Table 2d
Research methodology - summary of count and distribution – IJDAR.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Analytical	–	–	–	–	1	7.7%	*1*	*1.5%*
Archival	2	7.1%	7	28.0%	5	38.5%	*14*	*21.2%*
Experimental	3	10.7%	1	4.0%	1	7.7%	*5*	*7.6%*
Other - case studies	3	10.7%	1	4.0%	1	7.7%	*5*	*7.6%*
Other - Delphi	–	–	2	8.0%	1	7.7%	*3*	*4.5%*
Other - descriptive	2	7.1%	2	8.0%	–	–	*4*	*6.1%*
Other - DSR	5	17.9%	4	16.0%	–	–	*9*	*13.6%*
Other - field study	1	3.6%	–		1	7.7%	*2*	*3.0%*
Other - framework	–	–	1	4.0%	–	–	*1*	*1.5%*
Other - methodology	–	–	1	4.0%	–	–	*1*	*1.5%*
Other - review	1	3.6%	2	8.0%	1	7.7%	*4*	*6.1%*
Other - survey	11	39.3%	4	16.0%	2	15.4%	*17*	*25.8%*
Total	*28*	*100.0%*	*25*	*100.0%*	*13*	*100.0%*	*66*	*100.0%*
	42.4%		*37.9%*		*19.7%*		*100.0%*	

Table 2e
Research methodology - summary of count and distribution – AISEJ.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Archival	–	–	2	9.1%	–	–	*2*	4.3%
Experimental	–	–	2	9.1%	–	–	*2*	4.3%
Other - case studies	–	–	–	–	1	8.3%	*1*	2.2%
Other - case studies with teaching notes	6	50.0%	6	27.3%	7	58.3%	*19*	41.3%
Other - classroom development (simulation)	1	8.3%	3	13.6%	2	16.7%	*6*	13.0%
Other - descriptive	3	25.0%	–	–	–	–	*3*	6.5%
Other - DSR	–	–	1	4.5%	–	–	*1*	2.2%
Other - education	1	8.3%	2	9.1%	–	–	*3*	6.5%
Other - field study	–	–	1	4.5%	–	–	*1*	2.2%
Other - review	–	–	2	9.1%	–	–	*2*	4.3%
Other - survey	1	8.3%	3	13.6%	2	16.7%	*6*	13.0%
Total	*12*	*100.0%*	*22*	*100.0%*	*12*	*100.0%*	*46*	*100.0%*
	26.1%		*47.8%*		*26.1%*		*100.0%*	

period and to 15.4% in the third period. Design science research also declined from 17.9% in the first period to 16% in the second period, and was even absent in the third period.

Table 2e shows the research methodologies applied in AISEJ. Due to the educational nature of AISEJ, the primary research methodology applied in AISEJ is case studies with teaching notes (41.3%) over the entire thirteen-year period. In addition, classroom development (simulation) (13.0%) and survey (13.0%) are two other widely applied research methodologies in articles published in AISEJ between 2004 and 2016. The same pattern can be found in the latter two periods. While, in the first period, the second-ranked method is descriptive, it is completely missing in the latter two periods.

Research methodologies applied in ISAFM are summarized in Table 2f. Generally speaking, the research methodologies applied in ISAFM are not as diverse as the other five journals. Five research methodologies are utilized by the accounting articles published in ISAFM from 2004 to 2016, among which the two dominant methods are design science (38.9%) and experimental (27.8%). A noteworthy finding is that in the third period none of ISAFM's accounting publications adopts the experimental method, a commonly applied research methodology in the first two periods.

4.2. Accounting area of emphasis

Classification results by accounting topical areas of publications in the six journals in all the periods are summarized in Table 3. The accounting topical areas are mainly developed based on the topical area classifications in Coyne et al. (2010)—auditing, financial, managerial, accounting information systems (AIS), tax, and other. Since all the six journals are AIS journals, the articles being analyzed are all more or less related to AIS topical area. Therefore, in order to reveal the specific topical areas to which the articles contribute besides AIS, during the classification, the articles' contributing areas other than AIS are considered. For example, if a continuous auditing system is proposed in an article, the topical area of this article is considered as auditing. An article is classified as AIS only when it is purely related to AIS. If specific areas in accounting and accounting information systems to which an article contributes cannot be identified, then it is classified as "Other." If an article contributes to more than one accounting area, then a separate category including all the contributing accounting areas is created. For example, one category is named *auditing and managerial*, which indicates that an article covers both auditing and managerial topics.

Fig. 1 shows the distribution of articles across accounting areas for each journal. This illustrates that AIS, auditing, financial, and managerial areas account for the bulk of articles published in JIS, IJAIS, JETA and IJDAR. However, the comparative numbers in these accounting areas vary widely from journal to journal, even among these four. For JIS, more articles have been published in AIS (understandably) and auditing, than financial and managerial, although the latter still have significant numbers. The other areas,

Table 2f
Research methodology - summary of count and distribution – ISAFM.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Archival	1	8.3%	1	7.1%	2	20.0%	*4*	*11.1%*
Experimental	6	50.0%	4	28.5%	–	–	*10*	*27.8%*
Other - case studies	1	8.3%	2	14.3%	1	10.0%	*4*	*11.1%*
Other - DSR	3	25.0%	6	42.9%	5	50.0%	*14*	*38.9%*
Other - review	1	8.4%	1	7.1%	2	20.0%	*4*	*11.1%*
Total	*12*	*100.0%*	*14*	*100.0%*	*10*	*100.0%*	*36*	*100.0%*
	33.3%		*38.9%*		*27.8%*		*100.0%*	

Table 3
Accounting area - summary of count and distribution.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	55	*22.5%*	57	*23.4%*	37	*19.2%*	*149*	*21.9%*
Auditing	64	*26.2%*	85	*34.8%*	60	*31.1%*	*209*	*30.7%*
Financial	49	*20.1%*	41	*16.8%*	44	*22.8%*	*134*	*19.7%*
Managerial	53	*21.7%*	41	*16.8%*	26	*13.5%*	*120*	*17.6%*
Tax	1	*0.4%*	1	*0.4%*	4	*2.1%*	*6*	*0.9%*
General	6	*2.5%*	9	*3.7%*	8	*4.1%*	*23*	*3.4%*
AIS & audit	4	*1.6%*	3	*1.2%*	5	*2.6%*	*12*	*1.8%*
AIS & financial	–	–	1	*0.4%*	1	*0.5%*	*2*	*0.3%*
AIS & financial & managerial	–	–	1	*0.4%*	–	–	*1*	*0.1%*
AIS & managerial	–	–	2	*0.8%*	2	*1.0%*	*4*	*0.6%*
Auditing & financial	2	*0.8%*	1	*0.4%*	1	*0.5%*	*4*	*0.6%*
Auditing & financial & managerial	–	–	–	–	1	*0.5%*	*1*	*0.1%*
Auditing & managerial	1	*0.4%*	1	*0.4%*	–	–	*2*	*0.3%*
Managerial & auditing & marketing	–	–	–	–	1	*0.5%*	*1*	*0.1%*
Managerial & financial	4	*1.6%*	1	*0.4%*	–	–	*5*	*0.7%*
Other - acctg. education	2	*0.8%*	–	–	2	*1.0%*	*4*	*0.6%*
Other - acctg. history	2	*0.8%*	–	–	–	–	*2*	*0.3%*
Other - research ethics	–	–	–	–	1	*0.5%*	*1*	*0.1%*
Other - work environment	1	*0.4%*	–	–	–	–	*1*	*0.1%*
Total	*244*	*100.0%*	*244*	*100.0%*	*193*	*100.0%*	*681*	*100.0%*
	35.8%		*35.8%*		*28.3%*		*100.0%*	

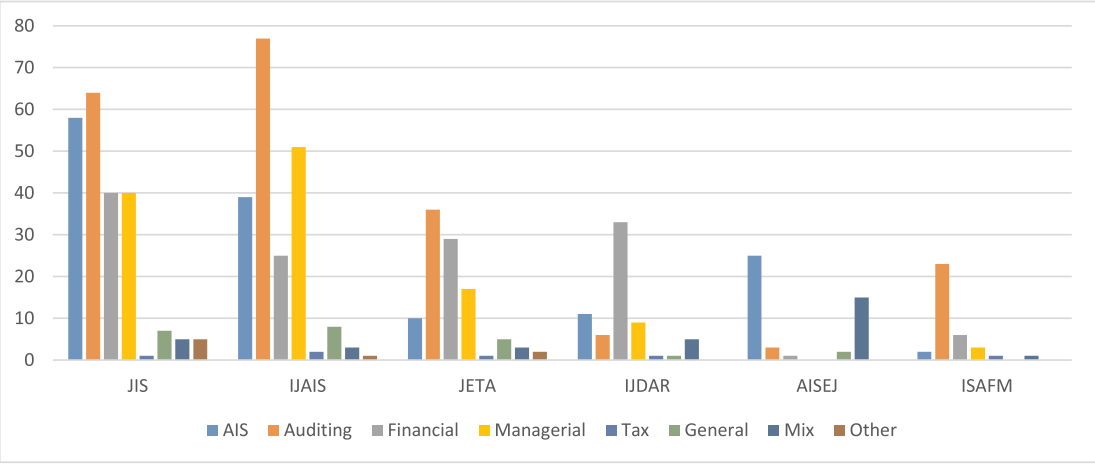

Fig. 1. Distribution of accounting areas by six journals.

though (tax, general, mix, and other), are relatively infrequently addressed in JIS.

Auditing is the top area in four journals, JIS, IJAIS, JETA and ISAFM. For IJAIS, auditing is clearly the leader, followed by managerial, AIS, and financial, with other areas relatively rarely discussed. JETA's distribution also shows auditing first, followed by financial, managerial, and AIS. IJDAR, interestingly, had published many more financial related articles than the other areas, whereas ISAFM had published auditing related articles much more frequently. AISEJ, of course, focuses on AIS mostly, and then mix. What is a common theme, though, is that many of the journals have several areas that are not often addressed. The most commonly overlooked area in all these journals is tax.

The results shown in Table 3a reveal that auditing (29.1%) is the most studied topical area in JIS, which is followed by AIS (26.4%), financial (18.2%) and managerial (18.2%) accounting. Generally speaking, the dominant topical areas in each of the three periods are consistent with those identified in the overall thirteen-year period. More AIS and managerial articles are published in the earlier years, and more auditing and financial articles are published in the later years. This finding indicates that the earlier JIS publications mainly focus on management decision aids research and pure system related issues, such as system design, adoption, and implementation, whereas the research interests transfer to the application of information systems to financial reporting and auditing in the recent years.

Table 3b summarizes the distribution of accounting areas in IJAIS publications across the three periods. In IJAIS, the distributions of topical areas are consistent across all three periods. IJAIS' all-time top-ranked topical area, auditing, accounts for 33.3, 37.1, and

Table 3a
Accounting area - summary of count and distribution – JIS.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	23	*28.4%*	22	*31.4%*	13	*18.8%*	*58*	*26.4%*
Auditing	16	*19.8%*	26	*37.1%*	22	*31.9%*	*64*	*29.1%*
Financial	10	*12.4%*	9	*12.9%*	21	*30.4%*	*40*	*18.2%*
Managerial	21	*25.9%*	12	*17.1%*	7	*10.1%*	*40*	*18.2%*
Tax	–	–	–	–	1	*1.5%*	*1*	*0.5%*
General	3	*3.7%*	1	*1.4%*	3	*4.4%*	*7*	*3.2%*
AIS & audit	1	*1.2%*	–	–	–	–	*1*	*0.5%*
Auditing & managerial	1	*1.2%*	–	–	–	–	*1*	*0.5%*
Managerial & auditing & marketing	–	–	–	–	1	*1.5%*	*1*	*0.5%*
Managerial & financial	2	*2.5%*	–	–	–	–	*2*	*0.9%*
Other - acctg. education	2	*2.5%*	–	–	–	–	*2*	*0.9%*
Other - acctg. history	2	*2.5%*	–	–	–	–	*2*	*0.9%*
Other - research ethics	–	–	–	–	1	*1.5%*	*1*	*0.5%*
Total	*81*	*100.0%*	*70*	*100.0%*	*69*	*100.0%*	*220*	*100.0%*
	36.8%		*31.8%*		*31.4%*		*100.0%*	

Table 3b
Accounting area - summary of count and distribution – IJAIS.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	15	*21.7%*	17	*19.1%*	11	*21.2%*	*43*	*20.4%*
Auditing	23	*33.3%*	33	*37.1%*	21	*40.4%*	*77*	*36.7%*
Financial	10	*14.5%*	11	*12.4%*	4	*7.7%*	*25*	*11.9%*
Managerial	18	*26.1%*	22	*24.7%*	11	*21.2%*	*51*	*24.3%*
Tax	–	–	–	–	2	*3.8%*	*2*	*1.0%*
General	2	*2.9%*	4	*4.5%*	2	*3.8%*	*8*	*3.8%*
Auditing & financial	–	–	–	–	1	*1.9%*	*1*	*0.5%*
Auditing & managerial	–	–	1	*1.1%*	–	–	*1*	*0.5%*
Managerial & financial	–	–	1	*1.1%*	–	–	*1*	*0.5%*
Other - work environment	1	*1.5%*	–	–	–	–	*1*	*0.5%*
Total	*69*	*100.0%*	*89*	*100.0%*	*52*	*100.0%*	*210*	*100.0%*
	32.9%		*42.4%*		*24.8%*		*100.0%*	

Table 3c
Accounting area - summary of count and distribution – JETA.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	2	*4.8%*	0	*0.0%*	8	21.7%	*10*	*9.7%*
Auditing	17	*40.5%*	9	*37.5%*	10	27.0%	*36*	*34.9%*
Financial	14	*33.3%*	6	*25%*	9	24.3%	*29*	*28.2%*
Managerial	8	*19.0%*	4	*16.6%*	5	13.5%	*17*	*16.5%*
Tax	0	*0.0%*	1	*4.2%*	0	0.0%	*1*	*1.0%*
General	0	*0.0%*	3	*12.5%*	2	5.4%	*5*	*4.9%*
Auditing & financial	1	*2.4%*	1	*4.2%*	0	0.0%	*2*	*1.9%*
AIS & managerial	0	*0.0%*	0	*0.0%*	1	2.7%	*1*	*1.0%*
Other - education	0	*0.0%*	0	*0.0%*	2	5.4%	*2*	*1.9%*
Total	*42*	*100.0%*	*24*	*100.0%*	*37*	100.0%	*103*	*100.0%*
	40.8%		*23.3%*		*35.9%*		*100.0%*	

40.4% over the three periods, respectively, followed by managerial, AIS, and financial accounting. Over time, the number of AIS and auditing studies slightly increased, but the number of financial and managerial publications slightly decreased in IJAIS.

The distribution of accounting areas in JETA is summarized in Table 3c. Over the entire thirteen-year period, the most studied accounting area in JETA is auditing (34.9%), followed by financial (28.2%) and managerial (16.5%) accounting. Additionally, the number of AIS studies significantly increased in the third period to 21.7% from 4.8% in the first period and 0% in the second period.

Table 3d summarizes the distribution of accounting areas in IJDAR. Table 3d reveals that financial accounting is the dominant accounting area throughout the entire thirteen years, accounting for 46.4%, 48.0%, and 61.5% in each of the sub-periods,

Table 3d
Accounting area - summary of count and distribution – IJDAR.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	7	*25.0%*	4	*16.0%*	–	–	*11*	*16.7%*
Auditing	1	*3.6%*	4	*16.0%*	1	*7.7%*	*6*	*9.1%*
Financial	13	*46.4%*	12	*48.0%*	8	*61.5%*	*33*	*50.0%*
Managerial	4	*14.3%*	2	*8.0%*	3	*23.1%*	*9*	*13.6%*
Tax	–	–	–	–	1	*7.7%*	*1*	*1.5%*
General	–	–	1	*4.0%*	–	–	*1*	*1.5%*
Auditing & financial	1	*3.6%*			–	–	*1*	*1.5%*
AIS & managerial	–	–	1	*4.0%*	–	–	*1*	*1.5%*
AIS & financial & managerial	–	–	1	*4.0%*	–	–	*1*	*1.5%*
Financial & managerial	2	*7.1%*	–	–	–	–	*2*	*3.0%*
Total	*28*	*100.0%*	*25*	*100.0%*	*13*	100.0%	*66*	*100.0%*
	42.4%		*37.9%*		*19.7%*		*100.0%*	

Table 3e
Accounting area - summary of count and distribution – AISEJ.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	8	*66.7%*	13	*59.1%*	4	*33.3%*	*25*	*54.3%*
Auditing	–	–	3	*13.6%*	–	–	*3*	*6.5%*
Financial	–	–	1	*4.5%*	–	–	*1*	*2.2%*
General	1	*8.3%*	–	–	1	*8.3%*	*2*	*4.3%*
AIS & auditing	3	*25.0%*	3	*13.6%*	5	*41.7%*	*11*	*23.9%*
AIS & financial	–	–	1	*4.5%*	1	*8.3%*	*2*	*4.3%*
AIS & managerial	–	–	1	*4.5%*	1	*8.3%*	*2*	*4.3%*
Total	*12*	*100.0%*	*22*	*100.0%*	*12*	100.0%	*46*	*100.0%*
	26.1%		*47.8%*		*26.1%*		*100.0%*	

respectively. The overall second-ranked accounting area is AIS (16.7%), followed by managerial accounting (13.6%). Unlike JETA, the number of AIS articles continuously decreased over time from 25.0% in the first period to 16.0% in the second period to zero in the last period.

The distribution of accounting areas in AISEJ is summarized in Table 3e, which reveals that AIS and auditing are two widely studied accounting areas in AISEJ throughout the whole thirteen-year period as well as in each sub-period. This is unsurprising given it is an AIS education specific journal.

Table 3f summarizes the distribution of accounting areas in ISAFM. As shown in Table 3f, the primary accounting area published in ISAFM is auditing. More than half of the accounting articles published in each sub-period are auditing articles. Since ISAFM is a journal specializing in the application of intelligent systems, this finding implies that the application of intelligent system in accounting is mainly focused on auditing. The overall second-ranked accounting area is financial (16.7%). This area is also ranked second in each sub-period.

Table 3f
Accounting area - summary of count and distribution – ISAFM.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	–	–	1	*7.1%*	1	*10.0%*	*2*	*5.6%*
Auditing	7	*58.3%*	10	*71.5%*	6	*60.0%*	*23*	*63.9%*
Financial	2	*16.7%*	2	*14.3%*	2	*20.0%*	*6*	*16.7%*
Managerial	2	*16.7%*	1	*7.1%*	–	–	*3*	*8.3%*
Tax	1	*8.3%*	–	–	–	–	*1*	*2.8%*
Auditing & financial & managerial	–	–	–	–	1	*10.0%*	*1*	*2.8%*
Total	*12*	*100.0%*	*14*	*100.0%*	*10*	100.0%	*36*	*100.0%*
	33.3%		*38.9%*		*27.8%*		*100.0%*	

Table 4
Emerging technologies research areas.

Emerging technology area	Articles	Percentage
XBRL, continuous/online/digital/e-reporting	80	26%
Artificial intelligence	61	20%
Continuous auditing/monitoring	55	18%
Big data, data analytics/mining, etc.	40	13%
Internet technologies (various)	24	8%
Informatics, textual analysis, text mining	16	5%
Cloud computing	9	3%
Decision support/group support systems	9	3%
Educational ET tools	7	2%
SysTrust, WebTrust	4	1%
XML	3	1%
Other	3	1%

5. Emerging technologies contributions

Belfo and Trigoab (2013) present accounting challenges to which they expect future technological solutions. These include external and compliance reporting, strategic analysis, benchmarking, forecasting, internal auditing & internal controls & risk management, real time reporting, more non-financial performance data, historical and current cost accounting combined as well as tailor-made and interactive reporting. Furthermore, the 2018 AACSB accounting accreditation standard A5, which addresses information technology skills, agility and knowledge for accounting graduates, "includes the ability of both faculty and students to adapt to emerging technologies as well as the mastery of current technology" (AACSB, 2018, p. 27). Furthermore, the basis for judgment for A5 includes such terms as "data creation, manipulation/management, security, and storage," as well as "data analytics including, for example, statistical techniques, clustering, data management, modeling, analysis, text analysis, predictive analytics, learning systems, or visualization" (AACSB, 2018, p. 27). Finally, the standard also emphasizes "developing information technology agility among students and faculty, recognizing the need for continual learning of new skills needed by accounting professionals" (AACSB, 2018, p. 27). Clearly, technology and emerging technologies are important for the future of both students and also the profession as a whole.

The emerging technologies [ET] that have been studied during this period are diverse. These also illustrate the broad definition of emerging technologies used in this study. The technologies listed in Table 4 are still emerging according to the definitions of the slope of enlightenment and plateau of productivity in the Gartner (2016b) hype cycle. New ideas and applications are still being developed. The payoff of these technologies has not yet been maximized. Even AI, which has been around the longest, has not reached the plateau of productivity in the Gartner (2016b) hype cycle. Table 4 shows the most common emerging technology areas these journal articles have discussed. Some articles addressed more than one technology.

XBRL (including continuous, online, digital, and e-reporting) is the most common emerging technologies area studied. About one-quarter of the ET articles have addressed one of these topics. The second most common ET area (20%) is artificial intelligence, which is not surprising given one of the journals (ISAFM) is focused on intelligent systems and which confirms the conclusion of Sutton et al. (2016) that artificial intelligence research in accounting continues strong. AI is defined broadly here, including such varied technologies as neural networks and genetic algorithms. Continuous auditing and monitoring topics make up another 18% of the ET articles, followed by big data/data analytics related articles at 13%. A variety of internet technologies (social networks and media, crowd sourcing, etc.) have been studied in 7% of the ET articles. Informatics, textual analysis and text mining, which are related to data analytics but focused on text, account for 5% of the ET articles. Each of the remaining topic areas accounts for 3% or less of the total ET articles, but some interesting themes are apparent. Some of these lesser topics are no longer of particular interest (SysTrust, WebTrust) or still emerging (XML), while others have been coming into the spotlight more recently among accounting researchers (e.g., cloud computing).

From this list of ET terms, some newer terms or technologies may appear to be missing. For example, blockchain is currently a hot topic but did not appear in these journals during the period studied which ends in 2016. However, articles addressing blockchain first appear in 2017 in three of these journals, JIS, JETA, and ISAFM. The blockchain-based cryptocurrencies first appeared on the Gartner Hype Cycle in 2014 (Gartner, 2014) and were last seen on the 2015 graphic. Blockchain itself first appeared in 2016 (Gartner, 2016a) with an expected maturity in three to five years. So blockchain was at the beginning of its hype cycle when the first articles appeared in AIS journals whereas some of the more studied topics have been around for quite some time.

Table 5 summarizes the emerging technologies research articles count per year per journal. Each article's title, keywords, and abstract were examined for evidence of emerging technologies. Obvious emerging technology keywords include continuous auditing, artificial intelligence, XBRL, neural network, genetic algorithm, social media, etc. Articles that were focused on general systems, accounting information systems, or ERP were not included in the emerging technology category if they did not otherwise address some obvious emerging technology issue. Clearly, some technologies are emerging, then emerge, and then become a common element of broader information systems. Mostly, when this happens, such technologies are no longer discussed as separate from the information systems. Some emerging technologies that were popular in research early in the period studied, such as expert systems, are rarely seen studied separately or mentioned with this term in more recent years.

The fact that all of the ISAFM articles and most of the JETA articles address emerging technologies is not a surprise as those

Table 5
The number of emerging technologies research articles published per year in JIS, IJAIS, JETA, IJDAR, AISEJ, and ISAFM.

Year	JIS	IJAIS	JETA	IJDAR	AISEJ	ISAFM	Total
2004	2	4	5	4	–	5	20
2005	3	6	3	4	–	3	19
2006	4	5	6	0	1	2	18
2007	0	4	9	3	–	2	18
2008	3	4	13	4	1	0	25
2004–2008	*12*	*23*	*36*	*15*	*2*	*12*	*100*
2009	1	8	4	3	1	3	20
2010	2	7	4	2	–	2	17
2011	2	5	4	3	–	4	18
2012	11	11	3	3	1	3	32
2013	6	7	2	4	–	2	21
2009–2013	*22*	*38*	*17*	*15*	*2*	*14*	*108*
2014	6	7	2	1	–	3	19
2015	16	9	7	2	–	3	37
2016	11	7	14	3	2	4	41
2014–2016	*33*	*23*	*23*	*6*	*2*	*10*	*97*
Total emerging technologies	67	84	76	36	6	36	305
	30.4%	*40.0%*	*73.8%*	*54.6%*	*13.0%*	*100.00%*	
Total non-emerging technologies	153	126	27	30	40	0	376
	69.6%	*60.0%*	*26.2%*	*45.4%*	*87.0%*	*0.00%*	
Total accounting articles	***220***	***210***	***103***	***66***	***46***	***36***	***681***

journals explicitly have this focus. IJDAR also has an emerging technologies focus in more than half of the articles published. What is even more interesting is the large percentage of emerging technologies related articles in the other journals. In IJAIS it is 40% and in JIS it is almost one third. Even AISEJ addresses emerging technologies in 13% of its articles. Clearly, emerging technologies are central to the focus of this set of journals and not just those obviously aiming directly at that segment of research, but rather all the

Table 6
Emerging technologies research – accounting area summary count and distribution in JIS, IJAIS, JETA, IJDAR, AISEJ, and ISAFM.

Accounting area	JIS 2004–2016		IJAIS 2004–2016		JETA 2004–2016		IJDAR 2004–2016		AISEJ 2004–2016		ISAFM 2004–2016		Total 2004–2016
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%	Total
AIS	12	*17.9%*	11	*13.1%*	4	*5.3%*	3	*8.4%*	2	*33.3%*	2	*5.6%*	*34* *11.1%*
Auditing	26	*38.8%*	42	*50.0%*	31	*40.8%*	4	*11.1%*	1	*16.7%*	23	*63.9%*	*127* *41.6%*
Financial	22	*32.8%*	16	*19.0%*	21	*27.6%*	22	*61.1%*	–	–	6	*16.7%*	*87* *28.5%*
Managerial	5	*7.5%*	12	*14.3%*	9	*11.8%*	4	*11.1%*	–	–	3	*8.3%*	*33* *10.8%*
Tax	–	–	1	*1.2%*	1	*1.3%*	–	–	–	–	1	*2.8%*	*3* *1.0%*
General	1	*1.5%*	2	*2.4%*	5	*6.6%*	1	*2.8%*	–	–	–	–	*9* *3.0%*
AIS & auditing	–	–	–	–	–	–	–	–	2	*33.3%*	–	–	*2* *0.7%*
AIS & financial	–	–	–	–	–	–	–	–	1	*16.7%*	–	–	*1* *0.3%*
AIS & financial & managerial	–	–	–	–	–	–	–	–	–	–	1	*2.8%*	*1* *0.3%*
Auditing & financial	–	–	–	–	–	–	1	*2.8%*	–	–	–	–	*1* *0.3%*
Managerial & auditing & marketing	1	*1.5%*	–	–	–	–	–	–	–	–	–	–	*1* *0.3%*
Financial & managerial	–	–	–	–	–	–	1	*2.8%*	–	–	–	–	*1* *0.3%*
Other - acctg. education	–	–	–	–	2	*2.6%*	–	–	–	–	–	–	*2* *0.7%*
Financial & auditing	–	–	–	–	2	*2.6%*	–	–	–	–	–	–	*2* *0.7%*
AIS & managerial	–	–	–	–	1	*1.3%*	–	–	–	–	–	–	*1* *0.3%*
Total	*67*	*100.0%*	*84*	*100.0%*	*76*	*100.0%*	*36*	*100.0%*	*6*	*100.0%*	*36*	*100.0%*	*305*

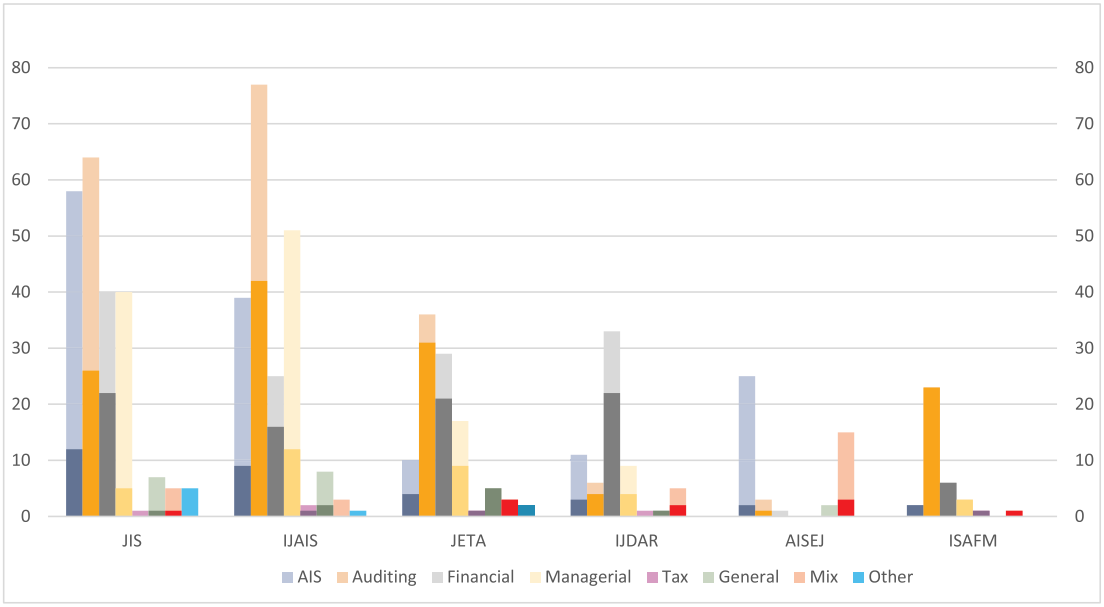

Fig. 2. Comparison of the distribution of accounting and emerging technologies (ET) related articles by accounting areas in the six journals.

journals have significant output on this topic.

This is a growth area not least because of demand for accounting graduates on staff who can deal adeptly with expanding new technologies (Arrowsmith, 2018). Given that research and teaching often lag technology changes in the profession, this trend could just be the beginning of more emphasis on emerging technologies as new technologies, such as blockchain, virtual currency, data visualization, etc. are being adopted that are expected to significantly affect the accounting profession.

5.1. Accounting area of emphasis

Table 6 shows the emerging technologies related articles by area of accounting for all six journals. Auditing (41.6%) and financial accounting (28.5%) are most often application areas for emerging technologies research. These are followed distantly by AIS and managerial accounting, both around 11%. Curiously, tax has been largely ignored by emerging technology researchers, despite potentially interesting opportunities for ET use.

Like Fig. 1, Fig. 2 shows the distribution of articles across accounting areas for each journal, but this second figure also distinguishes the emerging technology related articles (darker tone in each bar) from the rest. Clearly, all of these journals (except for AISEJ) addressed emerging technologies in a significant portion of the articles published. Almost all the articles in JETA and all the articles in ISAFM are ET related, with a smaller but still significant portion in IJDAR, IJAIS and JIS. Apparently, emerging technologies are important in accounting and accounting information systems research. Unfortunately, this does not seem to be true thus far in the one education journal in this study, AISEJ.

Table 6a shows the emerging technologies related articles by area of accounting across the three time periods for JIS. While JIS articles more frequently have applied ET to auditing (39%), in more recent years' financial accounting has become more dominant and closely follows at 33%. ET applications in AIS, understandably, have been studied third most frequently (18%). ET articles in JIS rarely address more than one area of accounting.

Table 6b shows the emerging technologies related articles by area of accounting across the three time periods for IJAIS. IJAIS

Table 6a
JIS emerging technologies research articles – accounting area summary of count and distribution.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	2	*16.7%*	6	*27.3%*	4	*12.1%*	*12*	*17.9%*
Auditing	4	*33.3%*	11	*50.0%*	11	*33.3%*	*26*	*38.8%*
Financial	4	*33.3%*	4	*18.2%*	14	*42.4%*	*22*	*32.8%*
Managerial	2	*16.7%*	1	*4.5%*	2	*6.1%*	*5*	*7.5%*
General	–	–	–	–	1	*3.0%*	*1*	*1.5%*
Managerial & auditing & marketing	–	–	–	–	1	*3.0%*	*1*	*1.5%*
Total	*12*	*100.0%*	*22*	*100.0%*	*33*	*100.0%*	*67*	*100.0%*

Table 6b
IJAIS emerging technologies research articles – accounting area summary of count and distribution.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	2	*8.7%*	6	*15.8%*	3	*13.0%*	*11*	*13.1%*
Auditing	11	*47.8%*	19	*50.0%*	12	*52.2%*	*42*	*50.0%*
Financial	7	*30.4%*	7	*18.4%*	2	*8.7%*	*16*	*19.0%*
Managerial	3	*13.0%*	6	*15.8%*	3	*13.0%*	*12*	*14.3%*
Tax	–	–	–	–	1	*4.4%*	*1*	*1.2%*
General	–	–	–	–	2	*8.7%*	*2*	*2.4%*
Total	*23*	*100.0%*	*38*	*100.0%*	*23*	*100.0%*	*84*	*100.0%*

Table 6c
JETA emerging technologies research articles – accounting area summary of count and distribution.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	1	*2.8%*	–	–	3	13.0%	*4*	*5.3%*
Auditing	15	*41.6%*	7	*41.2%*	9	39.1%	*31*	*40.8%*
Financial	13	*36.1%*	4	*23.5%*	4	17.4%	*21*	*27.6%*
Managerial	6	*16.7%*	1	*5.9%*	2	8.7%	*9*	*11.9%*
Tax	–	–	1	*5.9%*	–	–	*1*	*1.3%*
General	–	–	3	*17.7%*	2	8.7%	*5*	*6.6%*
Auditing & financial	1	*2.8%*	1	*5.9%*	–	–	*2*	*2.6%*
AIS & managerial	–	–	–	–	1	4.4%	*1*	*1.3%*
Other - education	–	–	–	–	2	8.7%	*2*	*2.6%*
Total	*36*	*100.0%*	*17*	*100.0%*	*23*	*100.0%*	*76*	*100.0%*

articles have consistently applied ET most frequently to auditing (50%), which is followed distantly by financial accounting (19%), managerial accounting (14%), and AIS (13%). Again, tax is rarely addressed in IJAIS's ET articles.

Table 6c shows the emerging technologies related articles by area of accounting across the three time periods for JETA. Again, ET research is most consistently and frequently applied to auditing (41%). Financial accounting is second at 28% but has been decreasing over the period. Similarly, managerial accounting ET research has decreased over the period, averaging 12% in total. In JETA, AIS is relatively rarely studied in ET papers (5%) and tax is even more rare as a setting for ET research (1%).

Table 6d shows the emerging technologies related articles by area of accounting across the three time periods for IJDAR. This journal's ET articles have a much heavier focus on financial accounting (61%), distantly trailed by auditing and managerial accounting, both at 11%. Tax is not addressed in this setting at all. Perhaps this international journal is more focused on financial accounting because of the recent movement toward convergence in accounting standards and the development of digital reporting technologies.

Table 6e shows the emerging technologies related articles by area of accounting across the three time periods for AISEJ. With its focus on education and teaching, AISEJ has a relatively rare ET focus with only 6 articles addressing ET in the entire period studied. ET has only been applied to AIS, auditing, AIS and auditing, AIS and financial areas in AISEJ.

Table 6f shows the emerging technologies related articles by area of accounting across the three time periods for ISAFM. The journal's articles more frequently have applied ET to auditing (64%), followed by financial accounting (17%). AIS and managerial accounting areas have been relatively rarely studied in ET articles. Both managerial and tax are areas that have not been studied in ET

Table 6d
IJDAR emerging technologies research articles – accounting area summary of count and distribution.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	1	*6.7%*	2	*13.3%*	–	–	*3*	*8.3%*
Auditing	1	*6.7%*	3	*20.0%*	–	–	*4*	*11.1%*
Financial	9	*60.0%*	8	*53.3%*	5	*83.3%*	*22*	*61.1%*
Managerial	2	*13.3%*	1	*6.7%*	1	*16.7%*	*4*	*11.1%*
General	–	–	1	*6.7%*	–	–	*1*	*2.8%*
Auditing & financial	1	*6.7%*	–	–	–	–	*1*	*2.8%*
Financial & managerial	1	*6.7%*	–	–	–	–	*1*	*2.8%*
Total	*15*	*100.0%*	*15*	*100.0%*	*6*	*100.0%*	*36*	*100.0%*

Table 6e
AISEJ emerging technologies research articles – accounting area summary of count and distribution.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	2	*100.0%*	–	–	–	–	*2*	*33.3%*
Auditing	–	–	1	*50.0%*	–	–	*1*	*16.7%*
AIS & auditing	–	–	–	–	2	*100.0%*	*2*	*33.3%*
AIS & financial	–	–	1	*50.0%*	–	–	*1*	*16.7%*
Total	*2*	*100.0%*	*2*	*100.0%*	*2*	*100.0%*	*6*	*100.0%*

Table 6f
ISAFM emerging technologies research articles – accounting area summary of count and distribution.

Accounting area	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
AIS	–	–	1	*7.1%*	1	*10.0%*	*2*	*5.6%*
Auditing	7	*58.3%*	10	*71.4%*	6	*60.0%*	*23*	*63.9%*
Financial	2	*16.7%*	2	*14.3%*	2	*20.0%*	*6*	*16.7%*
Managerial	2	*16.7%*	1	*7.1%*	–	–	*3*	*8.3%*
Tax	1	*8.3%*	–	–	–	–	*1*	*2.8%*
Auditing & financial & managerial	–	–	–	–	1	*10.0%*	*1*	*2.8%*
Total	*12*	*100.0%*	*14*	*100.0%*	*10*	*100.0%*	*36*	*100.0%*

articles in recently years. This perhaps reflects the discipline's overall focus on auditing and financial accounting. Like most of the other journals, ET articles that address multiple areas of accounting are rare.

5.2. Research methodology

The summary statistics of research methods applied in ET articles in the six journals are provided in Table 7. Of the four main categories previously identified in Coyne et al. (2010) two are more common here: archival (19%) and experimental (16%). Few ET studies engage analytical methods. As was the case when addressing all the articles, the methodologies of more than half of the articles are “Other.” These are divided into subcategories. Clearly, in the ET article subgroup, a wide range of methods are used. The most common method applied to ET studies in this period is actually design science research (21%).

Each of the individual journals has its own methodological focus when ET research is considered separately. Table 7a provides this data for JIS. This journal most often publishes ET research using archival methods (25%), descriptive methods (21%), or experimental methods (15%). Note that archival research has been increasing in the most recent period, which may reflect the discipline's move to favor archival research or may just reflect changing editor interests. The increase in archival research published in JIS could also be due to the increasing emphasis on archival research by doctoral programs in the Americas. Since JIS is a section journal of the American Accounting Association, it is more likely to attract this particular research than IJAIS or IJDAR which have an international focus. Further, a broad range of research methodologies have been used in the ET research published in JIS.

Table 7b provides the ET and research methodology data for IJAIS. Experimental research (21%) and archival methods (18%) have been staples for ET studies in IJAIS. Also relatively common is the application of design science research methods to ET (18%) which has been increasing significantly in the most recent period. The increasing emphasis on design science research is not surprising in light of the development of new systems and approaches. New emerging technologies need newly designed approaches.

Table 7c provides the ET and research methodology data for JETA. JETA has had a large percentage of archival research related to ET (24%) although the trend is not increasing as in some other journals. All the “Other” research methods are relatively rarely used except for design science research which was even more commonly applied to ET than archival during the period of study (29%). Like most of the journals studied, a broad range of research methodologies has been used in the ET research. This may reflect the more diverse interests of the AIS and ET researchers relative to the traditional accounting researchers.

Table 7d provides the ET and research methodology data for IJDAR. This journal has a relatively even spread of research methods applied to ET, including design science research (22%), archival (19%), experimental (14%), and survey research (11%). No analytical methods were used in ET studies at IDJAR during this period.

Table 7e provides the ET and research methodology data for AISEJ. AISEJ had relatively few ET articles and their methods are not a surprise in an education journal: case studies, descriptive studies, and surveys.

Table 7f provides the ET and research methodology data for ISAFM. Design science research (39%) is applied frequently to ET topics in this journal and is increasing in application over time. The second most common research method is experimental (28%) although these sorts of studies have dropped off in the most recent period. Archival studies, case studies, and reviews have each been

Table 7
Emerging technologies research – research methodology summary count and distribution in JIS, IJAIS, JETA, IJDAR, AISEJ, and ISAFM.

Research methodology	JIS 2004–2016		IJAIS 2004–2016		JETA 2004–2016		IJDAR 2004–2016		AISEJ 2004–2016		ISAFM 2004–2016		2004–2016
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%	Total
Analytical	1	*1.5%*	1	*1.2%*	7	*9.2%*	–	–	–	–	–	–	*9* *3.0%*
Analytical & other - case	–	–	–	–	–	–	–	–	–	–	4	*11.1%*	*4* *1.3%*
Archival	17	*25.4%*	15	*17.9%*	18	*23.7%*	7	*19.4%*	–	–	–	–	*57* *18.7%*
Experimental	10	*14.9%*	18	*21.4%*	6	*7.9%*	5	*13.9%*	–	–	10	*27.8%*	*49* *16.1%*
Experimental & other - field	1	*1.5%*	–	–	–	–	–	–	–	–	–	–	*1* *0.3%*
Other - bibliometrics - citation analysis	1	*1.5%*	–	–	3	*3.9%*	–	–	–	–	–	–	*4* *1.3%*
Other - case studies	6	*8.9%*	7	*8.3%*	4	*5.3%*	1	*2.8%*	–	–	4	*11.1%*	*22* *7.2%*
Other - case studies with teaching notes	3	*4.5%*	–	–	5	*6.6%*	–	–	4	*66.7%*	–	–	*12* *3.9%*
Other - descriptive	14	*20.9%*	14	*16.7%*	7	*9.2%*	3	*8.3%*	1	*16.7%*	–	–	*39* *12.8%*
Other - Delphi	–	–	–	–	–	–	2	*5.6%*	–	–	–	–	*2* *0.7%*
Other - DSR	5	*7.4%*	15	*17.9%*	22	*29.0%*	8	*22.2%*	–	–	14	*38.9%*	*64* *21.0%*
Other - field	1	*1.5%*	–	–	–	–	2	*5.6%*	–	–	–	–	*3* *1.0%*
Other - interview	–	–	2	*2.4%*	–	–	–	–	–	–	–	–	*2* *0.7%*
Other - methodology	–	–	–	–	–	–	*1*	*2.8%*	–	–	–	–	*1* *0.3%*
Other - review	4	*6.0%*	*3*	*3.6%*	2	*2.6%*	3	*8.3%*	–	–	*4*	*11.1%*	*16* *5.2%*
Other - review & case study	–	–	*1*	*1.2%*	–	–	–	–	–	–	–	–	*1* *0.3%*
Other - review & interview	–	–	*1*	*1.2%*	–	–	–	–	–	–	–	–	*1* *0.3%*
Other - simulation	1	*1.5%*	–	–	–	–	–	–	–	–	–	–	*1* *0.3%*
Other - survey	3	*4.5%*	7	*8.3%*	2	*2.6%*	4	*11.1%*	1	*16.7%*	–	–	*17* *5.6%*
Total	*67* *22.0%*	*100.0%*	*84* *27.5%*	*100.0%*	*76* *24.9%*	*100.0%*	*36* *11.8%*	*100.0%*	*6* *2.0%*	*100.0%*	*36* *11.8%*	*100.0%*	*305* *100.0%*

Table 7a
JIS emerging technologies research articles research methodology summary of count and distribution.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Analytical	–	–	–	–	1	*3.0%*	*1*	*1.5%*
Archival	1	*8.3%*	3	*13.6%*	13	*39.4%*	*17*	*25.3%*
Experimental	1	*8.3%*	3	*13.6%*	6	*18.2%*	*10*	*14.9%*
Experimental & other - field	–	–	–	–	1	*3.0%*	*1*	*1.5%*
Other - bibliometrics - citation analysis	–	–	–	–	1	*3.0%*	*1*	*1.5%*
Other - case studies	2	*16.7%*	1	*4.6%*	3	*9.1%*	*6*	*9.0%*
Other - case studies with teaching notes	3	*25.0%*	–	–	–	–	*3*	*4.5%*
Other - descriptive	2	*16.7%*	7	*31.8%*	5	*15.2%*	*14*	*20.9%*
Other - DSR	2	*16.7%*	3	*13.6%*	–	–	*5*	*7.4%*
Other - field	–	–	1	*4.6%*	–	–	*1*	*1.5%*
Other - review	–	–	2	*9.1%*	2	*6.1%*	*4*	*6.0%*
Other - simulation	1	*8.3%*	–	–	–	–	*1*	*1.5%*
Other - survey	–	–	2	*9.1%*	1	*3.0%*	*3*	*4.5%*
Total	*12*	*100.0%*	*22*	*100.0%*	*33*	*100.0%*	*67*	*100.0%*

Table 7b
IJAIS emerging technologies research articles research methodology summary of count and distribution.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Analytical	1	*4.3%*	–	–	–	–	*1*	1.2%
Archival	5	*21.7%*	8	*20.5%*	2	*8.7%*	*15*	17.9%
Experimental	5	*21.7%*	9	*23.1%*	4	*17.4%*	*18*	21.4%
Other - case studies	2	*8.7%*	3	*7.7%*	2	*8.7%*	*7*	8.3%
Other - descriptive	4	*17.4%*	9	*23.1%*	1	*4.3%*	*14*	16.7%
Other - DSR	3	*13.0%*	5	*12.8%*	7	*34.8%*	*15*	17.9%
Other - interview	–	–	1	*2.6%*	1	*4.4%*	*2*	2.4%
Other - review	–	–	1	*2.5%*	2	*8.7%*	*3*	3.6%
Other - review & case study	1	*4.4%*	–	–	–	–	*1*	1.2%
Other - review & interview	1	*4.4%*	–	–	–	–	*1*	1.2%
Other - survey	1	*4.4%*	3	*7.7%*	3	*13.0%*	*7*	8.3%
Total	*23*	*100.0%*	*39*	*100.0%*	*22*	*100.0%*	*84*	100.0%

Table 7c
JETA emerging technologies research articles research methodology summary of count and distribution.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Analytical	7	*19.4%*	–	–	–	–	*7*	*9.1%*
Archival	5	*13.9%*	8	*47.0%*	5	*21.7%*	*18*	*23.7%*
Experimental	5	*13.9%*	–	–	1	*4.4%*	*6*	*7.9%*
Other - bibliometrics - citation analysis	–	–	2	*11.8%*	1	*4.4%*	*3*	*3.9%*
Other - case studies	1	*2.8%*	–	–	3	*13.0%*	*4*	*5.3%*
Other - case studies with teaching notes	–	–	1	*5.9%*	4	*17.4%*	*5*	*6.6%*
Other - descriptive	1	*2.8%*	2	*11.8%*	4	*17.4%*	*7*	*9.2%*
Other - DSR	15	*41.6%*	3	*17.6%*	4	*17.4%*	*22*	*29.0%*
Other - review	1	*2.8%*	–	–	1	*4.4%*	*2*	*2.6%*
Other - survey	1	*2.2%*	1	*5.9%*	–	–	*2*	*2.6%*
Total	*36*	*100.0%*	*17*	*100.0%*	*23*	*100.0%*	*76*	*100.0%*

Table 7d
IJDAR emerging technologies research articles research methodology summary of count and distribution.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Archival	2	13.3%	2	13.3%	3	50.0%	*7*	*19.4%*
Experimental	3	20%	1	6.7%	1	16.7%	*5*	*13.9%*
Other - case studies	1	6.7%	–	–	–	–	*1*	*2.8%*
Other - Delphi	–	–	2	13.3%	–	–	*2*	*5.6%*
Other - descriptive	1	6.7%	2	13.3%	–	–	*3*	*8.3%*
Other - DSR	4	26.7%	4	26.7%	–	–	*8*	*22.2%*
Other - field study	1	6.7%	–		1	16.7%	*2*	*5.6%*
Other - methodology	–	–	1	6.7%	–	–	*1*	*2.8%*
Other - review	–	–	2	13.3%	1	16.7%	*3*	*8.3%*
Other - survey	3	20%	1	6.7%	–	–	*4*	*11.1%*
Total	*15*	*100.0%*	*15*	*100.0%*	*6*	*100.0%*	*36*	*100.0%*

Table 7e
AISEJ emerging technologies research articles research methodology summary of count and distribution.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Other - case studies with teaching notes	1	*50.0%*	1	*50.0%*	2	*100.0%*	*4*	*66.7%*
Other - descriptive	1	*50.0%*	–		–	–	*1*	*16.7%*
Other - survey	–		1	*50.0%*	–	–	*1*	*16.7%*
Total	*2*	*100.0%*	*2*	*100.0%*	*2*	*100.0%*	*6*	*100.0%*

Table 7f
ISAFM emerging technologies research articles research methodology summary of count and distribution.

Research methodology	2004–2008		2009–2013		2014–2016		2004–2016	
	Subtotal	%	Subtotal	%	Subtotal	%	Total	%
Archival	1	8.3%	1	7.1%	2	20.0%	*4*	*11.1%*
Experimental	6	50.0%	4	28.5%	–	–	*10*	*27.8%*
Other - case studies	1	8.3%	2	14.3%	1	10.0%	*4*	*11.1%*
Other - DSR	3	25.0%	6	42.9%	5	50.0%	*14*	*38.9%*
Other - review	1	8.4%	1	7.1%	2	20.0%	*4*	*11.1%*
Total	*12*	*100.0%*	*14*	*100.0%*	*10*	*100.0%*	*36*	*100.0%*

used in 11% of ET studies in this journal. No analytical methods were used in ET studies at ISAFM during this period.

6. Summary, conclusions, and future research

The principle objective of this bibliometric and comparative study was to investigate the main research characteristics, especially the research methodologies and topical areas of accounting articles in the six AIS journals JIS, IJAIS, JETA, IJDAR, AISEJ and ISAFM, collectively and individually, over the time period 2004 to 2016 in segments of two quinquennia (2004 to 2008 and 2009 to 2013) and a triennium (2014 to 2016), how the research characteristics changed over time and how the answers change when only emerging technologies research is examined.

With regard to RQ1, with the exception of AISEJ, each of the journals has published contributions to the emerging technologies literature to varying extent between 30% (JIS) and 100% (ISAFM). Of all the accounting related articles published in these journals, about 45% address emerging technologies in some way. While JETA is explicitly focused on emerging technologies, JIS and IJAIS actually have published during this period a somewhat similar number of articles related to ET in accounting as JETA. This is due to the fact that these are larger journals with more issues per year.

With regard to RQ2, from a methodology standpoint, archival, experimental, and survey research are the most common methods employed in these journals overall. That result is likely driven, however, by the larger journals, JIS and IJAIS. JIS has those three areas as most common, joined by descriptive research as a fourth methodology comprising 10%, respectively. Compared to results in Coyne et al. (2010) where JIS research mainly adopted “Other” methods (47%) and experimental (39%) methods from 1990 to 2009, this study found a pattern change in JIS research methods where archival research has shown an apparent increase and became the top ranked method in the recent two sub-periods. IJAIS articles applied the same four top research methodologies as those in JIS but also a significant percentage of design science research (14%). By comparing to results in Hutchinson et al. (2004), the dominant research methodologies in IJAIS are consistent over time. The distribution within these methods has, however, changed in the period 2004–2016. The archival method increased from 11% to 20%, experimental method decreased from 27% to 16%, and descriptive method papers increased from 7% to 17%. JETA's most common methodology is design science research followed by archival, this finding remains consistent with the content analysis results of JETA from 2004 to 2013 (Muehlmann et al., 2015). IJDAR's most common methodologies are, in order, survey, archival, and design science research. ISAFM's accounting articles tend to use design science, case studies, and surveys the most. So, the more specialized journals with a focus on emerging technologies or education tend to publish works with somewhat different research methodologies than the larger and broader AIS journals.

With regard to RQ3, overall the most common accounting areas studied, in order, are auditing, AIS, financial, and managerial. Again, these overall results are likely driven by the larger journals, as JIS shows exactly those results. IJAIS, interestingly, covers those same areas but in a different order of frequency: auditing, managerial, AIS, and financial. This might reflect a different focus or even a broader perspective, which may, of course, change over time at any journal depending on the editors and current developments. With JETA, AIS is not a high priority area. The top areas in order are auditing, financial, and managerial. Surprisingly, tax is largely absent from these journals, although emerging technology applications in tax compliance as well as tax planning abound.

IJDAR is more focused on financial accounting, followed by AIS and managerial. This journal is the least focused on auditing of all six journals, which may reflect its international flavor or different areas of emphasis for a journal published outside of the USA or perhaps just editorial preference during a particular period. AISEJ is, predictably, focused on AIS. ISAFM's accounting articles have focused most on auditing and financial accounting. This information about varying areas of emphasis and diversity of accounting areas is useful for those seeking articles in the literature and also those deciding where to submit research. Of course, this information is descriptive, and not necessarily prescriptive, as most of these journals are open to a wide variety of AIS and emerging technologies research and editorial preferences change over time.

With regard to RQ4, these emerging technologies are the most commonly studied, respectively: XBRL, continuous/online/digital/e-reporting and artificial intelligence. All the journals have significant portions of published articles addressing emerging technologies-related topics. Excluding the education-only journal, the coverage ranges from just below one third of articles to 100% of articles across the other five journals. Authors submit their ET papers to any of the covered journals, not only to JETA. Clearly, emerging technologies are important in accounting research and in accounting information systems research. This level of emphasis is expected to continue given the emphasis in the profession on understanding and applying emerging technologies, and the latest

update to 2018 AACSB Standard A5. In conclusion, the acronym AIS would more accurately represent the term accounting innovation scholarship than accounting information systems.

The span of opportunity for future research is wide. Future research should address citation analysis of the articles in all six journals similar to the smaller sample analyzed in Muehlmann et al. (2015). Future research should also extend the analysis specifically to the AACSB A5 data terms and to characteristics of highly-cited articles in the academic and professional literature as well as in patents representing the useful arts. Understanding which research leads to patentable concepts will help identify how such ideas grow to be applied in the professional accounting world and potentially beyond. Future research could also examine the editorial positions of the journals over time and identify how journal output matches what this study has identified for each journal and explicit and implicit editorial positions.

The increasing importance of emerging technologies in accounting suggests that closer scrutiny of the study of emerging technologies over time, including which topics appear, become common, and disappear, either through absorption into AIS (i.e. they are no longer emerging) or through lack of adoption or obsolescence, could provide interesting insight into the evolving history of emerging technologies in accounting and possibly the prediction of future.

Furthermore, within this data, other kinds of interesting analysis are possible to identify which institutions are supporting and furthering emerging technologies and AIS research. Such an effort could include characteristics of the authors, such as their doctoral granting and employer institutions. The most logical next step in this research stream is to conduct a citational analysis of the publications in these journals. A study of the authors might also show interesting patterns and/or diversity in the backgrounds of those researching in these important areas. Further research may also reveal collaborations across disciplines.

More generally, we must consider the future of ET research in accounting. In the future, ET research is likely to spread beyond the concentration in auditing and financial applications, to all the other areas of accounting, especially taxation. Taxation has seen lively development of ET but lacks a corresponding significant research literature, so this area is ripe for research projects. Also, as some ET moves on in the hype cycle to the plateau of productivity research on those areas will become more mainstream and may move toward more general accounting journal outlets. New technologies that are becoming buzzwords today, such as blockchain, will likely be addressed in the near future in the AIS and ET journals and then later become mainstays of ET in accounting and auditing research. Farther ahead, new technologies will emerge that we have not yet heard of and they will become the leading edge of ET research in accounting. An open mind when evaluating proposed new technologies and researching them is needed.

References

AACSB, 2018. 2018 Eligibility Procedures and Accreditation Standards for Accounting Accreditation. Available online. https://www.aacsb.edu/-/media/aacsb/docs/accreditation/standards/2018%20accounting%20accreditation%20standards.ashx?la=en.

Arrowsmith, R., 2018. Excel on the way out? (February 28). Available online Accounting Todayhttps://www.accountingtoday.com/news/cfos-no-longer-see-excel-skills-as-vital-for-new-hires.

Baldwin, A.A., Morris, B.W., Schreiner, J.H., 2000. Where do AIS researchers publish? Int. J. Account. Inf. Syst. 1 (2), 123–134.

Barrick, J.A., Mecham, N.W., Summers, S.L., Wood, D.A., 2017. Ranking Accounting Journals by Topical Area and Methodology. J. Inf. Syst. https://doi.org/10.2308/isys-51981. In-Press.

Belfo, F., Trigoab, A., 2013. Accounting information systems: tradition and future directions. Proc. Technol. 9, 536–546.

Black, E.L., Stainbank, L., Elnathan, D., Giner, B., Gray, S.J., Meljem, S., Rivera, E.D., Noguchi, A., Sellhorn, T., Wood, D.A., 2017. Usage of journal rankings: an international perspective. J. Int. Account. Res. 16 (3), 1–15.

Brigham Young University Accounting Research Ranking. Retrieved June 11, 2018, from. http://www.byuaccounting.net/rankings/univrank/rankings.php.

Chiu, V., Liu, Q., Vasarhelyi, M.A., 2014. The development and intellectual structure of continuous auditing research. J. Account. Lit. 33 (1–2), 37–57.

Coyne, J.G., Summers, S.L., Williams, B., Wood, D.A., 2010. Accounting program research rankings by topical area and methodology. Issues Account. Educ. 25 (4), 631–654.

Ferguson, C., Seow, P.-S., 2011. Accounting information systems research over the past decade: past and future trends. Account. Financ. 51 (1), 235–251.

Garfield, E., 1979. Citation Indexing – Its Theory and Application in Science, Technology, and Humanities. John Wiley and Sons, New York.

Gartner, 2014. Gartner's 2014 Hype Cycle for Emerging Technologies Maps the Journey to Digital Business. Retrieved May 26, 2018, from. https://www.gartner.com/newsroom/id/2819918.

Gartner, 2016a. Gartner's 2016 Hype Cycle for Emerging Technologies Identifies Three Key Trends That Organizations Must Track to Gain Competitive Advantage. Retrieved May 26, 2018, from. https://www.gartner.com/newsroom/id/3412017.

Gartner, 2016b. How the Art, Science and Rigor Behind Our Research Process and Proprietary Methodologies Help You Make the Right Decisions, Every Day. Retrieved July 15, 2018. https://www.gartner.com/imagesrv/research/methodologies/inside_gartner_research.pdf.

Grabski, S.V., Leech, S.A., 2016. Present and publish? A snapshot of converting AIS presentations to publications from 1994 to 2015. Int. J. Account. Inf. Syst. 23, 45–49.

Grabski, S.V., Leech, S.A., Schmidt, P.J., 2011. A review of ERP research: a future agenda for accounting information systems. J. Inf. Syst. 25 (1), 37–78.

Gray, G.L., 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 (4), 423–451.

Guffey, D.M., Harp, N.L., 2014. Ranking faculties, Ph. D. programs, individual scholars, and influential articles in accounting information systems based on citations to publications in the Journal of Information Systems. J. Inf. Syst. 28 (1), 111–144.

Hutchinson, P.D., White, C.G., Daigle, R.J., 2004. Advances in Accounting Information Systems and International Journal of Accounting Information Systems: first ten volumes (1992–2003). Int. J. Account. Inf. Syst. 5 (3), 341–365.

Lindquist, T.M., Smith, G., 2009. Journal of management accounting research: content and citation analysis of the first 20 years. J. Manag. Account. Res. 21 (1), 249–292.

Moffitt, K.C., Richardson, V.J., Snow, N.M., Weisner, M.M., Wood, D.A., 2016. Perspectives on past and future AIS research as the Journal of Information Systems turns thirty. J. Inf. Syst. 30 (3), 157–171.

Muehlmann, B.W., Chiu, V., Liu, Q., 2015. Emerging technologies research in accounting: JETA's first decade. J. Emerg. Technol. Account. 12 (1), 17–50.

O'Leary, D.E., 2008. On the relationship between citations and appearances on “top 25” download lists in the International Journal of Accounting Information Systems. Int. J. Account. Inf. Syst. 9, 61–75.

O'Leary, D.E., 2009a. Downloads and citations in Intelligent Systems in Accounting, Finance and Management. Intell. Syst. Account. Financ. Manag. 16 (1–2), 21–31.

O'Leary, D.E., 2009b. The ten most-cited papers in Journal of Emerging Technologies in Accounting: the first five years. J. Emerg. Technol. Account. 6 (1), 1–3.

O'Leary, D.E., 2010. On the number of ISI citations to JETA, JIS, IJAIS, and ISAFM. J. Emerg. Technol. Account. 7 (1), 89–100.

O'Leary, D.E., 2011. The ten most-cited papers in Journal of Emerging Technologies in Accounting: 2009 versus 2011. J. Emerg. Technol. Account. 8 (1), 1–5.

Poston, R.S., Grabski, S.V., 2000. Accounting information systems research: is it another QWERTY? Int. J. Account. Inf. Syst. 1 (1), 9–53.

Rom, A., Rohde, C., 2007. Management accounting and integrated information systems: A literature review. Int. J. of Account. Inf. Syst. 8 (1), 40–68.
Stone, D.N., 2002. Researching the revolution: prospects and possibilities for the Journal of Information Systems. J. Inf. Syst. 16 (1), 1–6.
Sutton, S.G., Holt, M., Arnold, V., 2016. "The reports of my death are greatly exaggerated"—artificial intelligence research in accounting. Int. J. Account. Inf. Syst. 22, 60–73.
Vasarhelyi, M.A., Bao, D.H., Berk, J., 1988. Trends in the evolution of scholarly accounting thought: a quantitative examination. Account. Hist. J. 15 (1), 45–64.
Weber, R.P., 1990. Basic Content Analysis, 2nd edition. Sage, Newbury Park, CA.
Wilkin, C.L., Chenhall, R.H., 2010. A review of IT governance: a taxonomy to inform accounting information systems. J. Inf. Syst. 24 (2), 107–146.