2008

Profiling Adoption, Acceptance and Diffusion Research in the Information Systems Discipline

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Abstract

The substantial level of investigative activity to date into information systems and technology acceptance and diffusion has witnessed the use of a wide range of exploratory techniques examining many different systems and technologies in countless different contexts. The aim of this paper is to provide a comprehensive and systematic review of the literature pertaining to such adoption and diffusion issues in order to ascertain the current "state of play" of the field along a number dimensions. Information on a series of variables were extracted after conducting a review of 345 articles on Innovation adoption, acceptance and diffusion, published in 19 peer reviewed journals between 1985 and 2007. Findings suggest that the positivist paradigm, empirical and quantitative research, the survey method and TAM theory was used predominantly when investigating the topics of adoption and diffusion of technology. Results of this research may have implications for researchers, journal editors, reviewers and universities.

Keywords: Adoption, Acceptance, Literature Review, Diffusion, Information Systems; ICT, Research Context, Research Issues, Research Method, Theories

1 INTRODUCTION

The continuing quest to ensure user-acceptance of information systems and technology (IS/IT) is an ongoing management challenge (Schwarz and Chin, 2007), and one that has occupied the IS research community to the extent that IS/IT adoption and diffusion research is now considered to be among the more mature areas of exploration within the IS discipline (Hirschheim, 2007; Venkatesh et al. 2007). This substantial level of investigative activity has witnessed the use of a wide range of exploratory techniques examining many different systems and technologies in countless different contexts to the extent that even the most cursory examination of the extant literature will reveal a variety of stakeholder perspectives, technologies and contexts, units of analysis, theories, and research methods. For instance, contexts vary from the societal to the industrial, to the organizational and individual, and many theories and models - such as the Technology Acceptance Model (TAM), Diffusion of Innovation (DoI) theory, Theory of Planned Behavior (TPB) and Institutional Theory - have been utilised to study an assortment of adoption and diffusion related issues. Recently, IS researchers have begun stretching their reach beyond the commonly addressed organisation and user perspectives. For example, studies related specifically to the adoption of technology within the household context are beginning to emerge (Dwivedi et al. 2006; Venkatesh and Brown, 2001; 2003; 2005) adding yet further variability to the body of existing research in terms of contexts and units of analysis.

Reviewing and profiling the existing literature on IS/IT adoption and diffusion is likely to be of use to researchers in assisting them to identify currently under-explored research issues, and select theories and methods appropriate to their investigation, all of which are critical issues for conducting fruitful original and rigorous research. This will also help to identify existing strengths and weaknesses of the pertinent research streams, promote discussion regarding critical issues in the area, and assist in the identification of alternative theoretical and methodological perspectives (Venkatesh et al. 2007).

There have been a number of reviews and meta-analytic articles published in the area to date. However, perhaps due to the customary inclination of the IS researcher to make use of TAM, almost all of the existing studies have focused primarily upon reviewing the literature relating to technology acceptance rather providing a comprehensive review on the broader area of adoption and diffusion. A number of these studies are identified and briefly discussed further in Section 2. The general aim of this exploratory paper therefore is to provide a more comprehensive and systematic review of the literature pertaining to IS/IT adoption and diffusion research in order to ascertain the current "state of play" of the field along a number of dimensions. This overall aim is realised by means of the following twelve objectives; 1. to identify the journals publishing most articles on IS/IT adoption, acceptance and diffusion; 2. to present the general trends on adoption and diffusion research according to the year of publication; 3. to identify countries (and hence areas of greatest activity) with the largest number of publications on IS/IT adoption, acceptance and diffusion; 4. to identify authors active in the area of IS/IT adoption, acceptance and diffusion; 5. to classify the publications according to three keywords 'Adoption', 'Acceptance' and 'Diffusion'; 6. to identify the various *units of analysis* commonly utilised in IS/IT adoption, acceptance and diffusion research; 7. to classify adoption and diffusion publications according to the research paradigm; 8. to classify adoption and diffusion publications on the basis of their use of primary research data (empirical and non empirical); 9. to classify adoption and diffusion publications on the basis of nature of primary research data (quantitative and qualitative); 10. to classify adoption and diffusion publications according to the research methods employed; 11. to explore and identify the various technologies examined; 12. to explore the theories and theoretical constructs utilised when examining the adoption, acceptance and diffusion of IS/IT within various contexts.

In order to realise these objectives, a systematic and comprehensive review of 345 articles appearing in 19 different peer-reviewed journals (see Table 2) during the period 1985-2007 was conducted. The remainder of this paper is structured as follows. In Section 2, we present a brief discussion of the existing literature reviewing adoption and diffusion research in the IS field. In Section 3 we provide a

discussion of the method we employed in our analysis of the trends of adoption and diffusion research. Our findings are presented and discussed in Section 4 and finally, Section 5 presents our conclusions from this work and the limitation to the approach.

2 LITERATURE REVIEW

A number of review and meta-analysis articles have previously been published on the general theme of this paper – see for instance Bagozzi (2007), Benbasat and Barki (2007), Choudrie and Dwivedi (2005), Hirschheim (2007), Jeyaraj et al. (2006), King and He (2006), Legris et al. (2003), Lucas et al. (2007), Schwarz and Chin (2007), Silva (2007); Venkatesh et al. (2007). It should be noted that all but two of these studies (Choudrie and Dwivedi, 2005; Jeyaraj et al. 2006) have adopted a rather narrow perspective of the area by focusing on reviewing and critiquing material that deals specifically with the issue of technology acceptance, particularly those works employing TAM or some aspect of it.

Choudrie and Dwivedi (2005) considered the literature in general and examined the range of research methods used for studying technology adoption issues by reviewing 48 articles published in peer reviewed journals between 1985 and 2003. Despite its attempt at extending the scope of such review articles, this study has two evident limitations; firstly its analysis was restricted to the research methodology employed, and secondly, its findings were based on review of only 48 articles. The work of Jeyaraj et al. (2006) was based on a comparatively larger sample (99 articles), and provides a rigorous review of the predictors, linkages and biases in IT innovation adoption research (thereby focusing upon on theoretical constructs) but again only gives consideration to publications appearing up until 2003.

To the best of our knowledge, there is no article that has yet provided a broad portrait of the adoption, acceptance and diffusion of IS/IT/Innovation literature by systematically profiling a larger and more timely set of existing IS publications in terms of author, institution, country, publication year, research paradigm employed, nature of primary data, research methods, theories and theoretical constructs and technology examined. It has been suggested by previous studies that such research is of importance in order to encourage debate about critical issues in the IS field (Hirschheim, 2007) and to assist in the identification of alternative theoretical and methodological perspectives (Venkatesh et al. 2007). It is therefore suggested that the material presented in this papers will form a useful and incremental contribution to the existing knowledge of IS/IT/Innovation adoption and diffusion.

3 RESEARCH METHODOLOGY

For the purpose of conducting this research we made use of the academic journals database provided by Thomson Scientific (previously known as the Institute for Scientific Information (ISI)). Thomson Scientific publishes the Science Citation Index (SCI) and the Social Science Citation Index (SSCI) as two of three elements of its Web of Science® product. The reason for selecting this database is that the majority of IS journals are included either within the Science Citation Index (SCI) or within the Social Science Citation Index (SSCI). Therefore, it is possible to search for and locate a significant proportion of the published material on diffusion and adoption within IS discipline using the Web of Science® search facility. Moreover, restricting the search activities to a single publication database removed many of the potential problems of duplication inherent in the use of multiple data sources. The Web of Science product provides two main search-techniques i.e. ‘General Search’ and ‘Advanced Search’. The search-technique used within this research exercise was the 'General Search'. The main reason for employing a 'General Search' approach was simply that its easy to use characteristics facilitate the repetition of searches without any confusion, henceforth is straightforward to obtain consistent results in repetitive searches provided the same search criteria are applied.

In order to identify publications specific to the adoption and diffusion area, three search-terms were sought after in this study: ‘Diffusion’, ‘Adoption’, and ‘Acceptance’. The search was restricted to occurrences of any of these keywords appearing in the article title in order to avoid locating publications where any of these keywords might have been used as casual words in the main text. However, if one of these words appeared in the article title, it suggested that the main focus of the

article is adoption and diffusion in some form. The first search using the 'Diffusion', 'Adoption', and 'Acceptance' keywords resulted in more than 10,000 publications being selected as the search was not restricted to the information systems field. The search was consequently refined by restricting the search to those Web of Science® subject categories (illustrated in Table 1) viewed as being appropriate to the investigation. The search restricted to the subject categories shown in Table 1 returned 4000 articles, and subsequent inspection of the results revealed that many of the journals (and indeed, publications) included were not particularly relevant to, or associated with, the IS field. Therefore, the search was further refined by restricting it to the 19 journals (viewed as being important to IS researchers) listed in Table 2. This resulted in the extraction of 345 records providing details on publications relating to adoption, acceptance or diffusion. All 345 items were then examined manually to crosscheck and confirm the relevance of the search results.

A number of analyses were then conducted on the search output employing the various analysis tools available in the Web of Science®. Count and percentage data was generated for the assorted variables utilised to categorise the search output. Variables analysed included subject category, journal in which an article appeared, year of publication, author, author's institution, and the country in which the research was conducted. A further detailed manual analysis was then conducted in order to extract various items of information which could not be obtained directly from the Web of Science® database. In order to do so we examined each of the abstracts of the articles contained in the search results. Then these abstracts were individually scrutinized in order to obtain and record information such as the unit or level of analysis, the research paradigm, issues pertaining to primary data, the form of technology examined, and so on. However, it is important to note that for this stage of the analysis, only 301 of the original 345 articles could be considered as articles without abstracts were excluded, as were articles appearing in Communications of the ACM (CACM). The reasons for excluding the CACM articles were the lack of abstracts, and also the content of the articles in terms of methodological and theoretical description provided is very different to that of other journals. Data obtained from this analysis relating to the variables under examination were first recoded in SPSS v.14, and then count and percentage values generated, the results of which are described in Sections 4.7-4.14. With exception of the variables referring to the methodological approaches, data on all the other variables were recorded without considering the pre-specified categories. For the methodological variables we adopted categories from the previous studies of Avison et al. (2008), Choudrie and Dwivedi (2005), Galliers (1987; 1992), and Mingers (2003).

4 FINDINGS

4.1 Adoption and Diffusion Studies According to Subject Category

Table 1 illustrates that a total of 10 Web of Science® Subject Categories have published research on adoption and diffusion of IS/IT/Innovation, the largest number of articles (237) appearing within the 'Computer Science, Information Systems' category on adoption and diffusion of information systems. This is followed by the 'Information Science & Library Science' category (195), and then the 'Management' category (148).

Subject Category	*Article Count (n=345)*	*% of 345*
Computer Science, Information Systems	237	68.69
Information Science & Library Science	195	56.52
Management	148	42.89
Computer Science, Hardware & Architecture	34	9.85
Computer Science, Software Engineering	34	9.85
Computer Science, Theory & Methods	34	9.85
Computer Science, Inter-Disciplinary Applications	27	7.82
Engineering, Industrial	16	4.63
Computer Science, Artificial Intelligence	15	4.34
Operations Research & Management Science	15	4.34

Table 1. Adoption & Diffusion Studies in IS Publishing Outlets According to Subject Category

The lowest number of articles in our study (15) appeared in the 'Operations Research and Management Science' category. It is important to note at this point that these results are indicative only, and are intended to provide a representation of the main areas of study in which research articles on adoption and diffusion of information systems are likely to appear. Clearly, extending the number of keywords and altering the categories included would alter the results, although it is argued, not to the extent that it would substantially alter the overall profile.

Adoption & Diffusion Studies According to Journals

Table 2 presents the breakdown of our search output according to the journals in which the articles on adoption and diffusion of IS/IT/Innovation appeared. A total of 19 journals were selected as appropriate outlets for IS research. Table 2 illustrates that the largest number of articles (76) on adoption and diffusion appeared in the journal *Information & Management* and the least number (5) of articles resulting from our search activities appeared in two journals; The *DATA BASE for Advances in Information Systems* and the *Journal of Global Information Management*. Other journals that have published a significant number of articles on adoption and diffusion include *Communications of the ACM* (34), the *Journal of Computer Information Systems* (24), *MIS Quarterly* (24) and the *European Journal of Information Systems* (23). Our findings further reveal that of the journals publishing the highest numbers of articles on adoption and diffusion of IS/IT/Innovation, only one (the *European Journal of Information Systems*) is based in Europe, all the others being based in North America. This could be due to the fact that a large number of the articles in our search results were quantitative in nature, and it could well be the case that USA-based journals may be comparatively more sympathetic to such material (Lyytinen et al. 2007; Palvia and Pinjani 2006).

Journal Title	*Article Count (n=345)*	*% of 345*
Information & Management	76	22.02
Communications of the ACM	34	9.86
Journal of Computer Information Systems	24	6.96
MIS Quarterly	24	6.96
European Journal of Information Systems	23	6.66
International Journal of Information Management	18	5.21
Information Systems Research	17	4.92
Journal of Information Technology	17	4.92
Industrial Management & Data Systems	16	4.64
Decision Support Systems	15	4.34
Journal of Management Information Systems	14	4.06
Journal of Strategic Information Systems	13	3.77
Journal of Organizational Computing and Electronic Commerce	11	3.19
Information Society	9	2.61
Information Systems Journal	9	2.61
Information Systems Management	9	2.61
Journal of the Association for Information Systems	6	1.74
DATABASE for Advances in Information Systems	5	1.45
Journal of Global Information Management	5	1.45

Table 2. Adoption & Diffusion Studies in IS Publishing Outlets According to Journal

4.2 Adoption & Diffusion Studies According to Year of Publication

Our findings (illustrated in Table 3) reveal that the number of articles published on adoption and diffusion has constantly increased from 1996 (when five papers were published across our selected journals) to 2007 (which has so far seen 39 papers appear). To date, the largest number of articles (49) appeared in 2006, closely followed by 2005 with a total count of 46 articles. Prior to 1996, a low number of articles appeared in each year, with no articles at all appearing in our selected journals during some years. While it may be argued that the increasing number of articles appearing post 1996 illustrates increasing levels of interest and research activity in the subject area, the lack of articles prior

to this time may be attributed to a number of reasons, including the fact that not all journals in our search list were being published in each year. This point is particularly applicable to the earlier years considered.

Year	*Article Count (n=345)*	*% of 345*	*Year*	*Article Count (n=345)*	*% of 345*	*Year*	*Article Count (n=345)*	*% of 345*
2007	39	11.30	1999	14	4.06	1991	2	0.58
2006	49	14.20	1998	18	5.22	1990	1	0.28
2005	46	13.33	1997	16	4.64	1989	2	0.58
2004	28	8.12	1996	5	1.45	1988	1	0.28
2003	36	10.43	1995	10	2.89	1987	0	0
2002	18	5.22	1994	6	1.74	1986	3	0.87
2001	23	6.67	1993	0	0	1985	2	0.58
2000	22	6.38	1992	4	1.16			

Table 3. Adoption & Diffusion Studies Published between 1985-2007

4.3 Adoption & Diffusion Studies According to Country

Our findings (illustrated in Table 4) disclose that the research presented in the 345 publications we identified on adoption and diffusion was conducted in 31 countries. By far the largest amount of published activity has taken place in the USA, with a number of others countries (including the UK, China, Australia, Canada, Singapore and Taiwan) also being the location of a substantial amount of research activity which has resulted in publications that appeared in our search results.

Country	*Article count*	*Country*	*Article count*	*Country*	*Article count*
USA	207	Spain	4	Malaysia	2
UK	38	Finland	3	Portugal	2
China	30	Germany	3	South Africa`	2
Australia	19	Greece	3	Sweden	2
Canada	18	Israel	3	UAE	2
Singapore	14	New Zealand	3	Brazil	1
Taiwan	14	Norway	3	France	1
South Korea	9	India	2	Switzerland	1
Denmark	8	Ireland	2	Thailand	1
Netherlands	5	Italy	2	Turkey	1
Hong Kong	4				

Table 4. Adoption & Diffusion Studies According to Country

A number of countries (including France, India and Ireland) have been the location of research which has resulted in a low number of publications, and given the overall level of research activity in such countries, and indeed the supposed high-profile of ICT, this is perhaps a surprising result and indicates that there is opportunity for additional research based in such counties to take place in order to further expand the existing knowledge base.

4.4 Authors Actively Involved in Publishing Adoption & Diffusion Research

Table 5 lists the authors actively involved in conducting and publishing adoption and diffusion related research in the IS area. It appears that the most productive author in adoption and diffusion research (in terms of journal publications across the journals in our search) is Chau with nine articles, closely followed by two authors, Tam and Venkatesh, both with seven articles each. Thereafter seven authors contributed four articles each and 25 authors contributed three articles each. A further 51 authors contributed two articles each, while 414 authors published just one article in the set of journals comprising our search data. Due to space limitations these authors are not listed here, but interested readers may find them and other information relating to the development of this paper at: http://aadref.googlepages.com/home

Author	*Article count*	*Author*	*Article count*	*Author*	*Article count*
Chau, PYK	9	Bhattacherjee, A	3	Morris, MG	3
Tam, KY	7	Choudrie, J	3	Ngai, EWT	3
Venkatesh, V	7	Davis, FD	3	Premkumar, G	3
Brown, SA	4	Dwivedi, YK	3	Pries-Heje, J	3
Damsgaard, J	4	Fichman, RG	3	Rai, A	3
Kauffman, RJ	4	Gefen, D	3	Riemenschneider, CK	3
Kraemer, KL	4	Hong, WY	3	Shao, YP	3
Lai, VS	4	Igbaria, M	3	Straub, DW	3
Lyytinen, K	4	Karahanna, E	3	Teo, TSH	3
Zhu, K	4	Lee, J	3	Tung, LL	3
Agarwal, R	3	Lou, H	3	Wang, YM	3
Benbasat, I	3	Lu, J	3		

Table 5. Authors Actively Involved in Publishing Adoption & Diffusion Research

4.5 Adoption & Diffusion Studies According to Institution

Table 6 identifies the institutions apparently most active in the area of adoption and diffusion research. The overall number of contributions from each university varies from 1 to 13. Clearly Georgia State University (with 13 publications) has contributed the largest number and can therefore be seen a leading centre of adoption and diffusion related research. Georgia State University is closely followed by the National University of Singapore (with 11 outputs).

University	*Article count*	*University*	*Article count*
GEORGIA STATE UNIV	13	MISSISSIPPI STATE UNIV	5
NATL UNIV SINGAPORE	11	UNIV COLORADO	5
HK UNIV SCI & TECHNOL	9	UNIV HOUSTON	5
UNIV MINNESOTA	9	UNIV N CAROLINA	5
UNIV ARKANSAS	8	UNIV S FLORIDA	5
UNIV HONG KONG	8	BOSTON COLL	4
INDIANA UNIV	7	DREXEL UNIV	4
UNIV ARIZONA	7	FLORIDA STATE UNIV	4
UNIV CALIF IRVINE	7	IOWA STATE UNIV	4
UNIV WISCONSIN	7	MIAMI UNIV	4
BRUNEL UNIV	6	OHIO UNIV	4
CITY UNIV HONG KONG	6	TEXAS TECH UNIV	4
SO ILLINOIS UNIV	6	UNIV ALABAMA	4
UNIV BRITISH COLUMBIA	6	UNIV MELBOURNE	4
UNIV MARYLAND	6	UNIV MICHIGAN	4
UNIV TEXAS	6	UNIV SHEFFIELD	4
CHINESE UNIV HK	5	UNIV TOLEDO	4
HK POLYTECH UNIV	5	UNIV VIRGINIA	4

Table 6. Source of Adoption & Diffusion research Resulting in Journal Publications

A number of other institutions have also been the source of a noteworthy number of publications over the years, including the Hong Kong University of Science and Technology (nine publications), the University of Minnesota (also with nine publications) and the Universities of Arkansas and of Hong Kong (each being the source of eight publications). Table 6 illustrates that four universities contributed seven articles each, followed by six universities each contributing six articles. A further seven universities contributed five articles each, while 13 universities were the source of four articles each. All of these institutions are identified in Table 6. A further 23 universities (not listed) contributed three articles each, while 62 universities contributed two articles each. Finally, 189 universities were the source of just one article . Again, due to space limitations institutions producing

less than four articles over the period under study are not listed in Table 6, but interested readers may find them and other information relating to the development of this paper at: http://aadref.googlepages.com/home.

It can be seen that the largest amount of research activity resulting in journal publications has occurred within universities in the USA, and to an extent, within institutions based in Hong Kong. It is interesting to note that only three European universities appear in our list (Brunel and Sheffield), both of which are in the UK. Extending the list to include the 23 universities contributing three articles each increases the number of European universities present to four (adding Cranfield and Aalborg), and introduces three Australian universities (the University of New South Wales, Curtin University of Technology, and Edith Cowan University joining the already present University of Melbourne). However, the extended list is again largely dominated by additional USA-based institutions. Two Canadian universities appeared in our results, the University of British Columbia (listed in Table 6), being joined by the University of Calgary from the 23 institutions contributing three articles each. Our results therefore provide a strong indication that adoption and diffusion research resulting in journal publications takes place primarily in the USA and Hong Kong, with comparatively lower levels of activity (to date) taking place elsewhere.

4.6 Adoption, Acceptance or Diffusion?

Although the findings presented thus far include the total 345 articles identified from our search activities, hereafter only a total of 301 articles provide the basis for the basis for profiling adoption and diffusion research output. At this stage, all articles from *CACM* and a number of articles from other outlets were necessarily eliminated due to the non-availability of abstracts for analysis. The primary reason for excluding the *CACM* articles from the analysis being that format and content of articles as published differ from other IS journals, and hence, it is often difficult to extract methodological and theoretical information from them. Three keywords 'Adoption', 'Acceptance', and 'Diffusion' were employed to search published output for this study. The keyword 'Adoption' was used by the largest number of articles (178, 59.1%) followed by 'Acceptance' (81, 26.9%) with the term 'Diffusion' being employed by the least number of items appearing in our search results (42, 14%).

4.7 Adoption & Diffusion Studies According to Unit/Level of Analysis

The results of our exploration into the most common forms of unit of analysis suggest that the majority of articles (105, 34.9%) appearing in our search results examined adoption and diffusion issues at the organizational level, followed by studies focusing upon user level (92, 30.6%), consumer level (42, 14%), SMEs (26, 8.6%), subject/theory/tool/system (20, 6.9%), country level (7, 2.3%) and industry level (4, 1.3%) adoption and acceptance of IS/IT. Far fewer articles were found to examine adoption and diffusion in the context of stakeholders (3, 1%), households (3, 1%), and groups/teams (2%). For three papers, the units of analysis were other than these.

4.8 Adoption & Diffusion Studies According to Research Paradigm

Our findings clearly indicate that positivism (used in 225, 74.8% articles) is the dominant form of research paradigm amongst adoption and diffusion researchers, followed some way behind by the interpretive paradigm (being employed in 42, 14% articles). We have labelled the third category 'Descriptive/Conceptual/Theoretical' and it includes papers (27, 9%) that do not neatly fit into either positivist or interpretive categories, primarily comprising articles based on literature reviews, personal view points, or studies that are highly conceptual in nature. For seven (2.3%) articles, the paradigm was unclear and hence was not apparent if they should be placed in either positivist or interpretive category.

4.9 Research Methodology: Empirical vs. Non Empirical

A large proportion of articles considered during our investigation (273, 90.7%) were empirical in nature, in comparison to articles that fell within the non-empirical category (23, 7.6%). However, for

five (1.7%) articles it was not possible to determine if they were empirical or non empirical in nature, due to the lack of relevant information provided.

4.10 Research Methodology: Quantitative vs. Qualitative

Our findings suggest that the quantitative approach has dominated adoption and diffusion research within the IS discipline. A total of 195 (64.8%) articles employed a quantitative approach (which also includes descriptive quantitative articles) in comparison to the qualitative approach which was employed by only 68 (22.6%) articles and conceptual/theoretical/metal-analysis by 26 (8.6%) articles. Four (1.3%) articles employed a mix of data types, while for eight (2.7%) studies it was not possible to determine the primary approach employed.

4.11 Research Methods

Table 7 illustrates that although 12 different research methods were recorded during our data analysis activities, the majority of studies (173, 57.5%) within our results employed survey methods. The other major approach was the case study, which was used in 46 (15.3%) articles. Other approaches identified include literature review/conceptual/meta-analysis (29, 9.6%), field study (11, 3.7%), interview (7, 2.3%), mathematical model (6, 2%), and multi-method (6, 2%),. All remaining categories were employed by very few studies, with only one article employing action research.

Research Method	*Count (n=301)*	*%*	*Research Method*	*Count (n=301)*	*%*
Survey	173	57.5	Laboratory experiment	3	1.0
Case Study	46	15.3	Secondary Data Analysis	3	1.0
Literature analysis/ Conceptual/Meta-analysis	29	9.6	Field experiment	2	.7
Field Study	11	3.7	Content Analysis	2	.7
Interview	7	2.3	Action research	1	.3
Mathematical model	6	2.0	Not Known	12	4.0
Multi-method	6	2.0			

Table 7. Research Methods

4.12 The Technology Examined

Table 8 lists the diverse range of technologies examined in the 301 publications that formed our search results. It is clear from Table 8 that the scope is broad, and to an extent, reflects the emergence of different technologies over the period under consideration. In order to organise the technologies effectively we have grouped them in the following broad categories; communication, electronic commerce, information systems, information technologies, internet, mobile and website. The figures in parentheses indicate the number of articles in each case, and it can this be seen that the IS category has been most widely studied, followed by electronic commerce related issues. The least studied broad area to date appears to be that of mobile technology, although our results reveal a range of technologies, applications and contexts which appear to have received little investigative attention.

Category	*Technology/System*
Communication (15)	Communication Standards (1); Email (9); Fax (1); Instant Messaging/Wireless SMS (3); High Speed Data Services (1)
Electronic Applications & Technologies (74)	B2B Exchanges (1); B2B Marketplaces (1);B2B Portals (1); B2B, P2P and e-Speak (1);C2C Auction System/Online Escrow Services (1);E-banking/Internet Banking/Electronic Billing/Virtual Banking (7);E-Business/E-Business Technologies (7);E-Commerce/E-Shopping/E-Commerce Technologies (25);E-Marketplace (2);Electronic Service (1); Electronic Tax Filing (1);Electronic Trading (3); Price Comparision Shopping (1);EDI (9);E-Learning System and technology (2);E-Government/E-Gov Services/E-Voting (5); Electronic Health Records (EHRs)/Electronic Patient Record (EPR) (2); Application Service Oriented Medical Records (1);E-Sales, C-Procurement (1);Products in Electronic Markets

	(1);Proprietary and Open Systems (1)
Information Systems/ Systems/IS Development / IS Management (80)	Agile Adoption Practices (1); Application Service Provision (ASP) (1); BPR (2); B2B Eprocurement System (1); Business to Business Ordering System (1); CASE (8);Client Server Systems (1);Computer-based Information Systems (1);CRM (2);Design Methodologies of Component Based Architecture (1);Document Management System (1);DSS&TPS (1) ;End-user Computing (1);Enterprise Application Integration (EAI) (1);Enterprise Digital Transformation (1);Enterprise Level Systems (1); Enterprise Resource Planning (ERP) (8);Expert Systems and Expert Systems in Banking Industry (5);Expert Systems Advice (1);Group Support Systems (GSS) (2);Groupware (1);Lotus Notes (1); Healthcare Information Systems and Healthcare Information Technology (HIT) (3);Information Systems (6);Sales Information Systems (1);Hedonic Information Systems (1); Securities Trading Systems (1);IOS (2);IS Development Methods (ISDMs) (1);IS Process Innovation (1);EIS (4);Knowledge (1);Office Suite Applications - Spreadsheet, Database, Word, Graphics (2);Open Systems (2); Recommendation Agent (1); Outsourcing (3); Systems (2); System Development Methodology (1);System/Technology Use (1);User Involvement (1); Volitional/Voluntary Systems (1);Software System (1); Electronic Brain Storming (1); Software Development Tool (1); Software Re-use (2); Virtual Community Service – Avatar (1);Visual Information (1);Telecommuting (2)
Information Technology/ ICT/ Technology/ Software (70)	Advanced Manufacturing Technology (1);Broadband and Broadband Mobile Services (7);Collaborative Information Technology (1); Data warehouse (3); DBMS & Distributed DBMS (3);Digital Library (1); Family Technology Resource Center (1);IT (17); IT in Education (1); IT Innovation (2); Mandated IT (1);IT Platform (1); ICT (3); Personal Computer (PC)/Personal Computing (6); Tablet PC (1); Radio Frequency Identification (RFID) (1); Public Grid Computing (1); Self-Service Technology (1); Commercial Software Packages (1); Windows technology (1); Smart Card-based Payment Systems/micro payment infrastructure (2); Telemedicine Technology (4); Videotex newspaper (1);Knowledge Management Technologies (1); Object-oriented Technologies/Object technology (2); Tech. Mediated Distance Education (TMDE) (1); Technological Innovations (1);Technology (2);ATM (2)
Internet/Online (26)	Internet (11);Internet-based product customisation (1);Internet Based Learning Medium (ILM) (1); Internet Retailing (1);ISPs (1);Internet Standards - IPv6 (1);Intranet (1);ISDN-Integrated Services Digital Network (1);National Infrastructure (1);On-line Learning Systems (1);Online Consumer Behaviour (1);Online Investing (1);Online Retailing (1);Online Services (1); Online Shopping (1);Online stock trading (1)
Mobile (11)	3G Mobile Computing Device (1);Mobile (Cell) Phone Banking (1);Mobile Broadband Wireless Access Technology-Based (MBWA) games (1); Mobile Commerce (3);Mobile ICT Adoption (1); Mobile Internet (1);Multi-purpose Information Appliances-Mobile Data Services (1);Wireless Internet Service via Mobile Technology (WIMT) (2);
Website (16)	Web-based Training (WBT) (1);Web Services (1);Websites (8);Websites-Information Searching (1);Website-Women-centric (2);Intermediary Website (1);Infomediaries Websites (1); Business Homepage (1)

Table 8. Technologies Examined

4.13 Theories/Models and Theoretical Constructs

TAM has emerged as the most popular theory with 88 (29%) studies employing it, followed by DoI theory which was used in 49 (16.3%) publications. The third largest category was TPB which was utilised in 17 studies, followed by TRA and SE, each contributing eight studies. 47 other theories and 182 theoretical constructs were recorded from the various studies. These are not listed here due to space limitations, but again, interested readers may find the complete list at: http://aadref.googlepages.com/home. The large number of theories and theoretical constructs employed clearly indicates the diversity of adoption and diffusion research in the IS research

5 SUMMARY AND CONCLUSIONS

Our intention in this paper has been to provides an overview of the current state of adoption, acceptance and diffusion research in IS by presenting the results of a systematic and comprehensive review of 345 articles appearing across 19 different peer-reviewed journals during the period 1985-2007. We have presented the results of our investigation along a series of dimensions including the journals most often publishing articles on IS/IT adoption, acceptance and diffusion, authors most active in the subject area (in terms of articles published), the most commonly used units of analysis, methodological practice and use of primary data, the theories and theoretical constructs utilised, and contexts and technologies examined. Our intention in conducting our investigation is to provide a useful and usable resource for future researchers. In keeping with previous 'state of play' studies of this nature, we posit that our findings highlight 'promising lines of inquiry as well as those that are neglected and in need of renewed attention' (Palvia and Pinjani, 2007). Furthermore we argue that the findings of this study may help in directing limited and valuable research resources to fruitful lines of inquiry (Palvia and Pinjani 2007) as well as strengthening the area of research by facilitating consideration of less used but useful alternative theoretical and methodological perspectives.

Although the three keywords 'Adoption', 'Acceptance', and 'Diffusion' are often used interchangeably by IS researchers, our results suggest that 'Adoption' is preferred over other two terms. It may be an aim of further research to examine what determines the use of one of these three terms over the other. When considering research in terms of the research paradigm, the positivist approach is currently employed to a much greater extent than both the interpretive and descriptive/theoretical approaches. This provides a clear indication that adoption and diffusion researchers tend to neglect other paradigms, which has implications for editors, reviewers and authors. Similarly, the utilisation of empirical and quantitative techniques and survey research methods appears to have been much preferred over other available alternatives. It is clear that a rich diversity of theories and theoretical constructs exist within the extant literature, but researchers to date have overwhelmingly made use of just one theory; 'TAM', and its associated constructs 'perceived usefulness' and 'perceived ease of use'. This suggests that IS/IT adoption and diffusion research is gradually moving toward overall homogeneity, which is likely to weaken the field of technology adoption research. Therefore, we believe there are clear messages for authors to make greater use of the theoretical and methodological variety available to them, and for journal reviewers and editors to support the use of such alternative approaches, otherwise adoption and diffusion research itself will diffuse only within a limited domain. We anticipate this paper will prove to be a useful source of information for those readers who wish to learn more about the various facets pertaining to the existing body of published technology adoption and diffusion research in IS journals. Moreover, readers also may benefits by becoming aware how the various research approaches/methods fit with the different theories/models and units of analysis.

However, we fully acknowledge that our study has a number of limitations, and readers should be aware of these and indeed interpret the material presented in this paper within the context of these limitations. Firstly, our search activities were restricted to occurrences of the three keywords in the article titles only, and we fully acknowledge that there may be numerous studies which lack all three keywords in the title, but still focus upon adoption and diffusion in the main text. For example, the works of Benbasat, I. and Barki, H. (2007) and Lucas, H.C., Swanson, E.B. and Zmud, R.W. (2007) focus upon on adoption and diffusion, but they did not appear in our search results as they lack all three keywords in the title. A further limitation is the overall number of journals considered. We limited our search to 19 journals indexed in Web of Science®, but there are many well known journals in the IS field that are not indexed in this product, and this clearly will have limited our ability to identify all relevant articles, although further research is required to determine the extent of the influence of such factors. Although we believe that this paper has analysed the largest number of articles in comparison to other existing review articles on this theme, we believe that yet comprehensive research is required in order to reduce the impact of the limitations we have identified in order to provide a greater understanding of the domain of IS/IT adoption research.

References

NOTE: Due to space limitations, references analysed for the review are not be listed here, but interested readers find them and other information relating to the development of this paper at: http://aadref.googlepages.com/home

Avison, D, Dwivedi, Y.K., Fitzgerald, G. and Powell, P. (2008). The beginnings of a new Era: Time to reflect on 17 years of the *ISJ*. Information Systems Journal, 18 (1), 5-21.

Bagozzi, R.P. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift. . Journal of the Association for Information Systems, 8 (4), 244-254.

Benbasat, I. and Barki, H. (2007). *Quo vadis*, TAM? Journal of the Association for Information Systems, 8 (4), 211-218.

Choudrie, J. and Dwivedi, Y. K. (2005) Investigating the research approaches for examining the technology adoption in the household, Journal of Research Practice, 1, 1, D1, 1-12, available at http://jrp.icaap.org/content/v1.1/choudrie.pdf

Dwivedi Y.K., Choudrie J., and Brinkman, W.P. (2006) Development of a survey instrument to examine consumer adoption of broadband, Industrial Management and Data Systems, 106 (5), 700-718.

Galliers, R. D. (1992). Choosing information systems research approaches. In R. D. Galliers (ed.), *Information Systems Research: Issues, Methods and Practical Guidelines* (p. 144). Oxford: Blackwell Scientific.

Galliers, R.D., and Land, F. F. (1987). Choosing an appropriate information systems research methodology. Communications of the ACM, 30 (11), 900-902.

Hirschheim, R. (2007). Introduction to the Special Issue on "Quo Vadis TAM- Issues and Reflections on Technology Acceptance Research". Journal of the Association for Information Systems, 8 (4), 203-205.

Jeyaraj, A., Rottman, J.W. and Lacity, M.C. (2006). A review of the predictors, linkages, and biases in IT innovation adoption research. Journal of Information Technology, 21**,** 1-23.

King, W.R. and HE, J. (2006). A meta-analysis of the technology acceptance model. Information & Management, 43**,** 740-755.

Legris, P., Ingham, J. and Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. Information & Management, 40, 191-204.

Lucas, H.C., Swanson, E.B. and Zmud, R.W. (2007). Implementation, Innovation, and Related Themes Over the Years in Information Systems Research. Journal of the Association for Information Systems, 8 (4), 206-210.

Lyytinen, K., Baskerville, R., Iivari, J. and Te'eni, D. (2007). Why the old world cannot publish? Overcoming challenges in publishing high-impact IS research. European Journal of Information Systems, 16 (4), 317-326.

Mingers, J. (2003). The paucity of multi-method research: a review of the information systems literature. Information Systems Journal, 13, 233-249.

Palvia P and Pinjani, P (2006). A profile of information systems research published in the Information & Management. Information & Management, 44, 1-11.

Silva, L. (2007). Post-positivist review of technology acceptance model. Journal of the Association for Information Systems, 8 (4)**,** 255-266.

Schwarz, A. and Chin, W. (2007). Looking forward: Toward an Understanding of the Nature and Definition of IT Acceptance. . Journal of the Association for Information Systems, 8 (4), 230-243.

Venkatesh, V. (2006). Where to go from here? Thoughts on future directions for research on individual-level technology adoption with a focus on decision making. Decision Sciences, 37**,** 497-518.

Venkatesh, V., Davis, F.D. and Morris, M.G. (2007). Dead or alive? The development, trajectory and future of technology adoption research. Journal of the Association for Information Systems, 8**,** 267-286.