RESEARCH IN INFORMATION SYSTEMS PAST AND FUTURE DIRECTION (2000-2014)

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Abstract- The field of information system (IS) is continuously experiencing rapid changes over past few decades. Advancement in any discipline relies on the existing knowledge and understanding of the strategic direction pursued by scholars in the field. For this very reason, from time to time, investigators have conducted meta-research as a way to periodically report on IS research. This research aims to answer the following questions: What are the significant contributions and dominant research themes in IS discipline between 2000 and 2014? How has the focus of the research themes changed during this period? What are the emerging themes which likely set the direction of the future research in IS? To answer these questions a citation analysis was used and the main research themes on top 100 highly cited articles of three top IS journals were analyzed. The findings of this research can help IS researchers to know the predominant research themes in the past and its trend in future and can direct our limited resources to best practices and better contribute to the discipline.

Index Terms- Citation Analysis, Information System, Meta analysis, Thematic analysis

I. INTRODUCTION

Information Systems (IS) discipline is a relatively new field of study which has evolved for less than four decades. The field of IS is continuously experiencing rapid changes over past few decades. It addresses a wide range of topics such as, electronic commerce, information technology (IT) adoption, business value of IT, IS planning, IS outsourcing, security etc. Advancement in the discipline relies on the existing knowledge and understanding of the strategic direction pursued by scholars in the field. For this very reason, from time to time, investigators have conducted meta-research as a way periodically to report on IS research. Glass, McGaw [1] define meta-analysis as the statistical analysis of a large collection of analysis results for the purpose of integrating the findings. Despite the rapid changes, few research articles have explored the historical shifting in the research focus in IS discipline.

Alavi and Carlson [2] reviewed 908 research articles published in eight IS journals between 1968 and 1984 and found three popular research topics namely Popular research topics: 1. IS management 2. Information system types and characteristics and 3. Development and operation of systems. The most comprehensive works on research focus in IS domain have been done by Palvia, Ilinitch [3] and an update in [4]. Table 1 presents the list of the research articles focusing on the research topics and themes in IS discipline. Yet, the IS discipline has substantially evolved since 2004. Since then, the focus of IS research has shifted and new domains such as cloud computing, social media, mobile commerce etc. have emerged. Therefore, it is time to hold back and ask where is IS heading to? What is the main focus of the IS discipline? Hence, this paper aims to investigate these questions. It would be useful and important for IS researchers to know the predominant research themes in the past and its trend in future. By looking at the main focuses in IS filed we can direct our limited resources to best practices and better contribute to the discipline.

For this reason, this research article conducts a meta-analysis on three leading journals in IS domain between 2000 and 2014. The choice of this period, allows us to analyze a substantial period of IS research. Therefore, this study is motivated by the following main questions:

1. What are the significant contributions and dominant research themes in IS discipline between 2000 and 2014?
2. How has the focus of the research themes changed during this period?
3. What are the emerging themes which likely set the direction of the future research in IS?

Addressing the above research questions would provide us a better and more comprehensive understanding of the trends in IS discipline.

II. METHOD

The current study analyzes the main themes of articles published between 2000 and 2014 in Information and Management (I&M), Management Information Systems Quarterly (MISQ), and Journal of Management Information Systems (JMIS). These journals are ranked as most prestigious IS journals in a number of research articles such as Gillenson and Stutz [8], Holsapple [9], Claver, Gonzalez [5], Palvia, Ilinitch [3], and [4]. To address the first research question a citation analysis was used to identify the

most cited research articles among the three journals between 2000 and 2014. To address the rest of the research questions a comprehensive content analysis was conducted.

Table 1 Literature on Research Theme

Authors	Time period	Number of journals covered	Number of articles covered	Key findings
(Alavi and Carlson, 1992)	1968–1988	8	908	Popular research topics: 1. IS management 2. Information system types and characteristics and 3. development and operation of systems
(Palvia *et al.*, 2004)	1993–2003	7	1226	System usage and information systems resource management as top rank topics in MIS
(Claver *et al.*, 2000)	1981-1997	2	1121	31 research topics
(Farhoomand and Drury, 1999)	1985-1996	8	2098	In total 9 research themes were identified. Almost 70% of the published articles relate to four research themes: reference disciplines, IS management , IS development and operations and Information Systems.
(Vessey *et al.*, 2002)	1995-1999	5	488	8 main research themes were identified.

A. Data Collection

The analysis is mainly focused on the articles (excluding editorials, proceedings, and reviews) published in three IS journals between 2000 and 2014. During the time period examined, 1862 articles were published in three leading journals with total of 68447 citations. Of these, 100 articles (5.4%) were cited 27562 (40%) times. Table 2 presents the number of articles published in each journal. The last two columns of Table 2 present the distribution of top 100 articles.

Table 2 Number of Articles for Each Journal

Journal	Total Articles [1] between 2000-2014	Percentage	Top 100 cited Articles	Percentage
Information & Management	845	45.4	36	36
Journal Of MIS	547	29.4	20	20
MIS Quarterly	470	25.2	44	44
Total	1863	100	100	100

A citation analysis was employed to identify the top 100 most cited articles during the time period. Citation analysis can be used to address the first research question in this research. Citation analysis counts the number of times a research article has been cited by other scholars.

Higher citations can mean greater contribution and impact in the discipline. Citation Analysis for articles is available on different databases such as Web of Science, Google Scholar, BioMed Central, and PLoS. In the current study the Social Science Citation Index (SSCI) provided by Web of Science was employed to identify the most cited articles published in the three journals over the period of 2000 and 2014. SSCI includes 6.4 million records of 2,697 social science journals across 55 disciplines.

On 10th of July 2015 the citation results of the articles published in the three journals during the designated time span were extracted. Table 3 shows the top twenty most frequently cited articles between 2000 and 2014 in three leading IS journals. The minimum of 271 citations to these articles shows the importance of these articles in information systems discipline.
As shown in Table 3, of 100 articles, two articles of Venkatesh, Morris [10] and DeLone and McLean [11] were cited 4431 times accounting for 16 percent of total citations.

Venkatesh et al. work [10] on user acceptance of information technology published in MIS Quarterly, with 3044 citations is most cited article in the three journals during 2000 and 2014.
In this article, through reviewing and empirically comparing eight prominent IT acceptance models, Venkatesh, Morris [10] proposed and validated a unified model of technology acceptance. This is followed by the work of DeLone and McLean [11] with 1387 citations published in Journal of Management Information Systems. In this paper, DeLone and McLean review 10 years research on their

IS Success Model and proposed an updated DeLone and McLean IS Success Model.

Table 3 Top twenty most cited articles: 2000-2014 (as of July 10th 2015)

No. of citations	Article
3044	Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D., (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27 (3), 425-478.
1387	DeLone, W. and McLean, E., (2003). The DeLone and McLean model of information systems success: a ten-year update. Journal of Management Information Systems, 19 (4), 9-30.
833	Bhattacherjee, A., (2001). Understanding information systems continuance: An expectation-confirmation model. MIS Quarterly, 25 (3), 351-370.
807	Wasko, M. M. and Faraj, S., (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. MIS Quarterly, 29 (1), 35-57.
726	Agarwal, R. and Karahanna, E., (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. MIS Quarterly, 24 (4), 665-694.
685	Moon, J. W. and Kim, Y. G., (2001). Extending the TAM for a World-Wide-Web context. Information & Management, 38 (4), 217-230.
521	Kankanhalli, A., Tan, B. C. Y. and Wei, K. K., (2005). Contributing knowledge to electronic knowledge repositories: An empirical investigation. MIS Quarterly, 29 (1), 113-143.
513	Ba, S. L. and Pavlou, P. A., (2002). Evidence of the effect of trust building technology in electronic markets: Price premiums and buyer behavior. MIS Quarterly, 26 (3), 243-268.
446	Petter, S., Straub, D. and Rai, A., (2007). Specifying formative constructs in information systems research. MIS Quarterly, 31 (4), 623-656.
439	van der Heijden, H., (2004). User acceptance of hedonic information systems. MIS Quarterly, 28 (4), 695-704.
360	Okoli, C. and Pawlowski, S. D., (2004). The Delphi method as a research tool: an example, design considerations and applications. Information & Management, 42 (1), 15-29.
351	Wu, J. H. and Wang, S. C., (2005). What drives mobile commerce? An empirical evaluation of the revised technology acceptance model. Information & Management, 42 (5), 719-729.
346	Pavlou, P. A. and Fygenson, M., (2006). Understanding and predicting electronic commerce adoption: An extension of the theory of planned behavior. MIS Quarterly, 30 (1), 115-143.
336	Hsu, C. L. and Lu, H. P., (2004). Why do people play on-line games? An extended TAM with social influences and flow experience. Information & Management, 41 (7), 853-868.
314	Liu, C. and Arnett, K. P., (2000). Exploring the factors associated with Web site success in the context of electronic commerce. Information & Management, 38 (1), 23-33.
312	Teo, H. H., Wei, K. K. and Benbasat, I., (2003). Predicting intention to adopt interorganizational linkages: An institutional perspective. MIS Quarterly, 27 (1), 19-49.
304	Subramani, M., (2004). How do suppliers benefit from information technology use in supply chain relationships? MIS Quarterly, 28 (1), 45-73.
301	Benbasat, I. and Zmud, R., (2003). The identity crisis within the IS discipline: Defining and communicating the discipline's core properties. MIS Quarterly, 27 (2), 183-194.
279	Reich, B. and Benbasat, I., (2000). Factors that influence the social dimension of alignment between business and information technology objectives. MIS Quarterly, 24 (1), 81-113.
271	Chen, L. D., Gillenson, M. L. and Sherrell, D. L., (2002). Information & Management, 39 (8), 705-719.

A. Research Theme

In terms of theme classifications Barki, Rivard [12] developed the most comprehensive list of scheme list in Management information systems (MIS) field. The scheme list includes 1300 keywords in nine categories. However, for the purpose of this study the research themes developed by Palvia, Leary [4] were used. Table 4 presents thirty three research themes developed by Palvia, Leary [4]. While the article title and the keywords can provide clues to the theme area, our examination indicated that this was not always accurate, especially in identifying the research theme for each individual article. Therefore, the abstract and whole article was reviewed to identify the most relevant theme for each article. It is also acknowledged that each article may deal with multiple themes however, for the purpose of this study the aim is to identify the main focus in each article. Therefore for each article one research theme was extracted through reading the article abstract, article title and keyword provided by authors.

DISCUSSION

Among the list of 20 highly cited articles, five articles focused on IS Development, Methods and Tools. These articles are Moon and Kim [13], Chen, Gillenson [14], Pavlou and Fygenson [15], Petter, Straub [16], and Van der Heijden [17]. Table 5 shows the distribution of research theme during the time frame of this study. Out of original 34 research themes only eight themes have been the main focus of the 100 highly cited articles.

Table 4 the list of research themes by Palvia et al. (2004)

Code	Theme
1	IS usage
2	Resource management/IS management
3	Electronic commerce/EDI
4	IS development/methods and tools
5	IS evaluation
6	Artificial intelligence/expert system/neural
7	Networks/knowledge management
8	Group decision support systems
9	Internet
10	IS research
11	Global information technology
12	End user computing
13	IS staffing
14	Organizational design/BPR/workflow systems
15	IS planning
16	IS implementation
17	Internal/external environment
18	Media and communications
19	Supply chain management (SCM)/ERP
20	IT value
21	Software/programming languages
22	Innovation
23	Decision support systems
24	IS function application
25	Networks/telecommunications
26	Databases/DBMS
27	Outsourcing
28	Multimedia
29	Security
30	Executive information systems
31	Theory of MIS
32	IS education
33	Customer relationship management (CRM)
34	Hardware

The top three dominant research themes are IS development/methods and tools (19 articles), Networks/knowledge management (9 articles), Customer relationship management (CRM) (8 articles). Apart from the two articles in 2003 the only article which focused on the Theory of MIS is Venkatesh, Thong [18] which is extending the unified theory of acceptance and use of technology (UTAUT2). Despite the fact that it was published in 2012 it has been cited 165 times (an average of 41.3 cites per year).

Low number of highly cited articles on MIS theory might be an indication that IS researchers prefer to use the current theories rather than developing new ones. The least cited article is on IS implementation by Lapointe and Rivard [19]. This might be due the intensive research conducted on the implementation of information systems.

To further investigate the changes on the main focus on research theme, a citation analysis was conducted on top 20 cited articles (see Figure 1). As it is shown in Figure 1 the time span of top 20 articles is between 2000 and 2007. The last article which has been highly cited is Petter, Straub [16]. This figure depicts the articles with high citation along with the research theme over the period of the study.

Interesting insights can be obtained by analyzing Figure 1. In the first half of this period (2000-2003) three articles mainly focused on IS Research which are on cognitive absorption and belief [20], on information systems continuance [21], and on the identity crisis within the IS discipline [22]. This status has changed in the second half of the period (2004-2007) in which two articles, [23, 24] published within the areas of Network and Knowledge Management. More interestingly, in both periods, there were five articles on IS Development/Methods and Tools which have been consistently cited over the study period. It may indicate the overall interest among IS researchers in using the appropriate tools and methods in conducting research in IS field. It can be concluded that there is high chance that the themes in the second half of this period will be significant research activity among IS researchers in near future.

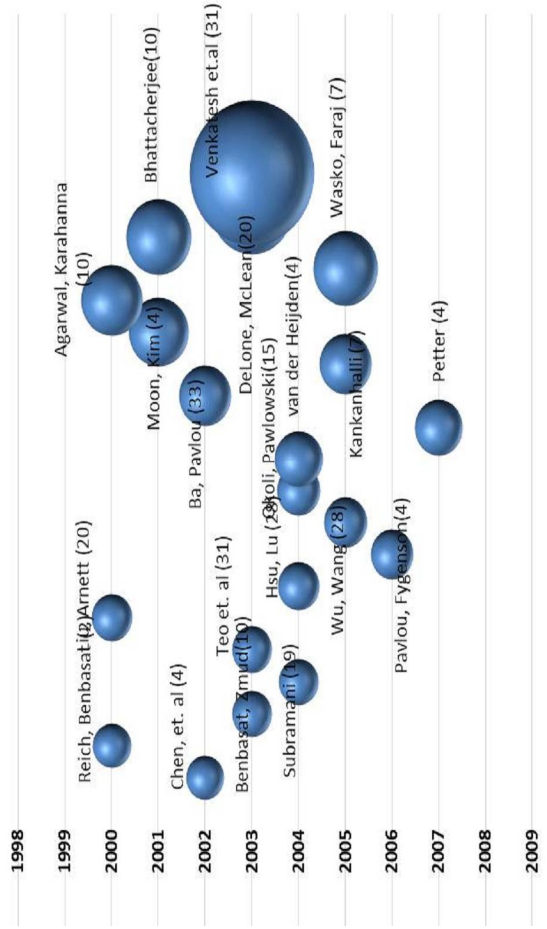


Fig 1 Distribution of highly cited articles, number in bracket shows the research theme (see Table 4)

Table 5 The Distribution of Research Theme among Top 100 Cited Articles 2000-2014 (as of July 10th 2015)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2012	Total
Customer relationship management (CRM)	0	1	3	0	0	1	2	0	0	0	1	0	8
Databases/DBMS	0	1	0	0	0	0	0	0	0	0	0	0	1
Electronic commerce/EDI	0	1	1	0	2	0	0	1	0	0	0	0	5
Internal/external environment	0	1	0	1	0	0	0	0	0	0	0	0	2
IS development/methods and tools	1	3	4	4	3	0	2	1	0	1	0	0	19
IS education	0	1	0	1	1	2	0	0	0	0	0	0	5
IS implementation	0	0	0	0	0	1	0	0	0	0	0	0	1
IS planning	1	1	0	0	1	0	0	0	0	0	0	0	3
IS research	2	1	1	1	0	2	0	1	0	0	0	0	8
IT value	2	0	0	2	2	1	0	0	0	0	0	0	7
Media and communications	1	1	0	0	0	0	0	0	1	0	0	0	3
Multimedia	0	0	0	0	1	2	1	2	0	0	0	0	6
Networks/knowledge management	0	4	0	1	1	2	0	0	1	0	0	0	9
Organizational design/BPR/workflow systems	1	0	1	1	0	0	0	0	0	0	0	0	3
Outsourcing	0	1	0	1	0	0	0	0	0	0	0	0	2
Resource management/IS management issues	1	0	0	0	0	1	0	0	0	0	0	0	2
Software/programming languages	1	0	2	0	0	0	3	0	0	0	0	0	6
Supply chain management (SCM)/ERP	0	0	3	0	2	2	0	0	0	0	0	0	7
Theory of MIS	0	0	0	2	0	0	0	0	0	0	0	1	3
	10	16	15	14	13	14	8	5	2	1	1	1	100

Another question was whether there is any differences in research themes across journals. Hence, the chi-square ($\chi 2$) test of independence between two factors was used. The $\chi 2$ statistic ($\chi 2 = .249$, $p = .883$, $df = 2$) was not significant which indicates that research themes across journals are homogeneous.

CONCLUSION

Information Systems is a fast growing filed hence it is imperative to consistently examine the research themes and future direction. Based on a review of the literature this paper provides a critical analysis of research theme in Information System field. Citation analysis is used to identify the most cited research articles between 2000 and 2014. Based on the results of citation analysis top 100 highly cited research articles are subject to comprehensive content analysis to investigate the trend of dominance of research themes over the period. Venkatesh et al's work on IT user acceptance and DeLone and McLean's work on

their model of information systems success have been the dominant articles within the time frame of this study. Of the initial 34 research themes used in this research, the finding revealed that highly cited articles focused on only nineteen themes. Among nineteen themes research on Theory of MIS with 3356 citations has had the highest citations followed by IS Development/Methods and Tools with 2187 citations. Majority of highly cited articles were based on Technology Acceptance Model (TAM). Out of 100 top cited articles there were 21 articles which used TAM model. Supply chain management and multimedia are among new themes which attracted more citations. The analysis provides the IS audience with an overview of research published in three leading IS journals. The findings also show the dominant research themes that researchers may find them worthy of research.

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