E-BUSINESS ADOPTION RESEARCH: STATE OF THE ART

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ABSTRACT

Adoption has been identified as a critical, growing, distinct topic in e-business research. Hundreds of articles on the topic of e-business adoption have been published annually since 2000. What are the primary and new messages that they convey? Going forward, an answer to this question is necessary and valuable to facilitate systematic advances in e-business adoption research. Several review studies of the e-business field have appeared since 2000, but they tend to examine the e-business field as a whole, or only certain slices of the e-business-adoption space. This study undertakes a full examination of the e-business-adoption area, focusing on 618 journal articles that deal with e-business adoption. These are coded and analyzed along multiple dimensions, including journal distribution, units of analysis, data source regions (geographic focus and economic focus), research method, and research theme. Additionally, by comparing our results with those of prior studies, new trends in e-business-adoption research are detected; by linking the five dimensions, practical implications for e-business adoption researchers are also provided. Overall, the paper contributes to a state-of-the-art appreciation of e-business adoption research, from which both practitioners and researchers can benefit.

Keywords: E-business; E-business adoption; E-commerce; Electronic business; Review

1. Introduction

Dating from the early 1990s, e-business[1] (electronic business) has not only introduced a new way of doing business, but has become a vital part of peoples' lives [Kalakota & Whinston 1996; Zwass 1996; Lee et al. 2007]. Individuals, practitioners, and even politicians are paying increasing attention to e-business and using it as a strategic tool. According to data from the Organization for Economic Cooperation and Development (OECD), on average, 96% of its sample firms in selected countries used the Internet and 69% had their own websites in 2011 [OECD 2012a]. Additionally, an increasingly high percentage of individuals is using the Internet for communicating, shopping, learning, social networking, banking, and many other functions [OECD 2012b].

Witnessing the strong growth of e-business, academics have directed increasing attention to e-business research, with various studies observing a surge of e-business articles [Lee et al. 2007]. Figure 1 compares scholarly publication trends for e-business and information systems (IS). Seminal publications date from 1996, with the number of e-business articles growing rapidly after that. Simultaneously, notable journals dealing with e-business started publishing or revised their titles (e.g., *International Journal of Electronic Commerce, Journal of Organizational Computing and Electronic Commerce*). Following the internet bubble burst, we see a downward slide. However, since 2006, ten years after the 1996 inception, we see a gradual upward trend.

Adoption has been identified as a distinct, critical, and growing topic in e-business research [Shaw et al. 1997; Urbaczewski et al. 2002; Wareham et al. 2005; Holsapple & Sasidharan 2009]. In a review of 172 e-business articles published between 1982 and 1998, Urbaczewski et al. [2002] find a large number aimed at adoption issues. Of late, hundreds of e-business adoption articles are published each year and the percentage of adoption research within e-business research is growing rapidly [Chen & Holsapple 2012]. Articles that reflectively examine publishing in the

[1] This study does not distinguish between e-commerce (electronic commerce) and e-business (electronic business). We use the term e-business for consistency and readability.

e-business field not only foster better understanding of the e-business phenomenon, but also indicate that e-business adoption is a critical and growing topic – one that is quite different from other e-business topics in terms of theories, research methods, and contributions. At the same time, e-business adoption is an instance of IT acceptance and use research. However, because it involves a setting that combines technology adoption with marketing elements, it is distinct from other IT adoption [Pavlou & Fygenson 2006]. Moreover, under the umbrella of e-business adoption, many research questions can be raised and investigated, such as adoption factors, adoption barriers, adoption theories, and adoption differences across units, regions, and cultures [Cao & Mokhtarian 2005; Zhou et al. 2007; Chitura et al. 2008].

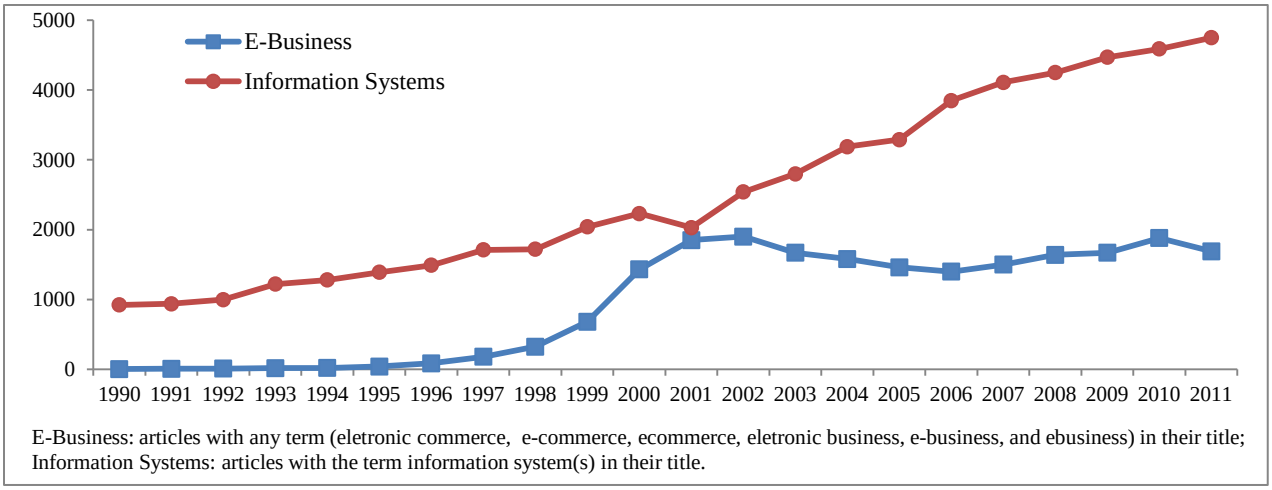

Figure 1: Trends in Scholarly Publications for E-Business versus Information Systems (as of October 2012)

Researchers are faced with thousands of e-business adoption articles to find when seeking and reviewing those most relevant to their own projects. Individually, this is very time-consuming and, collectively, it can mean that the "wheel is reinvented" many times. Accordingly, it is valuable to characterize the landscape of e-business adoption research and review what has so far been accomplished. Several review studies of the e-business field have appeared since 2000. However, most of them either broadly cover all e-business articles [e.g., Ngai & Wat 2002; Wareham et al. 2005], or narrowly include a specialized part of e-business adoption research [e.g., Zhou et al. 2007; Mohamad & Ismail 2009]. While helpful, there remains a need for a concentrated and comprehensive review of e-business adoption research. Such is the purpose of this paper.

Extant review studies tend to extract articles from a modest list of selected journals/conferences, most of which are published or hosted in European, North American, and IS-oriented forums [Wareham et al. 2005]. However, e-business adoption is a worldwide, multidiscipline topic – with many journals publishing English articles coming from non-western regions, non-IS-oriented journals, and new IS journals that publish e-business adoption articles. As such, existing review studies might be biased in describing profiles of e-business or e-business adoption. Furthermore, most of these studies were published in or before 2006. During the ensuing seven years, new e-business applications and services have been introduced and/or been growing rapidly (e.g., crowdsourcing, web 2.0, mobile, internet banking). Appreciation of the e-business adoption landscape can benefit from inclusions of more-recent research initiatives.

Motivated by foregoing considerations, this study develops an updated, relatively comprehensive picture focused on e-business adoption research. Such a view shows what issues have been studied intensively, how these issues have been studied, and what issues have not yet been studied. It suggests where researchers may want to invest their resources, and how they may start and conduct investigations. Overall, we advance a structured profile of e-business adoption research, compare our findings with prior studies, and indicate future research directions.

The study is based on data from Google Scholar (GS). Searching for relevant key terms in titles nets 1,729 publications between 2006 and 2011 (detailed in section 4). Data cleansing drops 288 of these. An initial review, based on the remaining 1,441 articles, examines them from standpoints of publication year, publication outlet, and GS citations. Then, we select and review 618 journal articles for which full text is available, and study them from standpoints of journal distribution, units of analysis, data source, research method, and research theme. We compare

our results with prior studies and highlight new trends in e-business adoption research. In addition, we link those five standpoints and describe an integrated landscape for e-business adoption research.

The next section briefly reviews and defines e-business and e-business adoption. It describes and summarizes related work. The research methodology is then described. Following, two sections present results: first reporting findings based the initial review (sample of 1,441), and secondly, describing findings based on the main review (618 journal articles), along with comparisons to extant review studies. This paper ends up with discussion and conclusions.

2. Theoretical Background and Related Work

2.1. E-business and Its Definition

Definitions are very important in shaping young and dynamic fields such as e-business. With an aim of developing a unified and inclusive definition, Holsapple & Singh [2000] collect representative e-business definitions from diverse printed/electronic, academic/practitioner sources – including seminal publications. From this collection, a definitional taxonomy is derived. It is comprised of five views of e-business: trading, information exchange, activity, effects, and value-chain views. From an analysis of the five views, an integrated definition of e-business is synthesized [p. 161]:

> *E-business is an approach to achieving business goals in which (networked, computer-based) technology for information exchange enables or facilitates execution of activities in and across value chains as well as supporting decision making that underlies those activities.*

Henceforth, this is what we mean by the term, and our investigation of e-business adoption occurs within this broader context.

2.2. E-business Adoption

As a new approach to business (including innovation, technology, application, service, and business model), e-business implementations must be adopted before benefits can be realized [Zhu et al. 2006]. As such, technology adoption theories and technology diffusion theories have been applied in the context of e-business. Summarizing some literature on e-commerce adoption, Hong & Zhu [2006] find over 10 theories that have been employed. Similarly, upon summarizing 43 articles on the adoption of online purchasing, Cao & Mokhtarian [2005] find about 10 theories being used.

Terms such as assimilation, readiness, diffusion, acceptance, implementation, intention to use, and actual usage appear in connection with e-business adoption. It has been observed that researchers differ on how these relate to adoption [Urbaczewski et al. 2002; Jimenez & Martin 2009; Chen & Holsapple 2012]. For example, Hernandez et al. [2009] argue that adoption and acceptance are two different decisions for individual consumers, but many researchers do not strictly distinguish between adoption and acceptance. This is evident in two theories with the term "acceptance," TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology) being used for investigating technology adoption. As another example, Zhu et al. [2006] draw on innovation diffusion literature to conceive of e-business assimilation as the three stages shown in Figure 2: initiation, adoption, and routinization. Terms such as e-business readiness focus on evaluating potential benefits e-business can bring and whether an organization (or individual) is prepared to facilitate e-business; e-business acceptance and adoption focus on making decisions to use e-business; usage and implementation focus on measuring e-business success [Molla & Licker 2001; DeLone & McLean 2004; Hafeez et al. 2006; Zhu et al. 2006].

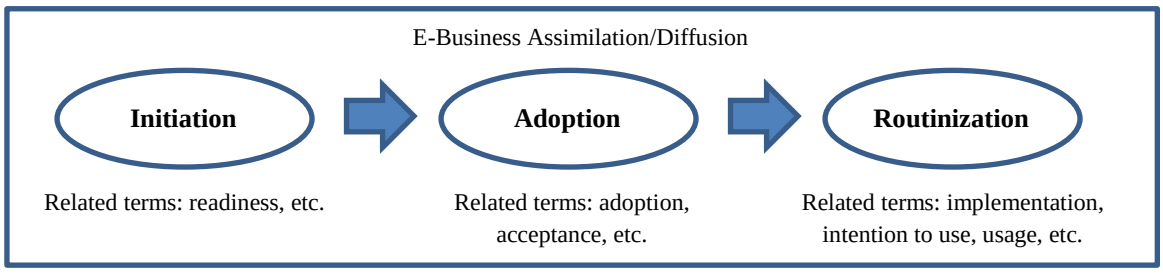

Figure 2: Three Stages of E-Business Assimilation (Adapted from Zhu et al. [2006])

Following suit, this study does not distinguish acceptance from e-business adoption. Following the general definition of e-business, it involves:

committing to pursuit of business goals, by means of networked technology for exchanging information and supporting decisions in the conduct of value-adding activities.

This is consistent with the Zhu et al. [2006] characterization of e-business adoption as making a decision to use networked, computer-based technology in value chain activities.

2.3. Related Work

As background, we begin with 'a review of review studies' that pertain to e-business. Table 1 summarizes review studies published during 2002-2012, exclusive of any that do not report quantitative aspects of their samples. Further, we exclude review studies that focus on narrow areas of e-business, such as online discussion forums in e-learning scenarios. Overall, most of the reviews cover e-business, in general, or focus on a specific aspect of e-business adoption. Only three journals published more than a single review article: *Journal of Electronic Commerce Research* (*JECR*), *Journal of Internet Banking and Commerce*, and *European Journal of Marketing.* Of these, *JECR* is the only wide-coverage e-business journal. The studies vary greatly in sample size, ranging from 30 [Chitura et al. 2008] to 7,823 [Wang & Chen 2010], and years covered, ranging from 4 [Casanovas 2010] to 17 [Urbaczewski et al. 2002]. Their starting year for sample articles ranges from 1982 to 2006, with closing year ranges from 1998 to 2010. Because sample articles in most of the studies are fairly old, updating the landscape of e-business research with recent articles is warranted, including research concentrating on e-business adoption.

In order to efficiently attain a relatively comprehensive list of sample articles, most of review studies search articles from electronic databases using various keywords and their synonyms. Additionally, most of them select journal articles for their review and describe results in terms of the following dimensions: publication year, publication outlet, journal type, units of analysis, data source (either geographic focus or economic focus), research method, and research theme. Accordingly, we search, code, and analyze sample articles using the similar approach.

Table 1: Review Work in E-Business Research (2002-2012)

Study	Published in	Review topic	Units of analysis	Count of sample articles	Years covered	Publication outlets covered	Data collection approach
Ngai & Wat [2002]	*Information & Management*	E-business general	General	275	1993-1999	9 journals	Search four key terms from selected journals.
Urbaczewski et al. [2002]	*JOCEC*	E-business general	General	172	1982-1998	Journals and conference	Search from academic journals (and conferences)
Ngai [2003]	*EJM*	Internet marketing	General	270	1987-2000	46 journals	Search three key terms from selected databases
Cao & Mokhtarian [2005]	*ITS UCDAVIS*	Adoption of online shopping	Individual Consumers	65	1998-2005	Journals	Not specified
Wareham et al. [2005]	*JIT*	E-business general	General	582	1997-2003	28 journals	Search multiple descriptors from electronic databases
Parker & Castleman [2006]	*Collecter E-Commerce Conference*	E-business adoption in SMEs	Business Organizations	100	2003-2006	41 journals	Search articles from electronic databases
Lee et al. [2007]	*IJEC*	E-business general	General	846	1996-2005	14 journals	Search multiple key terms from selected electronic journals
Schibrowsky et al. [2007]	*EJM*	Internet marketing	General	142	1992-2004	Around 80 journals	Search four key words in the title, abstract and keyword list
Zhou et al. [2007]	*JECR*	Acceptance of online shopping	Individual Consumers	64	1998-2004	36 journals	Search various keywords and their synonyms from electronic databases

Chitura et al. [2008]	*JIBC*	Barriers to e-business adoption in SMEs	Business Organizations	30	1996-2006	Not specified	Not specified
Mohamad & Ismail [2009]	*JIBC*	E-business adoption in SMEs	Business Organizations	81	2000-2008	Journals, books, and conferences	Not specified
Casanovas [2010]	*Electronic Journal of e-Learning*	Adoption of online education	Individual Consumers	53	2005-2008	12 journals and 7 conferences	From electronic databases using a set of key terms
Adolphs & Winkelmann [2010]	*JECR*	Personalization in e-business	Individual Consumers	42	2000-2008	13 journals	Search key terms in the title of articles in selected journals
Wang & Chen [2010]	*IJECS*	E-business general	General	7,823	1999-2008	Journals	Search articles from both SCIE and SSCI
Chen & Holsapple [2012]	*AMCIS*	E-business adoption	General	563 (112)	2006-2010	> 100 journals	Search two groups of terms in the tile of articles via GS

AMCIS: *Americas Conference on Information Systems*; *EJM*: *European Journal of Marketing*; *IJEC*: *International Journal of Electronic Commerce*; *IJECS*: *International Journal of Electronic Commerce Studies*; *ITS UCDAVIS*: *Institute of Transportation Studies, University of California, Davis*; *JEIM*: *Journal of Enterprise Information Management*; *JECR*: *Journal of Electronic Commerce Research*; *JIBC*: *Journal of Internet Banking and Commerce*; *JIT*: *Journal of Information Technology*; *JOCEC*: *Journal of Organizational Computing and Electronic Commerce.*
SMEs: Small and Medium Enterprises.
GS: Google Scholar; SCIE: Science Citation Index Expanded database; SSCI: Social Science Citation Index database.

3. Methodology

Our research steps are shown in Figure 3. Their details are described in each of the following subsections. A final subsection discusses techniques used to improve and measure this study's coding reliability.

3.1. Database Selection

To obtain research articles in which e-business adoption is the primary focus, we use the Google Scholar (GS) database. Its search facility is convenient and, compared to other bibliographic databases, the GS journal tracking is more comprehensive and offers the highest coverage of core/important articles [Jacsó 2005, 2008a, b, c; Noruzi 2005; Walters 2007; Harzing & van der Wal 2008; Gehanno et al. 2013]. These scientometric researchers conclude that GS is an excellent meta-search engine/tool for literature discovery and retrieval. Additionally, GS covers books, proceedings, non-English journals, open-access journals, and new journals [Walters 2007; Harzing & van der Wal 2008; Jacsó 2008a]. Interestingly, through experiments, Gehannoet al. [2013] find that the coverage of GS for studies included in prior systematic reviews is 100%, and then conclude that GS could be the first choice for systematic reviews or meta-analysis. Thus, we use GS to explore the landscape of e-business adoption research.

3.2. Article Search

We identify relevant articles using a "keyword" approach [Schibrowsky et al. 2007]. While a specific keyword can appear anywhere in a publication, we focus on title location as representative of those having a focus is on e-business adoption. This includes relevant publications, and excludes those that treat the topic in an incidental or minor way. Each item in our sample has a title that includes both an e-business-related term and an adoption-related term. In particular, the e-business-related keywords are: e-business, electronic business, ebusiness, e-commerce, electronic commerce, ecommerce, online, web, webpage, website, and internet. The adoption-related terms are: acceptance, adoption, accept, and adopt. Inclusion of these key terms is based on our review of e-business and e-business adoption studies previously mentioned.

A six-year sampling period (2006-2011) is of sufficient duration to get a sense of e-business adoption research [Shiau & Dwivedi 2013]. The start year of 2006 is one decade since the start of e-business as a research field. It also coincides with the beginning of the second rise in e-business publications (recall Figure 1). Importantly, most of extant studies review e-business (adoption) research published in or before 2006. The article search occurred in October 2012, when all articles (to be) published in 2012 were not available. Like other electronic databases, GS tracking has a lag time [Mayr & Walter 2007], with the full accounting for 2012 not being available until sometime in 2013. Thus, we search year-by-year through 2011. This yields 1,729 e-business adoption articles for the six years.

Because GS updates its database frequently, we save search results as a separate file for subsequent access and coding. Search results are copied directly from the GS website into a MS Word file containing 134,622 words in 408

pages. Each article is assigned an ID and all the components of a typical GS record are saved (title, year, author(s), abstract, GS citations, and hyperlink) [Mayr & Walter 2007]. For data cleansing and coding, the article ID, title, and hyperlink are copied to a MS Excel sheet.

Research Steps	Description	Results
Article Search	Search articles via Google Scholar (GS) ▪ Key terms must occur in the title of the article ▪ Customize publication years between 2006 and 2011 ▪ Exclude patents and citations	1,729 articles were found
↓		
Data Cleansing	Drop those articles: ▪ Not actually published between 2006 and 2011 ▪ Not written in English ▪ Not related to e-business adoption ▪ Duplicated with the same version ▪ Without a formal source	288 (17%) were dropped: ▪ 1% ▪ 7% ▪ 7% ▪ 1% ▪ 1%
↓		
Initial Coding & Analysis	Code and analyze all remaining articles by: ▪ Actual publication year ▪ Publication outlet ▪ GS citations	1,441 (83%) were left See findings in Section 4
↓		
Data Re-cleaning	Drop those articles: ▪ Not published in a journal ▪ Not available in full text	823 (48%) were dropped: ▪ 47% ▪ 1%
↓		
Main Coding & Analysis	Code and analyze journal articles by: ▪ Journal type ▪ Unit of analysis ▪ Data source (geographic focus and economic focus) ▪ Research method ▪ Research theme	618 (36%) remained in the final database See findings in Section 5

Figure 3: Research Steps

3.3. Data Cleansing and Initial Coding

We manually check, and then code, the articles. Those articles not written in English, without an official source, not actually related to e-business adoption, duplicated with the same version, and/or actually outside timeframe are dropped – leaving 1,441 articles for coding and analysis. For instance, we find forty-three articles have an incorrect publication year (e.g., recorded as 2008 when actually published in 2009, due to pre-print availability). More than 90% of search results are actually relevant to e-business adoption, indicating that the keyword approach works well.

An initial coding involves publication year, publication outlet, and GS citation count for each of the 1,441 sample articles. These dimensions help describe the overall landscape of e-business adoption research. As with prior studies [e.g., Wareham et al. 2005; Lee et al. 2007; Zhou et al. 2007; Adolphs & Winkelmann 2010], we drop non-journal articles from further coding and analysis, thereby avoiding duplication due to an article having been published as a non-journal study (e.g., proceedings, working paper) and then published in a journal [Urbaczewski et al. 2002]. Additionally, in order to obtain all the coding dimensions we need, the full text of each article is examined. If full text of an article is unavailable, the article is dropped. This results in elimination of 805 non-journal articles and 18 journal articles for which full text is unavailable (mostly regional journals, such as *Iranian Journal of Agricultural Sciences* and *Sri Lanka Journal of Humanities and Social Sciences*).

The remaining 618 journals articles are coded on the following dimensions: journal type, unit of analysis, data source (including geographic focus and economic focus), research method, and research theme. Most of these dimensions come from prior studies identified in Table 1. In coding geographic focus and economic focus, categories provided by the United Nations Statistics Division [2013] and International Monetary Fund [2012] are used.

3.4. Improve and Measure Reliability

Coding reliability is critical for all review studies. According to Krippendorff [2004], there are three types of reliability pertinent to content coding: stability, reproducibility, and accuracy. Stability refers to "the extent to which the results of content classification are invariant over time" [Weber 1990, p. 17]. Reproducibility, also called inter-coder reliability, refers to "the extent to which content classification produces the same result when the same content is coded by more than one coder" [Weber 1990, p. 17]. Accuracy refers to "the extent to which the classification of the context responds to a standard or norm" [p. 17]. Although accuracy is strongest form of reliability, it is only used when a standard coding for some text has been established. Therefore, Weber [1990, p.17] demonstrates that "researchers seldom use accuracy in reliability assessment".

In the interest of coding reliability, we developed a codebook based on discussion between co-authors and revisions after coding part of the articles published in 2011, which are not included in an initial partial search in that year. Additionally, we use the first index (i.e., stability) to measure coding reliability. Stability can be assessed when the same content is coded more than once by the same coder, with the same result – with inconsistencies in coding indicating unreliability. For this purpose, we randomly choose 200 of the articles included in searches of April 2011 and October 2012, and check reliability by comparing the two coding results. An 18-month gap between the two searches is sufficient to assure that results coded in 2011 do not influence those done in 2012 (i.e., the two coding processes could be treated independently). On all dimensions, coding reliability is very high.

4. Findings: Based on All Sample Articles

Initial cleansing yielded 1,441 publications, for which findings are reported in this section.

4.1. Publication Year

First, we classify sample articles by actual publication year, with the result portrayed in Figure 4. From 2006 to 2011, the compound annual growth rate for e-business adoption articles is 4.8%. This is higher than that of e-business in general (3.8%) and that of information systems (4.3%) at large, indicating that e-business adoption research is growing relatively rapidly.

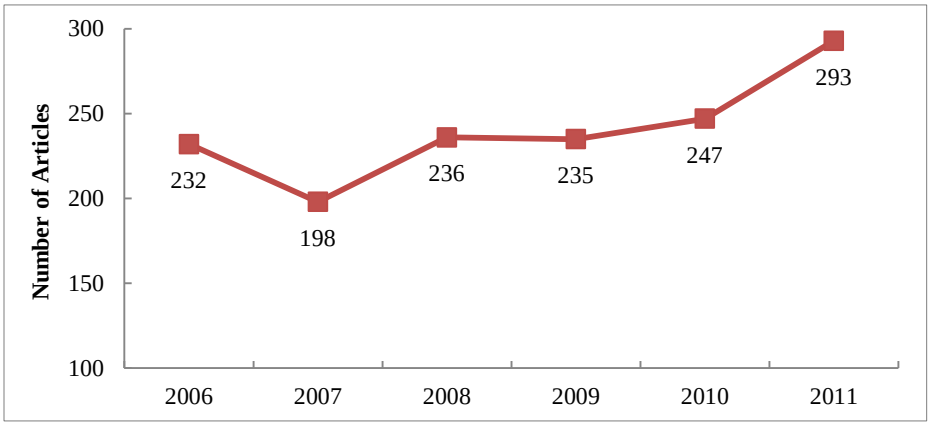

Figure 4: Total Number of Sample Articles per Year

4.2. Publication Outlet

Classes of publication outlets are: journal article, conference article, dissertation/thesis, book (chapter), working paper, and others. As Figure 5 shows, there are 636 (44.1%) journal articles in the sample. Along with proceedings papers and dissertations/theses, the three most common outlets account for 87.3% of the sample. Further, Figure 6 displays the number and percentage of articles by publication outlet across publication years. We find that they undergo significant variation across years (p=0.03). Specifically, conference proceedings hold greater percentages and counts of e-business adoption articles between 2008 and 2010, than during later years. Dissertations/theses experience an opposite trend. This may suggest a maturing of the area of e-business adoption research as a substantial aspect of e-business, in general – with increasing levels of research being directed toward the greater rigor and visibility epitomized by journals (in contrast to conferences), increasing editor recognition of such research, and perceptions of emerging scholars that e-business adoption holds solid potential as a worthy area for launching a research career.

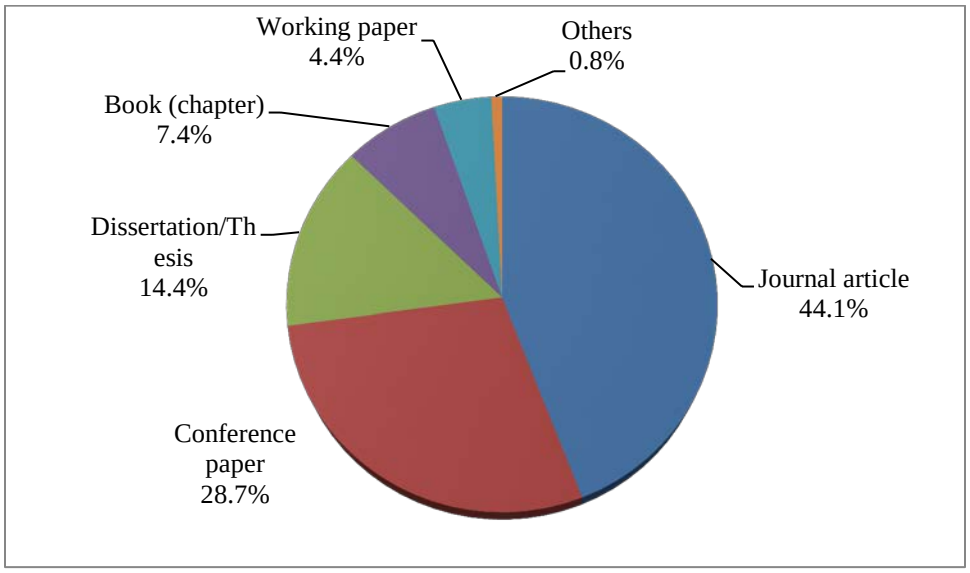

Figure 5: The Distribution of Sample Articles by Publication Outlet

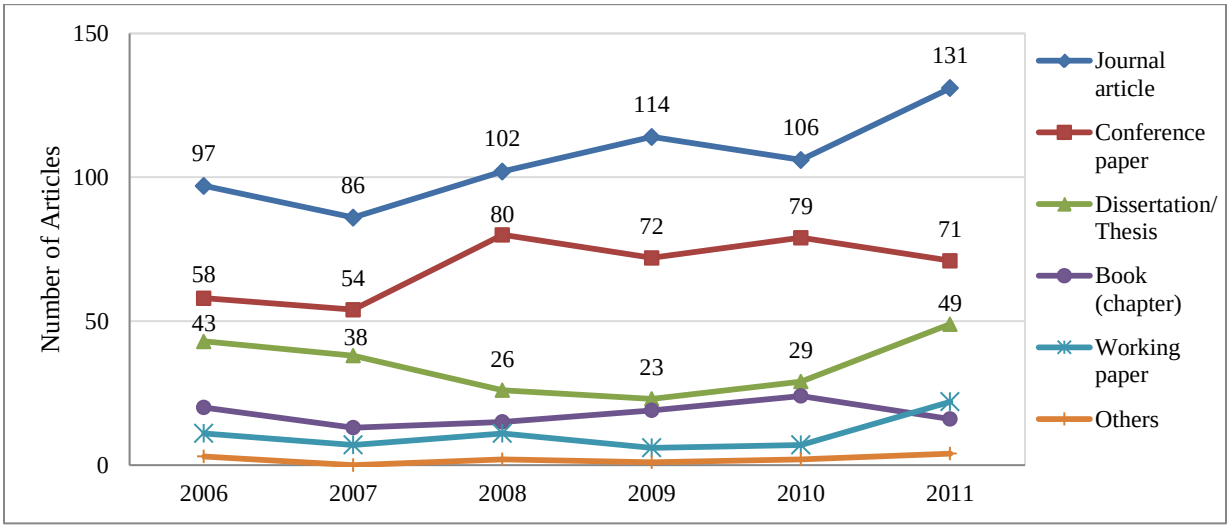

Figure 6: Number of Sample Articles by Publication Outlet and Publication Year

4.3. Citation Analysis

In addition to literature retrieval, Google Scholar (GS) has advantages in citation analysis [Noruzi 2005; Harzing & van der Wal 2008; Jacsó 2008c]. We use GS citation counts to measure impacts of e-business adoption research. Impacts across sample articles are not normally distributed, but display a long right tail. Such a pattern is well known [Gargouri et al. 2010]. Among 1,441 e-business adoption publications, almost one-fourth had over 5 citations: 637 (44.2%) with no citations as of October 2012, 176 (12.2%) with a single citation and 275 (19.1%) with 2-5 citations. In contrast, only 14 (1.0%) articles exhibited at least 100 citations. Figure 7 depicts GS citation counts for the 50 most-cited articles in each publication year. In each publication year, the top 50 articles account for at least 80% of total citations. In sum, the 300 articles account for 83.8% of the total GS citations.

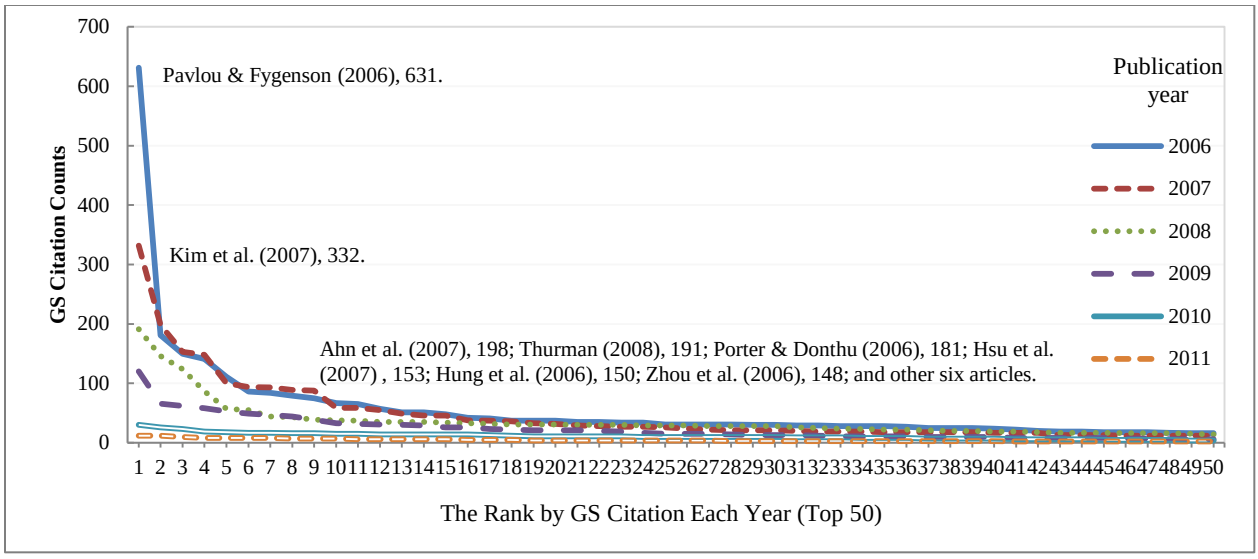

Figure 7: GS Citation Counts of the Top 50 Articles Each Publication Year (As of October 2012)

Appendix A shows the 20 most-cited articles, including their authors, titles, journals, GS citations, main topics, and data source. Pavlou & Fygenson [2006] and Kim et al. [2007] are the two most highly-cited publications in e-business adoption research (2006-2011). All of these articles had at least 85 GS citations as of October 2012 and, not surprisingly, all appear in journals. Overall, these articles have made theoretical contributions (i.e., extending, integrating, or developing adoption theories) and/or practical contributions (i.e., examining new and/or important phenomena in e-business adoption). In addition to traditional research topics, such as online shopping (3), internet usage (2), and website adoption (2), emerging topics, such as mobile internet (3), and internet banking (4), are covered in these highly-cited articles. Interestingly, new e-business issues, such as user-generated content, online opinion (or electronic word-of-mouth), and web 2.0 are emerging in the highly-cited articles, none of which come from IS journals, however.

5. Findings: Based on Journal Articles

The sample size of 618 e-business-adoption journal articles compares very favorably with review studies in Table 1. To check for potential difference in distributions of coding dimensions across years, three stages are considered in examining results: early stage (2006-2007), middle stage (2008-2009), and late stage (2010-2011).

5.1. Journal Distribution

The 618 articles appear in 342 journals, covering diverse disciplines. On average, each journal publishes 1.8 e-business adoption research articles between 2006 and 2011. Among the 342 journals, 231(67.5%) published one article and 61(17.8%) published two articles. The four most frequent journals are: *Journal of Internet Banking and Commerce* (16), *Communications of the IBIMA* (International Business Information Management Association) (10), *International Journal of Bank Marketing* (10), and *Journal of Electronic Commerce in Organizations* (10). Surprisingly, the most frequent outlets are dominated by non-IS journals.

Appendix B shows the 50 journals that have published at least three articles from the sample, including number of articles, start year, category, publisher, and GS citations (total GS citations, average GS citations, and rank based on total GS citations). Additionally, we report four journals that published only one or two e-business adoption articles during the sampling period, but still rank in the top-20 in terms of total GS citations: *Omega*, *Government Information Quarterly*, *The Internet and Higher Education*, and *Information Economics and Policy*. However, the four journals are only for readers' reference, and we do not include them in the following analyses. Overall, the number of articles is evenly distributed across years for most journals, suggesting that e-business adoption research is a generally accepted research topic. A few journals, such as *Information & Management*, intensively publish several articles in one year, suggesting that they may treat e-business adoption as a special issue or topic in that year.

A few interesting observations can be made based on 50 most commonly-used journals. First, among the 50 journals, 17 (14%) started their first volume after 2000, while 20 (40%) started before 1980, demonstrating that e-business adoption research is being accepted by both classic/old and new journals. Second, in terms of category, 11 journals (e.g., *Journal of Electronic Commerce Research*) concentrate on e-business research, 12 come from the rest

of the IS discipline (IS general or IS specialty), and 16 come from reference disciplines. Additionally, 11 journals, such as *International Journal of Business and Management*, cover multiple disciplines. This diversity indicates that e-business adoption is studied from various perspectives. Third, the 50 journals are sponsored by 11 professional publishers, such as Elsevier (10) Emerald (7), Inderscience (5), Taylor & Francis (4), and IGI (4), eight research centers or associations such as AIS, and four universities. Additional diversity is indicated by the 23 publishers being based in ten countries/regions.

Additionally, we find the 50 most commonly-used journals vary greatly in the total and average GS citations. Interestingly, in terms of total GS citations generated by sample articles, 16 of the journals rank in the top-20, but 11 are not in the top-100. On the one hand, the nine most-cited journals are included in the top-50: *MIS Quarterly*, *Decision Support Systems*, *Information & Management*, *International Journal of Banking Marketing*, *Electronic Commerce Research and Applications*, *Journal of Electronic Commerce Research*, *Journal of Business Research*, *New Media & Society*, and *Internet Research*. Additionally, all of these have very high average GS citations as well, indicating that these journals have high impact in the area of e-business adoption research. Researchers in the area may want to be especially alert for new articles published in these journals.

On the other hand, some journals that have a lower impact in terms of total and average GS citations are very open to e-business adoption research. For instance, *Communications of the IBIMA*, *International Journal of Business and Management*, *International Journal of Electronic Business*, *International Journal of E-Adoption*, *International Journal of Electronic Marketing and Retailing*, and *Journal of Theoretical and Applied Electronic Commerce Research* have lower impact, but have published at least four e-business adoption articles (2006-2011). Overall, Appendix B can help guide researchers in selecting target journals for their e-business adoption research.

5.2. Units of Analysis

The adoption of e-business can be studied through various units of analysis, ranging from an individual consumer, through an organization, to a region, or even to a country. Based on Lee et al. [2007] and Rodríguez-Ardura & Meseguer-Artola [2010], we develop a hierarchic classification for units of analysis: from two levels (i.e., macro and micro) at the top, through four scopes of analysis in the middle, to multiple units of analysis at the bottom. Results are in Table 2, where units of analysis are based on the major entity analyzed in the article and/or the main research theme of authors.

Table 2: The Distribution of Unit of Analysis

Level of Analysis	Scope of Analysis	Unit of Analysis	# of Articles	Percentage
Macro Level	Countries	-	5	0.8%
	Regions	-	1	0.2%
Micro Level	Organizations	Business organizations	219	**35.4%**
		Nonprofit organizations (NPOs)	58	9.4%
		Academic/educational organizations	30	4.9%
		Healthcare organizations	11	1.8%
		Governments	4	0.6%
		Others (e.g. library, church)	13	2.1%
	Individuals	Household consumers	9	1.5%
		Individual consumers	326	**52.8%**
Total			618	100%

It is beneficial to classify units of analysis in e-business adoption for several reasons. First, research questions determine the selection of units of analysis. Second, unit of analysis is related to theories. For instance, the technology-organization-environment framework is appropriate for e-business adoption by organizations, while TAM could be used for both individuals and organizations. Third, unit of analysis may influence data collection procedures and data analysis approaches. For instance, if we have multiple units of analysis in one study, we may consider using a Hierarchical Multiple Regression, multi-level model, or blocks in data analysis. Moreover, through segmenting units of analysis, we can detect whether some units (subunits) of analysis have been little or

overwhelmingly studied. For instance, we have found very few articles investigating e-business adoption for such subunits of analysis as old people, disabled people, multi-country enterprises, virtual teams, crowds, or churches.

Interestingly, journal articles dealing with e-business adoption in business organizations decrease from 2006 to 2011, as shown in Figure 8. In contrast, e-business adoption research about individual consumers and NPOs grows during the sample period. This result may be explained partly by rapid growth of emerging/innovative e-business applications in individual consumer markets and partly by a growing need for mature e-business applications in NPOs. Also, differences in ease of data collection across units of analysis may help explain distributions shown in Table 2.

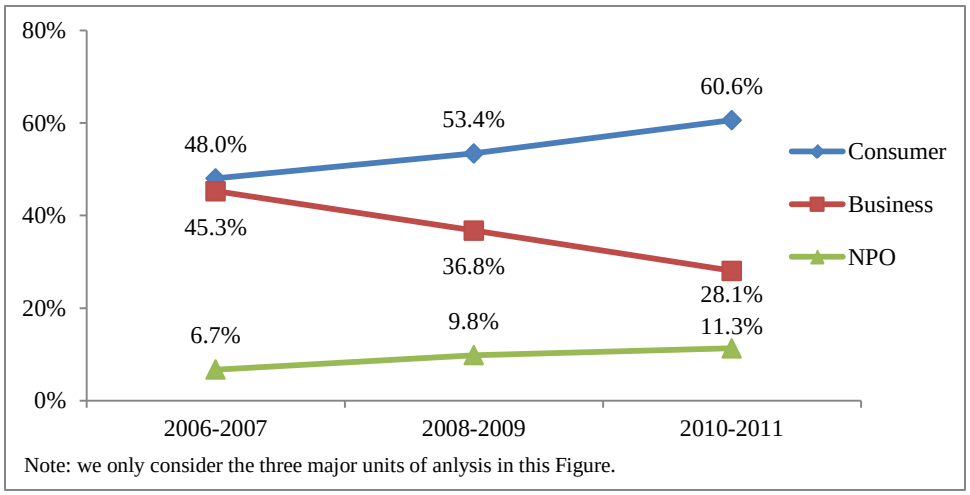

Figure 8: How Units of Analysis Change between 2006 and 2011

5.3. Data Source

Data source refers to the geographic region from which the data are collected. Overall, data sources are classified as: general (i.e., no particular region), single region/country, and multiple regions/countries (i.e., data collected from at least two regions/countries). As Table 3 shows, an overwhelming majority of journal articles on e-business adoption are single region/country (87.2%), and this characteristic is especially distinct for research focusing on individual consumers (90.5%). Among the 52 multiple regions/countries articles, two purposes are evident: detecting cross-regions differences and seeking to increase generalizability of results. In the first case, data source is typically treated as an independent variable; in the second case it serves as a control variable. Among 591 articles indicating data sources, three involve more than 30 countries across continents. We exclude them from the following report of data sources by geographic focus and economic focus.

Table 3: Distribution of Data Source Categories

Data Source Category	Overall		Business Organizations		Individual Consumers	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
General	27	4.4%	13	5.9%	11	3.4%
Single region/country	539	87.2%	182	83.1%	295	90.5%
Multiple regions/countries	52	8.4%	24	11.0%	20	6.1%
With comparisons	37	5.8%	15	6.8%	17	5.2%
Without comparisons	15	2.6%	9	4.1%	3	0.9%
Total	618	100%	219	100%	326	100%

5.3.1. Geographic Focus

A very high percentage (36.4%) of e-business adoption research is based in Asia, with Malaysia (56), Mainland China (34), Taiwan (30), South Korea (27), Hong Kong (21), and India (15) commanding the majority of journal articles. At 25%, the second most commonly-studied continent is Europe, with the United Kingdom (36), Spain (21), Greece (13) and Germany (11) registering most frequently. While North America dominates in general e-business research in Wareham et al. (2005), in terms of adoption research, the Americas are the third most commonly-studied region at 23.8%, with the United States (121) and Canada (12) being studied most frequently.

Notably, the Middle East and Africa, which were considered as blank regions in Wareham et al. (2005), are studied by 62 and 32 e-business adoption articles, respectively. Iran (15), Saudi Arabia (12), Jordan (11), and Nigeria (8) are among the most common of these. For Oceania, the volume of e-business adoption articles is also notable, with Australia (28) and New Zealand (10) being prominent. In sum, the United States (121), Greater China (including the mainland, Hong Kong, Macao, Taiwan) (83), and Malaysia (56) are the three most commonly-studied regions. Upon segmenting the 588 articles by the units of analysis, we find some differences. In European and Oceania regions, e-business adoption is more studied in business organizations; however, in Asian and American regions, it is more studied for individual consumers.

In terms of GS citations, adoption articles collecting data from American regions earn the highest average GS citations per article[2] (21.9), and then Asian regions (17.9), Oceania regions (15.1), and European regions (14.6). Articles collecting data from the Middle East (5.2) and Africa (5.7) receive relatively low average citations per article. For each year, we observe a similar impact pattern in average citations across the six regions. In addition, we detect a significant difference (p=0.006) in the regional distribution across years. Europe, Americas, and Oceania, which have formed a relatively mature e-business market, are decreasing in terms of e-business adoption publications. For the most commonly-studied continent, Asia, which experienced rapid e-business development in the mid-2000s, there is a modestly decreasing trend in e-business adoption research. However, Middle East and Africa have a rapid increase in e-business adoption research, suggesting that they have a growing need for e-business adoption research.

5.3.2. Economic Focus

Advanced economies dominate publications of e-business adoption, for both business organizations and individual consumers. However, the trend is changing rapidly (see Figure 9), as we detect a significant change (p=0.014) in the distribution of economic focus across years. In terms of impact scores, we find that articles collecting data from advanced economies received almost twice as many GS citations (20.5) as developing economies (8.8). When comparing those articles published in the same year across two types of economies, Table 4 shows that the same pattern persists.

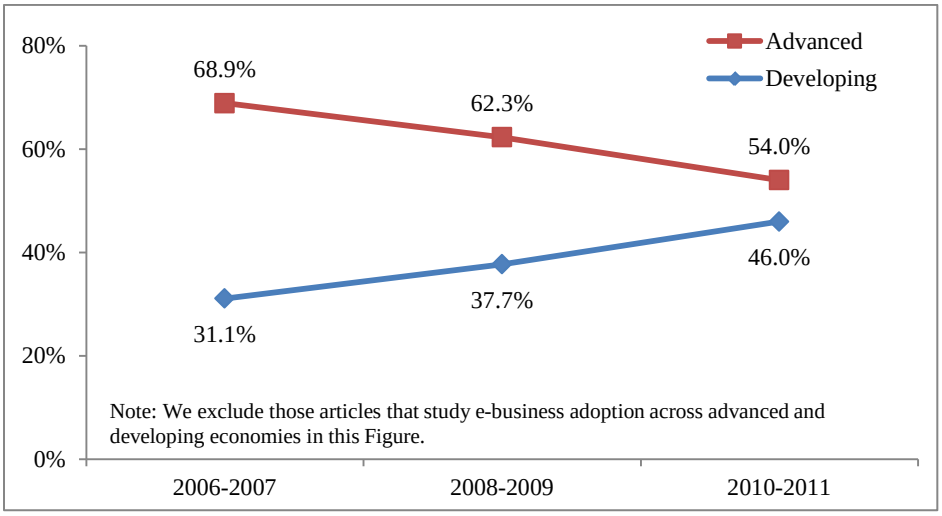

Figure 9: How Economic Focus Changes between 2006 and 2011

[2] The calculation here is based on 539 articles collecting data from single country or region (those articles collecting data from multiple regions were excluded here) because we cannot determine which region contributes to the citations in the case of articles covering multiple regions.

Table 4: Average GS Citations by Economic Focus and Publication Year (As of October 2012)

Economic Focus	Publication Year					
	2006	2007	2008	2009	2010	2011
Advanced economies (A)	40.1	32.0	25.5	14.3	6.3	2.5
Developing economies (D)	17.3	18.8	14.6	8.9	3.4	1.3

5.3.3. Comparison Studies

Comparison studies are important for e-business adoption research. To examine influence of regional variables on e-business adoption, they compare processes, patterns, and experience across regions. They are a starting point for detecting whether the experience achieved in one region might be replicated in another region. Gibbs et al. [2003] identify six national environmental factors (e.g., information infrastructure) and three national policy factors (e.g., e-commerce legislation). Zhu and Thatcher [2010] point out that three components of national information ecology – policy environment, legal environment, and socio-culture environment – influence e-business adoption across regions. As such, most of sample comparison articles examine how the above factors lead to different adoption patterns or processes across regions. For instance, Kartiwi & MacGregor [2007] compare e-business adoption barriers in SMEs in a developing economy (i.e., Indonesia) and those in an advanced economy (i.e., Sweden). Xu [2008] examines how two national environmental factors (information infrastructure and demographics) influence e-business adoption in the United States, China, and United Arab Emirates. Li et al. [2009] investigate the influence of national cultural values on acceptance of a personal web portal by users in China and the United States.

Among the 52 articles that collect data from multiple regions, 37 conduct comparison studies. In particular, 17 of these articles deal with individual consumers, 15 with business organizations, and the other five from countries (3), NPOs (1), and regions (1). In terms of data source, most comparison studies (23) are conducted between advanced and developing economies. Additionally, 12 comparison studies are conducted between advanced economies, and two between developing economies. Therefore, researchers with access to e-business adoption phenomena from multiple regions have abundant opportunities to conduct the comparison studies, especially those within developing economies.

5.4. Research Methods

Using our codebook developed from prior studies [e.g., Urbaczewski et al. 2002; Wareham et al. 2005], research methods used in the 618 journal articles are coded to produce Table 5. The method is determined by the main study or contribution the article makes. For instance, if an article uses interviews for a pilot study and a survey for the main study, it is coded as using a survey method, rather than multiple methods. If an article lists or describes multiple methods in its methodology section, but its analysis or results are based on one method, we do not code it to the multiple methods category. A few cases use multiple methods and provide analyses and results based on these methods; they are assigned to the multiple methods category.

Overall, quantitative approaches (82.4%) dominate, especially for articles dealing with e-business adoption by individual consumers (93.4%). A main reason for this is that e-business adoption is one instance of technology adoption research, which has formed its own theories (e.g., TAM, TPB) and constructs for over twenty years. Most extant e-business adoption studies can directly apply those mature theories in their own research contexts, or extend or integrate such theories.

In terms of specific research methods, we find that survey (74.3%) is the dominant research method, followed by case study (4.7%) and interview (4.4%) – both of which are qualitative approaches. Most of the case studies and interviews are conducted in business organizations. Use of archival research and conceptual research collectively account for over 7% of the journal articles. Remaining methods are little used in e-business adoption research.

However, we find that eight articles use a new and interesting research method: website review. Although this has rarely been indicated as a research method before, it can bring more value to research findings than relying on subjective perceptions from respondents [Mohamad & Ismail 2009]. Typically, this method collects a list of websites, then reviews those websites from multiple dimensions, and draws conclusions based on the review. Accordingly, it is different from archival data. For instance, Chiemeke et al. [2006] study the adoption of internet banking by reviewing websites of 12 banks in Nigeria along four dimensions: information delivery, transactional channels, customer relationship, and security measures. Similarly, in order to examine e-business adoption of travel and tourism organizations, Maswera et al. [2008] access and then evaluate e-business features displayed in 373 websites from four African countries and 180 from the United States and Western Europe.

Comparing research methods used in e-business adoption for business organizations versus individual consumers leads to a couple of observations. First, it is not surprising to find that articles dealing with individuals' e-

business adoption are more likely to use quantitative methods. A quantitative approach (especially surveys) typically requires a large sample size, which is typically not as easy to achieve by researchers who plan to study organizational e-business adoption. Second, researchers who study individuals' e-business adoption are most likely to use survey and experiment methods. In contrast, case study, interview, and conceptual methods are more extensively used in researching e-business adoption by business organizations.

Table 5: Distribution of Research Methods

Research Method	Overall		Business Organizations		Individual Consumers	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Quantitative Approaches	509	82.4%	156	71.2%	303	92.9%
Survey	459	74.3%	139	63.5%	278	85.3%
Archival data	23	3.7%	8	3.7%	10	3.1%
Experiment	13	2.1%	0	0.0%	12	3.7%
Website review	8	1.3%	6	2.7%	0	0.0%
Others (meta-analysis, simulation, modeling)	6	1.0%	3	1.4%	3	0.9%
Qualitative Approaches	93	15.0%	57	26.0%	16	4.9%
Case study	29	4.7%	23	10.5%	0	0.0%
Interview	27	4.4%	15	6.8%	5	1.5%
Conceptual	21	3.4%	11	5.0%	7	2.1%
Interpretive	7	1.1%	3	1.4%	0	0.0%
Literature review	6	1.0%	3	1.4%	3	0.9%
Others (focus group, action research)	3	0.5%	2	0.9%	1	0.3%
Multiple methods	16	2.6%	6	2.7%	7	2.1%
Total	618	100%	219	100%	326	100%

In terms of impact, we find that average citations for quantitative studies (16.1) are higher than those for qualitative studies (12.7). However, this difference is not significant ($p=0.50$), no matter whether or not we control for publication year. Among the ten most-cited e-business-adoption articles, eight are quantitative and two are qualitative. For the 100 most-cited articles, 85 are quantitative and 13 are qualitative. These proportions closely mirror the general distribution of articles across the quantitative-qualitative categories. We can conclude that both qualitative and quantitative studies of e-business adoption can have high impact.

5.5. Research Themes

Here, the notion of a 'research theme' is concerned with what aspect of e-business adoption is being investigated. When coding the research-theme dimension, we observe that adoption themes for articles about individual consumers are distinct from those about business organizations. So, we examine them separately. As Table 6 shows, research themes are very diverse in e-business adoption research for both individual consumers and business organizations. In the case of individual e-business adoption, the three most commonly-studied themes are online shopping, online banking, and online education. This finding is consistent with Holsapple & Sasidharan [2009], who note that these three are the main B2C marketplaces. Perhaps surprisingly, online banking takes the highest percentage of sample articles, 11 percent higher than online shopping. Recall that two of the top four journals in terms of article frequency (Appendix B) are specifically related to (online) banking.

Compared to online shopping and online education, online banking is more risky for consumers, involving barriers such as privacy concerns and perceived risk when consumers decide to adopt it [Featherman et al. 2010]. Furthermore, adoption of online banking can facilitate the adoption of other e-business services. Issues such as these

– both problematic and opportunity laden – may be responsible for online banking receiving the greatest attention from e-business adoption researchers. Online shopping is still heavily studied in the adoption research, especially as applications such as online customization, online product reviews, recommendation systems, and product virtualization have become increasingly used by online merchants. Online education has grown rapidly over the past decade, but its adoption rate is not as high as some expected [Wang & Wang 2009]. Accordingly, relevant questions, such as how to facilitate learners' intentions to use online learning systems, attract researchers' attention.

Additionally, we find some traditional/basic e-business services such as internet access and website browsing are still studied by some articles. However, examination of these reveals that they study either e-business adoption in developing countries [e.g., Pan & Jordan-Marsh 2010], testing of moderation effects [e.g., Castañeda et al. 2007], or e-business adoption by particular consumer types such as old people [e.g., Lam & Lee 2006]. On the other hand, adoption of emerging e-business services, such as online product reviews [e.g., Papathanassis & Knolle 2011] and online healthcare [e.g., Klein 2006], have lately become more frequently studied. More detailed trend examination also shows that the three most-frequently studied adoption themes are growing only slightly across the six years.

As for organizational e-business adoption, the text of about one-third of the articles uses only a general term such as "e-business" or "e-commerce" without indicating any more-specific themes. This suggests that e-business might be treated as a business model or strategy in those articles. In contrast, only three percent of articles dealing with e-business adoption by individual consumers do not indicate what applications are studied. A possible reason is that unlike individual consumers, business organizations typically play the role of e-business provider and may want to adopt comprehensive e-business applications. Such a difference also suggests that e-business adoption by business organizations is more complex than that of individual consumers, not only in the adoption process, but also in the adoption theme.

Table 6: Research Themes for E-Business Adoption: Individual Consumers versus Business Organizations

Individual Consumers			**Business Organizations**		
Themes	**Freq.**	**Pct.**	**Themes**	**Freq.**	**Pct.**
Online banking	85	26.1%	General (e.g. "electronic business")	71	32.4%
Online shopping	49	15.0%	Internet	26	11.9%
Online education	32	9.8%	EB technology	19	8.7%
Internet access	29	8.9%	Website	14	6.4%
Mobile internet access	18	5.5%	B2B	12	5.5%
Online entertainment (e.g., online video)	12	3.7%	Multiple (involve multiple themes)	12	5.5%
Specialized technologies	11	3.4%	Online supply chain integration	12	5.5%
General (e.g., "electronic commerce")	10	3.1%	Banking	8	3.7%
Online intermediary (e.g., online agency)	8	2.5%	Selling	6	2.7%
Web 2.0	8	2.5%	B2C	5	2.3%
Online healthcare (e.g., online prescription)	7	2.1%	ICT (Information & Communications Technology)	5	2.3%
Online financial services except banking	7	2.1%	Online marketing	5	2.3%
Website browse (e.g., use of a website)	7	2.1%	Human resource (e.g., online training)	4	1.8%
Online auction	5	1.5%	Semantic web	4	1.8%
Electronic words of mouth	5	1.5%	Online information systems	3	1.4%
Online government service	5	1.5%	Others (e.g., web 2.0, online social media)	13	5.9%
Social network	5	1.5%			
Virtual community	5	1.5%			
Others (e.g., online betting, software)	18	5.5%			
Total	**326**	**100%**	**Total**	**219**	**100%**

Surprisingly, Internet and website are two of top four themes, although both are elementary segments in the continuum of e-business evolution [Earl 2000]. However, a further investigation reveals that most of these articles are concerned with SMEs, which lag behind large firms in e-business adoption. In addition, technology-specific themes, such as general e-business technology and ICT, are highly represented in organizational e-business adoption. It is noteworthy that online supply chain integration, which is considered to be an advanced segment in the continuum of e-business evolution, has received considerable attention in e-business adoption research. Interestingly, most of the other adoption themes more or less reflect functions/departments in an organization, including marketing, sales, IT, supply chain management, human resource management, customer relationship management, and finance. Finally, we observe that twelve studies investigate multiple segments, and most of them compare adoption determinants across various e-business applications/services.

6. Discussion

In this section, we explain the significance of this paper from two standpoints. First, we compare the findings to prior research, which reviews either e-business studies in general or e-business adoption studies (recall Table 1). In particular, our comparisons focus on the following three dimensions: journal distribution, data source, and research methods. Through such comparisons, we can detect some new trends in e-business adoption research. Second, we link those three dimensions to adoption themes, resulting in practical implications for e-business adoption researchers. The section ends with discussion of future research directions and research limitations.

6.1. Comparisons with prior studies

A few studies involve journal distribution of e-business research. In order to classify e-business research, Ngai & Wat [2002] review 275 articles from nine selected journals. Their results reveal that, of the nine journals, *International Journal of Electronic Commerce* (23%), *Communications of the ACM* (22%), and *Internet Research* (17%) have the most articles related to e-business topics. Similarly, Wareham et al. (2005), review 582 articles from 28 selected "mainstream" IS journals. They find that *Electronic Markets* (15%), *Communications of the ACM* (12%), *International Journal of Electronic Commerce* (9%), *Journal of Organizational Computing and Electronic Commerce* (6%), and *Decision Support Systems* (6%) are the top five journals in the frequency of e-business articles. Although all six journals above are in the full list of journals that our study reveals for e-business adoption research, none of them ranks in the top-five in terms of article frequency; and only *Decision Support Systems*, *Internet Research*, and *Electronic Markets* are in the list of commonly-used journals (see Appendix B). Two likely reasons for this difference are: the two studies above review e-business articles in general, whereas our study focuses on e-business adoption in particular; both studies above review articles published before 2003, whereas the sample of articles examined here were published more recently (2006-2011).

Compared to prior studies of e-business adoption research literature, the present study indicates some new trends. For instance, Urbaczewski et al. [2002] review 172 articles related to e-business, among which 30 journal articles fall into the area of adoption. The 30 articles are published in ten journals, nine of which appear in our study. Parker & Castleman [2006] review 100 articles regarding e-business adoption by SMEs, published in 41 journals, 11 (26%) of which had at least three articles. Most of those journals appear in the list uncovered by our study. Zhou et al. [2007] review 64 articles related to adoption of online shopping from 36 journals, among which only seven (19%) journals publish at least three articles. This result is very close to ours: 15% of journals publish at least three sample articles. However, among the seven journals, only three (*Journal of Business Research*, *Journal of Computer-Mediated Communication*, and *Information & Management*) are in the top-50 in terms of article frequency (see Appendix B). Although the three studies above review e-business adoption research, they either focus on a particular aspect of e-business adoption (e.g., SMEs or individual consumers) or use older articles. In comparison, our study sketches out a new landscape of journal distribution for the e-business adoption area – but one that exhibits some degree of continuity with the past.

A few studies indicate data source region. Compared with their findings, our study reveals some change in the distribution of data source regions. For instance, Wareham et al. [2005] find that the vast majority of research on e-business is implicitly and explicitly based on North American content and that outside of North America, Europe is the most commonly-studied region, followed by Asia. However, our study demonstrates that Asia is the most commonly-studied region in e-business adoption research, and then Europe and North America. In addition, they find geographic regions that are very under-represented in e-business research: South America, Middle East, Africa, Japan, former Soviet Union, and East Block. However, our study on the more specific area of e-business adoption demonstrates that Middle East and Africa are growing, but Russia, Japan, and South America are still little-represented. They point out that Singapore and Hong Kong are two commonly-studied areas in Asia in e-business research, but our study indicates that, in the most recent e-business-adoption landscape, Malaysia and Mainland

China are the two most commonly-studied regions in Asia. Potential reasons for the difference include the focus on e-business adoption and review of more recent articles.

Therefore, we conjecture that e-business adoption has propagated from western regions, through Asian regions, to the Middle East, Africa, and then South America. Such a trend is implicitly supported by Mohamad & Ismail [2009], who review 81 articles regarding e-business adoption by SMEs. In their study, European regions and Asian regions are most commonly-studied in e-business adoption research. They also state that progress of e-business adoption is relatively widespread among advanced economies as compared to developing ones; however, studies for developing economies are slowly catching up. All of these findings are further verified in our study. Additionally, prior studies determine that cross-country comparisons are rare and mainly conducted between developed countries. However, we find more comparisons conducted between developed and developing economies.

In terms of research method, we find that distribution of research approaches is fairly stable from 2006 to 2010. However, when we compare our results with Urbaczewski et al. [2002] and Wareham et al. [2005], which were conducted around ten years ago, we find that the percentage of quantitative investigation has increased greatly. For instance, we extract 30 journal articles dealing with e-business adoption from Urbaczewski et al. [2002] and find that only 40% of the articles used a quantitative approach. As such, compared to their study, our study demonstrates that the quantitative approach has doubled its percentage of articles. Additionally, only 27% of e-business adoption studies in Urbaczewski et al. [2002] use surveys, but such a rate increases to 74.3% in our study. Actually, such a trend could be verified by Mohamad & Ismail [2009], in which around 50% of e-business adoption studies use the survey approach. Interestingly, they also indicate that only a few studies use multiple methods, which is consistent with our results.

6.2. Linking Research Themes to Other Dimensions

Through a pile-sorting approach, we consolidate research themes into thematic groups for the case of individual adoption. The same is done for adoption by business organizations. These consolidated themes appear in the second column of Table 7, which shows six for individuals; coincidentally, there are also six for adoption at the organization level.

At a detailed level, we detect some change in adoption themes across the six years. For adoption by individuals, we find that collaboration-related themes (e.g., web 2.0, social network, virtual community, and intermediary) have grown rapidly during the six years. In contrast, access & information-related themes (e.g., internet, website, and online information) have dropped greatly. For adoption by business organizations, elementary applications (e.g., Internet, website, and web-based resources) have dropped greatly. The same is true of HR & finance-related themes (e.g., online recruitment, training, and banking). Conversely, themes of supply chain management and marketing & selling have grown rapidly. These trends may suggest themes where e-business adoption researchers are inclined to invest future research effort.

For each research theme, Table 7 shows its characteristics for each of three dimensions: research methods, data sources, and journals. Clearly, research themes vary greatly with respect to these dimensions. Although survey is the majority research method for nearly all themes, its percentage ranges from 23% to 95%. In addition, we find that other research methods are by no means rare. For instance, interviews are noteworthy for the SCM themes, archival for marketing & selling themes, and experiment for study of purchasing-related themes. A substantial percentage of studies collect data from Asian regions, ranging from 20% to 44%. However, for some themes such as collaboration and marketing & selling, European regions are the most highly represented. Although every group of themes involves a large number of journals, some journals are especially associated with specific themes. For instance, two journals, IJBM and JIBC, contribute most frequently to research dealing with adoption of financial services, while JSCM contributes greatly to research dealing with the adoption of electronic SCM. This finding indicates a link between research themes and target journals.

For any particular research theme (what to study), researchers have to figure out what research methods they are going to use (how to study), where they are going to collect the data, and find the prior studies. After they finish their research, they have to figure out where to publish it. Accordingly, our study provides researchers with practical implications for conducting e-business adoption research. Researchers can either follow the commonly-used pattern (i.e., the dominant method and/or data source) or fill in the blanks (i.e., the sparse methods and/or data sources).

Table 7: Top Research Methods, Data Source, and Journals for Each Research Theme

Unit of Analysis	Group of Research Themes	Research Method	Data Source	Journals
Individual Consumers	Financial services (92)	Survey (92%), interview (2%), archival (2%)	AS (42%), ME (19%); EU (14%), NA (10%)	IJBM (11%), JIBC(10%) and 60 other journals
	Purchasing (73)	Survey (87%), experiment, (8%), conceptual (3%)	AS (33%), NA (32%), EU (22%)	IJRDM (8%) and 51 other journals
	Access & Information (61)	Survey (95%), archival, modeling, review (2%)	AS (37%), NA (22%), EU (17%)	OIR (7%) and 52 other journals
	Welfare (58)	Survey (83%), conceptual, experiment (5%)	AS (44%), EU (22%), NA (20%)	CE (9%) and 46 other journals
	Collaboration (27)	Survey (74%), experiment, archival, interview (7%)	NA (33%), AS (30%), EU (19%)	ITT (7%) and other 25 journals
	General & others (15)	Survey (67%), archival (13%)	AS (29%), AF, NA (21%)	EJISDC (13%) and 13 other journals
Business Organizations	EB general (83)	Survey (59%), case study (17%), conceptual (7%)	AS (23%), EU (19%), AF, ME, OC (12%)	JECO (6%) and 62 other journals
	Elementary applications (42)	Survey (71%), website review, case study, (7%)	EU (39%), AS (20%), multiple (14%)	CIBIMA (7%) and 37 other journals
	Technology general (36)	Survey (70%), case study, conceptual (8%)	AS (31%), EU (26%), NA (23%)	IMDS (8%) and 30 other journals
	Electronic SCM (25)	Survey (68%), interview (16%)	AS (32%), EU (23%), multiple (23%)	JSCM (8%) and 23 other journals
	Marketing & Selling (19)	Survey (74%), archival (11%)	EU (33%), AS (28%), NA (17%)	19 journals
	Human Resource & Financial (13)	Archival, survey, mixed (23%)	AS (38%), NA, EU, multiple (15%)	13 journals

Note:
AF: Africa; AS: Asia; EU: Europe; ME: Middle East; NA: North America; OC: Oceania; multiple: multiple countries/regions.
CE: *Computers & Education*; CIBIMA: *Communications of the IBIMA*; EJISDC: *The Electronic Journal of Information Systems in Developing Countries*; IJBM: *International Journal of Bank Marketing*; IJRDM: *International Journal of Retail & Distribution Management*; IMDS: *Industrial Management & Data Systems*; ITT: *Information Technology & Tourism*; JECO: *Journal of Electronic Commerce in Organizations*; JIBC: *Journal of Internet Banking and Commerce*; JSCM: *Journal of Supply Chain Management*; OIR: *Online Information Review*.
For a full list of each dimension (research method, data source, and journal), please contact with the corresponding author.

6.3. Future Research Directions

Our systematic review triggers the identification of numerous future research avenues. For instance, the classification for unit of analysis suggests various frames in which e-business adoption could be studied. Future studies can compare adoption patterns across units (e.g., business organizations vs. nonprofit organizations), or further investigate adoption of subunits of analysis (e.g., adoption by healthcare organizations). Additionally, we notice that between organizations and individuals, there could be another scope of analysis, namely groups. Nowadays, social network, virtual community, web 2.0, and other collaborative technologies facilitate many forms of virtual teams [Duarte & Snyder 2011]. Unlike individuals and organizations, group decision making involves "series of interactions, communication, deliberation and other activities such as search for information" among a collection of individuals [Turban et al. 2011, p.139]. Therefore, it is very promising to scrutinize groups' e-business adoption, either conceptually or empirically. For instance, recently, Turban et al. [2011] advance a framework for adopting social networking software for virtual groups.

Comparison studies across regions, especially for those within developing economies, are scarce, but it is important for researchers to understand e-business adoption phenomenon across cultures, economic levels, and other national variables. A great number of studies on e-business adoption research use surveys, indicating that future research could conduct a meta-analysis of e-business adoption to examine the relationship between adoption factors and adoption decisions, and how such a relationship is moderated by research contexts, such as data source regions and sample size. Through further investigation of the survey-based articles, we find very few studies use surveys to compare the utility of multiple adoption theories [e.g., Gounaris & Koritos 2008; Grandón et al. 2011]. This indicates another future research opportunity. Furthermore, in order to examine e-business adoption processes and

barriers in more detail and/or more objectively, surveys could be complemented by other research methods, such as website analysis, experiments, and interviews [Mohamad & Ismail 2009].

Findings concerning research themes provide many research avenues. For example, regarding adoption by individual consumers, online banking, shopping, and education are prevalent. Comparing existing review studies in Table 1 with these three themes, we find that none of those studies systematically reviews online banking. Accordingly, future research may review online banking literature for more detail on this theme, as well as update the review of online shopping or online education literature. Another research opportunity is adoption of collaboration-related themes, including web 2.0, social network, virtual community, and intermediary [e.g., Li 2011]. These themes are under-represented, but rapidly-growing.

For adoption by business organizations, many articles study e-business as a general term. E-business consists of many segments, involves multiple evolutionary stages, and takes various forms [Earl 2000; Ghobakhloo et al., 2011]. Additionally, researchers, respondents, and readers may have different understandings of e-business, so it might be problematic to treat e-business as a general term. In order to avoid such a problem, future research can develop ways to measure e-business adoption. A potential solution is to specify a research theme such as online marketing and online selling. Another solution is to use a multi-dimensional operationalization of e-business. Doing so, researchers can get more insight into e-business adoption for business organizations. Voola et al. [2010] suggest that the multi-dimensional approach provides further insights into e-business adoption, identifying idiosyncratic antecedents and effects of each e-business dimension. For instance, Ghobakhloo et al. [2011] examine adoption determinants of seven e-business applications; Voola et al. [2010] compare the determinants and influences of four dimensions of e-business adoption. Additionally, the multi-dimensional approach also allows researchers to examine relationships between dimensions. For instance, Andreu et al. [2010] use e-communication and e-procurement as two dimensions of e-business adoption and find that e-communication predicts e-procurement.

Furthermore, the rapidly-growing themes such as supply chain management, selling, and marketing are an additional research avenue. Huang et al. [2008] state that e-business applications can serve various purposes in SCM, such as transmitting orders and collaborative product design/improvement. Gupta et al. [2009] review e-business research published in *Production and Operations Management*, identifying quite a few research opportunities for e-business applications in SCM, most of which could be examined from the adoption perspective. In addition, it is interesting to examine the adoption of new e-business technologies such as social media, web 2.0, and semantic web in business organizations [e.g., Joo & Lee 2009].

6.4. Limitations

This study has some limitations, although we endeavor to minimize them using various approaches. First, in order to search a comprehensive list of relevant articles, we use five clusters of variable search terms (11 terms in particular) and four fixed search terms to identify related research (i.e., we consider 44 combinations). However, we may still miss some articles that are strongly related to e-business adoption, even though these terms do not appear in their titles. Second, when using the sample articles to characterize the research landscape, we treat all articles equally, regardless of their publication outlet, quality, and impact. Although such an approach is commonly used in review studies, some articles may have more impact than others. One question is whether and how we should give more weight to high-impact articles. This study is based on all sample e-business-adoption publications and then focuses specifically on journal articles, along with impact measures (i.e., GS citations).

Coding bias is practically unavoidable in a review study. However, a majority of extant review studies in Table 1 do not check the coding reliability. Via collaborative coding and a codebook, we have sought to achieve a high degree of coding reliability. There may be some biases affecting the results, but the coding reliability (in terms of stability) is extremely high. Due to limited space, we choose only five dimensions for coding our sample articles. We think the five commonly-used dimensions are sufficient to describe the research landscape. However, we may miss some important dimensions, such as the use of adoption theory.

7. Conclusions

Based on a systematic review, this study reveals the current landscape of e-business adoption research. Overall, e-business adoption is a growing topic, both across years (longitudinally) and compared with other topics (horizontally). Although the distribution of publication outlets varies across years, journal articles keep growing, either in the frequency or percentage. GS citations of e-business adoption research display a long right tail, indicating that a small percentage of highly-cited articles contribute to a majority of citations. In addition, we identify the 20 most highly-cited e-business adoption articles and describe their features. Journal articles are significantly more highly cited than other kinds of publications.

A sample of 618 journal articles on e-business adoption is studied. These have been published in over 300 journals, covering diverse disciplines, involving various publishers, having varying frequencies of e-business

adoption articles, and accumulating a history of impacts. We find relatively new journals have published high-impact e-business adoption research. Business organizations (with SMEs as the majority) and individual consumers are major units of analysis, and they are distinct in terms of search keywords in the title, theories, data collection procedures, and data analysis techniques. A large majority of articles collect data from single or multiple regions, which cover various continents and economies. Among them, Asian regions and advanced economies have been frequently studied, but e-business-adoption research for the Middle East and developing economies appears to be growing rapidly. Survey is the dominant research method, especially for investigating e-business adoption by individual consumers, and some new approaches have been introduced as well.

E-business adoption involves various research themes, either for business organizations or individual consumers. However, adoption by business organizations is different from that of individual consumers, in which online banking, online shopping, and online education are three commonly-studied themes. During the six year window, some research themes such as social network and supply chain management have grown rapidly, while some others (e.g., internet access and website) have dropped. Compared to extant review studies, we examine new trends of e-business adoption research in terms of journal distribution, data source regions, and research methods. Additionally, we link research themes to these three dimensions and find that research themes vary substantially in research methods, data source regions, and target journals. In doing so, this study provides practical implications for e-business adoption researchers.

To sum up, this study's findings characterize the state-of-the-art for e-business-adoption research, as a platform for seeing future research needs, for positioning future investigations, and for supporting the identification of relevant literature. Armed with a better understanding of e-business-adoption research, along multiple dimensions described here, both practitioners and researchers can benefit. Additionally, this study is of value to educators concerned with organizing coverage of e-business adoption in course plans.

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APPENDIX A

Top-20 Citied Articles Published between 2006 and 2010 (as of October 2012)

Rank	GS citations	Study	Title	Journal	Main Topics	Data Source
1	631	Pavlou & Fygenson [2006]	Understanding and predicting electronic commerce adoption: An extension of the theory of planned behavior	*MIS Quarterly*	Theory extension, online shopping	US
2	332	Kim et al. [2007]	Value-based adoption of mobile internet: An empirical investigation	*Decision Support Systems*	Theory development, mobile internet	Singapore
3	198	Ahn et al. [2007]	The impact of Web quality and playfulness on user acceptance of online retailing	*Information & Management*	Online retailing	Korea
4	191	Thurman [2008]	Forums for citizen journalists? Adoption of user generated content initiatives by online news media	*New Media & Society*	User generated content, online media	UK
5	181	Porter & Donthu [2006]	Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics	*Journal of Business Research*	Internet usage, user attitude	US
6	153	Hsu et al. [2007]	Adoption of the mobile internet: An empirical study of multimedia message service (MMS)	*Omega*	Mobile internet	Taiwan
7	150	Hung et al. [2006]	Determinants of user acceptance of the e-Government services: The case of online tax filing and payment system	*Government Information Quarterly*	e-government	Taiwan
8	148	Zhou et al. [2006]	Online shopping acceptance model-A critical survey of consumer factors in online shopping	*Journal of Electronic Commerce Research*	Literature review, online shopping	General
9	146	Ajjan & Hartshorne [2008]	Investigating faculty decisions to adopt Web 2.0 technologies: Theory and empirical tests	*The Internet and Higher Education*	Web 2.0, education	US
10	141	Cheng et al. [2006]	Adoption of internet banking: An empirical study in Hong Kong	*Decision Support Systems*	Internet banking	Hong Kong
11	124	Goldfarb & Prince [2008]	Internet adoption and usage patterns are different: Implications for the digital divide	*Information Economics and Policy*	Internet usage, economic policy	US
12	120	Lee [2009]	Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit	*Electronic Commerce Research and Applications*	Internet banking, theory integration	Taiwan
13	111	Hong & Zhu [2006]	Migrating to internet-based e-commerce: factors affecting e-commerce adoption and migration at the firm level	*Information & Management*	Adoption & migration	US & Canada
14	100	Castañeda et al. [2007]	Web Acceptance Model (WAM): Moderating effects of user experience	*Information & Management*	Website, User experience	Spain
15	94	Hernandez & Mazzon [2007]	Adoption of internet banking: proposition and implementation of an integrated methodology approach	*International Journal of Bank Marketing*	Internet banking	Brazil
16	93	Yiu et al. [2007]	Factors affecting the adoption of Internet Banking in Hong Kong—implications for the banking sector	*International Journal of Information Management*	Internet banking	Hong Kong
17	89	Shin [2007]	User acceptance of mobile internet: Implication for convergence technologies	*Interacting with Computers*	Mobile internet	US
18	88	Tan et al. [2007]	Business-to-business adoption of eCommerce in China	*Information & Management*	B2B	China
19	87	Cheung et al. [2008]	The impact of electronic word-of-mouth: The adoption of online opinions in online customer communities	*Internet Research*	Online opinion, customer community	Hong Kong
20	86	Flanagin [2006]	Social pressures on organizational website adoption	*Human Communication Research*	Website, social influence	US

APPENDIX B

Journals Publishing at Least Three E-business Adoption Articles
(Top 20 journals in terms of total GS citations are bolded)

Journal	# of articles	# of articles each year (06' → 11')	Start Year	Category	Publisher/sponsored by	GS Citations[3]		
						Total	AVG	Rank
Journal of Internet Banking and Commerce	16	1/3/4/1/3/4	1996	EB application	ARRAY Development (Canada)	172	10.8	11
Communications of the IBIMA	10	0/0/7/0/1/2	2008	IS general	IBIMA (US)	28	2.8	77
International Journal of Bank Marketing	**10**	**1/1/5/1/2/0**	**1983**	**Reference-Finance**	**Emerald (UK)**	**358**	**35.8**	**4**
Journal of Electronic Commerce in Organizations	**10**	**3/1/1/0/2/3**	**2003**	**EB general**	**IGI (US)**	**137**	**13.7**	**19**
Computers in Human Behavior	**8**	**0/0/2/1/4/1**	**1985**	**Reference-Computer Science**	**Elsevier (Netherlands)**	**166**	**20.8**	**12**
International Journal of Retail & Distribution Management	**8**	**2/1/0/1/3/1**	**1973**	**Reference-Marketing**	**Emerald (UK)**	**154**	**19.3**	**14**
The Electronic Journal of Information Systems in Developing Countries	8	2/2/0/1/1/3	2000	IS general	City Univ. of Hong Kong (HK)	80	10.0	26
Decision Support Systems	**7**	**3/1/0/2/0/1**	**1985**	**IS general**	**Elsevier (Netherlands)**	**591**	**84.4**	**2**
Electronic Commerce Research and Applications	**7**	**1/2/0/2/1/1**	**2002**	**EB general**	**Elsevier (Netherlands)**	**279**	**39.9**	**5**
Industrial Management & Data Systems	**7**	**2/1/0/2/1/1**	**1980**	**Multidiscipline**	**Emerald (UK)**	**163**	**23.3**	**13**
Information & Management	**7**	**2/4/0/1/0/0**	**1977**	**IS general**	**Elsevier (Netherlands)**	**563**	**80.4**	**3**
International Journal of Business and Management	7	0/0/0/1/1/5	2006	Multidiscipline	Canadian Center of Science and Education (Canada)	21	3.0	86
International Journal of E-Business Research	7	1/2/0/2/2/0	2005	EB general	IGI (US)	34	4.9	55
International Journal of Electronic Business	7	2/0/0/3/1/1	2003	EB general	Inderscience (Switzerland)	12	1.7	131
Internet Research	**7**	**1/1/1/1/1/2**	**1991**	**Reference-Computer Science**	**Emerald (UK)**	**223**	**31.9**	**9**
Journal of Business Research	**7**	**1/0/1/0/3/2**	**1973**	**Multidiscipline**	**Elsevier (Netherlands)**	**268**	**38.3**	**7**
Online Information Review	7	1/0/1/1/1/2	1977	IS general	Emerald (UK)	57	8.1	36
Information Technology & Tourism	6	2/1/0/1/1/1	1998	Reference-Tourism	Cognizant (US)	53	8.8	39
International Journal of E-Adoption	6	0/0/0/5/1/0	2009	EB general	IGI (US)	7	1.2	166
Journal of Electronic Commerce Research	**6**	**1/2/0/0/3/0**	**2000**	**EB general**	**National Chengchi University (Taiwan)**	**271**	**45.2**	**6**
Journal of Internet Commerce	6	4/0/2/0/0/0	2002	EB general	Taylor & Francis (UK)	58	9.7	35
Computers & Education	**5**	**0/1/2/2/0/0**	**1976**	**Reference-Education**	**Elsevier (Netherlands)**	**141**	**28.2**	**18**
Electronic Markets	5	2/2/0/1/0/0	1991	EB general	Springer (US)	89	17.8	24
Journal of Enterprise Information Management	5	0/0/0/2/2/1	1988	IS specific	Emerald (UK)	73	14.6	29
Journal of Financial Services Marketing	5	0/0/2/2/0/1	1996	Reference-Finance	Palgrave Macmillan (UK)	59	11.8	33
Behaviour & Information Technology	4	0/0/0/1/1/2	1982	Multidiscipline	Taylor & Francis (UK)	42	10.5	48
International Journal of Electronic Marketing and Retailing	4	1/2/0/0/0/1	2006	EB general	Inderscience (Switzerland)	13	3.3	124
Journal of Retailing and Consumer Services	4	0/1/1/0/1/1	1994	Reference-Marketing	Elsevier (Netherlands)	108	27.0	22
Journal of Theoretical and Applied Electronic Commerce Research	4	1/1/0/1/0/1	2006	EB general	Universidad de Talca (Chile)	18	4.5	99
The Service Industries Journal	4	0/0/0/2/1/1	1981	Reference-Service	Taylor & Francis (UK)	30	7.5	63
Tourism Management	4	0/0/0/1/1/2	1980	Reference-Tourism	Elsevier (Netherlands)	79	19.8	27

[3] Total denotes the total GS citations, which refer to the sum of GS citations for all identified articles in a journal; AVG denotes average GS citations per article in a journal (for instance, if a journal includes two sample articles in our study and the sum of GS citations for the two articles is 50, the AVG of this journal will be 25); Rank denotes the ranking of the total GS citation of a journal among all 342 journals identified in this study.

APPENDIX B (Continued)
Journals Publishing at Least Three E-business Adoption Articles
(Top 20 journals in terms of total GS citations are bolded)

Journal	# of articles	# of articles each year (06' → 11')	Start Year	Category	Publisher/sponsored by	GS Citations		
						Total	AVG	Rank
African Journal of Business Management	3	0/0/0/0/0/3	2007	Multidiscipline	Academic Journals (US)	2	0.7	252
British Journal of Educational Technology	3	1/0/1/1/0/0	1970	Reference-Education	Wiley-Blackwell (US)	41	13.7	49
European Journal of Information Systems	3	1/1/1/0/0/0	1991	IS general	Palgrave Macmillan (UK)	63	21.0	31
International Journal of Business and Management Science	3	0/0/0/1/2/0	2008	Multidiscipline	Society for Alliance, Fidelity & Advancement (Australia)	3	1.0	224
International Journal of Business Information Systems	3	0/0/1/1/0/1	2005	IS general	Inderscience (Switzerland)	25	8.3	81
International Journal of Information Management	**3**	**1/1/0/1/0/0**	**1981**	**IS general**	**Elsevier (Netherlands)**	**141**	**47.0**	**18**
International Journal of Services Technology and Management	3	0/2/1/0/0/0	2000	Reference-Service	Inderscience (Switzerland)	12	4.0	131
International Journal of Technology Diffusion	3	0/0/0/0/1/2	2010	Multidiscipline	IGI (US)	0	0.0	342
International Journal of Technology Marketing	3	1/0/0/0/1/1	2005	Reference-Marketing	Inderscience (Switzerland)	2	0.7	252
Journal of Applied Sciences	3	1/0/1/2/0/0	2001	Multidiscipline	Asian Network for Scientific Information (Pakistan)	13	4.3	124
Journal of Business Systems, Governance and Ethics	3	2/1/0/0/0/0	2006	Multidiscipline	Victoria Univ. (Australia)	16	5.3	109
Journal of Computer-Mediated Communication	3	2/0/0/0/0/1	1995	IS specific	Wiley-Blackwell (US)	45	15.0	44
Journal of Extension	3	1/0/2/0/0/0	1963	Reference-Natural Science	US Cooperative Extension Education (US)	10	3.3	144
Journal of Small Business and Enterprise Development	3	1/1/0/1/0/0	1994	Reference-Entrepreneurship	Emerald (UK)	60	20.0	32
Journal of the Association for Information Systems	3	0/0/1/0/0/2	2000	IS general	AIS (US)	47	15.7	43
MIS Quarterly	**3**	**1/0/0/2/0/0**	**1977**	**IS general**	**MIS Research Center (US)**	**759**	**253**	**1**
New Media & Society	**3**	**2/0/1/0/0/0**	**1999**	**Multidiscipline**	**Sage (US)**	**230**	**76.7**	**8**
Technovation	3	1/0/0/2/0/0	1981	Multidiscipline	Elsevier (Netherlands)	100	33.3	23
Total Quality Management & Business Excellence	3	1/0/0/1/0/1	1990	Reference-Operations Management	Taylor & Francis (UK)	33	11.0	56
Government Information Quarterly	2					205	102.5	**10**
Information Economics and Policy	2					126	63	**20**
The Internet and Higher Education	2					153	76.5	**16**
Omega	1					153	153	**16**