ERP Research in Information System Field: A Multiple-Dimension Review

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ERP Research in Information System Field: A Multiple-Dimension Review

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ABSTRACT: Enterprise resource planning (ERP) solutions are considered as a common and unified system to capture information organizational wide, and we have seen that many organizations acquire and implement ERP to improve their operational performance and create strategic value. The goal of this study is to gain a better understanding of the number of citations of ERP related research in the past. Our method of analysis can be divided into two main steps. This study used 81 journals as data sources for the analysis of the number of citations of ERP articles. The time span of this study was from January 1997 to May 2012. We selected articles by using the Web of Science (WOS) database system, which resulted in a total of 674 records. We listed the 15 most frequently cited articles and the number of citations, the ranking of the articles, where they were published, the key words, the distribution of the academic institutions and the geographical location, for each 15 article. We also analyzed the ranking of journals and the ranking of scholars based on the number of published ERP articles. Future research directions and contributions to theory are provided.

Keywords: Citation Analysis, Enterprise Resource Planning, ERP, Information System, Web of Science.

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1. INTRODUCTION

Enterprise resource planning (ERP) solutions are considered as a common and unified system to capture information organizational wide, and we have seen that many organizations acquire and implement ERP to improve their operational performance and create strategic value (Nazemi, Tarokh, & Djavanshir, 2012; Subramanian & Peslak, 2010). In the 1990s ERP systems became the popular solution for the replacement of legacy systems in large companies, particularly multinationals (Kang, Park, & Yang, 2008). In recent years, the importance of ERP is increased due to upgrading needs on systems to fulfill new international accounting rules as required to comply among businesses in the world. It may cost the implementing firm over a million US dollars or more for spending in a year. As ERP upgrade projects are expensive and high risk, they must be carefully managed (Khoo, Chua, & Robey, 2011). Moreover, the global ERP market size was $43 billion in 2010 and $40.6 billion in 2009, and it is expected to grow to 50.3 billion by 2015 (CBR, 2011).

Apart from the wide spread of usage in the practical world, during the past decade, ERP has also attracted attention from academic communities. ERP related research grew steadily from 1999 to 2001, and the period between 2002 and 2004 presented a growing number of research activities related to ERP issues. It is found a great boost in recent years with an increasing number of literature reviews, journals, special magazine issues, and international symposia dedicated to the discussion of ERP issues (Botta-Genoulaz, Millet, & Grabot, 2005). Rather than indicating the ERP research as a new research discipline, Schlichter and Kraemmergaard (2010) revealed that the ERP research field is shifting to an interdisciplinary field and that field has been driven by an interest in an empirical phenomenon.

In line with the rising popularity of ERP adoption, the IS academic community has been investing a lot of manpower and research resources continuously to provide solutions for problems in the practical application of ERP (Bajwa, Garcia, & Mooney, 2004; Fadel, 2012; Jasperson, Carter, & Zmud, 2005; Wang, Butler, Po-An Hsieh, & Sheng-Hsun, 2008). Thus, the publication amount on this topic is vast. It becomes more difficult for researchers to be familiar with the state of the field and the latest research trends about ERP since little overview and analysis of the state of the field of ERP research and the latest development trends has been undertaken. An exploration of the state of the field of ERP research and therefore the latest research developments is necessary; hence, this study aims to analyze ERP articles that were published in Information System-related journals over a period of time.

The rest of this paper is organized as follows. First, we will examine the citations number of articles in order to identify highly cited articles, and analyze latest development trends and key

words. Then, we will conduct a series of analysis on highly cited authors including their academic institution, country of origin, and their institution's productivity on ERP research. Finally, we will take a closer look at the IS-related journals themselves to obtain the number of articles published on ERP related issues in order to understand which journals publish more ERP articles. It is hoped this study can shed the light to understand current status of ERP research and serve as an orientation for future research directions.

2. LITERATURE REVIEW

2.1 Enterprise resource planning

Similar to many other new fields of IS, there are many different kinds of definition for ERP that include: integrated standard software packages, enterprise systems, enterprise wide-systems, enterprise business-systems, integrated vendor software, and enterprise application systems (Al-Mashari, Al-Mudimigh, & Zairi, 2003). Davenport (1998) defined ERP as an enterprise system that enables a company to integrate the data used throughout its entire organization. ERP provides various useful features included in the financial, operation and logistics, human resource, sales and distribution modules.

Cumbie, Jourdan, Peachey, Dugo, and Craighead (2005) summarized the research on ERP and divided it into three categories: ERP implementation, operation, and the benefits of ERP. They discovered that there were a total of 49 ERP-related studies in the period between 1999 and 2004. Most of these studies (28 in all) focused on ERP implementation, followed by ERP operation-related studies with a total of 14 studies. Only seven of the studies dealt with the benefits of ERP. A review of ERP-related research based on statements and publications in 11 IS-related journals and 8 IS symposia revealed that the amount of ERP research in the academic field of IS did not exceed the actual production of ERP software between 1997 and 2000. In recent years, there has been a greater emphasis on ERP research. There has also been an increasing amount of research on the organizational benefits of integrating ERP systems with other IS systems and research is no longer confined to the study of ERP systems and has been extended to the exploration and measurement of ERP capabilities.

2.2 Citation analysis on IS studies

An analysis of the number of citations of IS articles is quite valuable in that it is able to identify those representative studies in a specific field based on how they are referenced by other peer scholars. Citation analysis also allows for studying the recent findings and perceptions of hundreds, or even thousands, of experts, simultaneously and over time (Walstrom & Leonard, 2000). In the past, scholars employed different methods to conduct their analysis of the number

of article citations in the field of IS. This includes the selection of different scopes of analysis such as the nine top-ranked major IS-related journals (Walstrom & Leonard, 2000) or the European Conference on IS (ECIS) or empirical and taxonomic research on research publications on other specialized decision support systems in the field of IS (Holsapple, Johnson, Manakyan, & Tanner, 1995).

From the bibliometricians perspective, citation analysis is useful to track highly visible and objective indicators of scholarly activity from the notable publications (Cronin, 2001). Researchers often use academic article database created by the Institute of Scientific Information (ISI) such as the Science Citation Index (SCI), the Social Science Citation Index (SSCI), and the Arts & Humanities Citation Index (AHCI) as well as the Engineering Index (EI) to calculate indicators such as the number of published articles which only show growth trends but not present anything about the quality and changing impact of articles. In recent years, researchers in the field of bibliometrics therefore started to rely on statistical data provided by ISI such as National Science Indicators (NSI), Essential Science Indicators (ESI), and Journal Citation Reports (JCR) to analyze the quality of articles. The analysis of the number of article citations represents a quantitative analysis of the author and bibliographic data based on published articles. Its main assumption is that researchers use publicly available publications to prove established theories and accumulate scientific knowledge. The number of published articles can therefore be viewed as an indicator of scientific production, while the number of citations in a specific period of time can serve as an indicator for the impact generated by the article.

3. RESEARCH METHODS

The goal of this study is to gain a better understanding of the number of citations of ERP related research over the past period of time. Our method of analysis can be divided into two main steps. First, we will select certain IS journals as data sources for the analysis of the number of citations of ERP articles. These journals will then be cross-checked with search results in the SSCI/SCIE (Social Science Citation Index / Science Citation Index Expanded) from Web of Science (WOS) databases to make sure that the ERP articles that we found through keyword searches were all published in the selected IS journals. Our selection of IS journals is based on the list of major IS-related journals collated by the Association for information Systems (AIS). AIS is a professional organization that provides a global platform for scholars in the fields of information management, information technology, and information systems to discuss ideas and exchange information. A list of 384 Management Information System (MIS) journals has been collated on the AIS website. 66 of these publications also appear in the SCI/SSCIE database. A list of these 66 journals in alphabetical order can be found in Appendix A.

This analysis of the number of citations of ERP articles is mainly based on articles that appear in SSCI/SCIE with WOS as the main citation database. WOS is an online academic citation index database that was established by Thomson Reuters in 1997. It provides users with bibliographic data, author information, and citation data for articles in the academic disciplines of physics, engineering, medical science, agriculture, humanities, and sociology. The multidisciplinary coverage encompasses more than 11,000 journals with records being updated every week. The database system also supplies more than 1.1 million bibliographic and 23 million citation data per year. The unique cross-reference index of this database not only provides scholars with a rich source of research reference information but also enables them to follow in the footsteps of past scientists and gain a better understanding of the research of other scholars in the same field. The SCIE of the WOS covers more than 8,250 science and technology journals (roughly 2,000 more than the CD-ROM version) and more than 150 scientific disciplines. In 2005, it started to provide citation data from 1900 to the present, and all data after 1991 include author information. Users can access these data for the length of their subscription. The SSCI includes more than 2,850 social science journals and selected data from roughly 3,300 science journals covering more than 50 disciplines. It supplies citation data from 1952 to the present, and all data after 1992 contain author information. Users can access these data for the length of their subscription.

Esteves and Pastor (2001) pointed out that major international IS symposia such as the International Construction Information Society (ICIS) started to sponsor ERP-related research tracks or mini-tracks only in 2000. This trend suggests that the IS research community started to pay attention to ERP research topics around 2000. The analysis period of this study is from 1997 to 2012 should therefore allow us to cover all major ERP-related articles.

The WOS database can rank search results (articles) based on the number of citations. The time span of this study is from January 1997 to May 2012, and the key words for searching are as follows: enterprise resource planning, enterprise wide system(s), enterprise system(s), enterprise business-system(s), integrated vendor software, enterprise application system(s), enterprise application system(s), ERP, SAP, Oracle, Baan, PeopleSoft, and JD Edwards. The filtered results produced a total of 5,734 ERP-related articles. The first step of the filtering process was based on the ERP articles in the abovementioned 66 journals. However, in the course of our research, we discovered that certain journals that had published a large number of ERP-related were not in our list of 66 journals. In order to add an additional perspective to our understanding of the development of ERP research, we decided to include another 15 journals based on the number of published articles as shown in Appendix B. This study therefore uses 81 journals as data sources for the analysis of the number of citations of ERP articles. In a second step, we filtered and

selected articles in those 81 journals by using the WOS database system, which resulted in a total of 674 data sets. These data were filtered manually and coded at the same time.

4. RESEARCH RESULTS AND FINDINGS

The number of citations of an article as an indicator of the scientific impact of an article in a specific field refers to the number of times an article is cited during a specific period of time. The fact that an article is cited frequently is not only an indication of its quality and importance but also a direct expression of its international reception. We sorted the articles based on the number of citations in WOS and ranked them according to the difference in the number of citations. We have listed the 15 most frequently cited (more than 100 citations) articles and the number of citations for each article in the table below. Among the most highly cited articles, the highest number of citations is 471, the lowest being 112. The article with the highest number of citations is "Putting the enterprise into the enterprise system" by Davenport which was published in the Harvard Business Review in 1998. The ranking of the highly cited articles is shown in Table 1 below.

After determining these most frequently cited articles, we then further analyze (1) the ranking of the articles of the most highly cited ERP articles based on the number of citations (2) the time sequence of these articles (3) the journals where these articles were published (4) the key words of these articles (5) the distribution of the academic institutions that published these articles (6) the geographical location of the articles (7) the ranking of journals based on the number of published ERP articles. The results of this analysis are summarized below.

Table 1 Highly cited ERP articles based on the number of citations

Title	WOS	Authors	Source Title	Publication Year
Putting the enterprise into the enterprise system	471	Davenport, TH	Harvard Business Review	1998
Enterprise resource planning: Cultural fits and misfits: Is ERP a universal solution?	205	Soh, C; Kien, SS; Tay-Yap, J	Communications of The ACM	2000
Critical issues affecting an ERP implementation	202	Bingi, P; Sharma, MK; Godla, JK	Information Systems Management	1999
Enterprise resource planning: Implementation procedures and critical success factors	202	Umble, EJ; Haft, RR; Umble, MM	European Journal of Operational Research	2003
Learning to implement enterprise systems: An exploratory study of the dialectics of change	200	Robey, D; Ross, JW; Boudreau, MC	Journal of Management Information Systems	2002
The critical success factors for ERP implementation: An organizational fit perspective	197	Hong, KK; Kim, YG	Information & Management	2002

A critical success factors model for ERP implementation	168	Holland, CP; Light, B	IEEE Software	1999
Antecedents of knowledge transfer from consultants to clients in enterprise system implementations	156	Ko, DG; Kirsch, LJ; King, WR	MIS Quarterly	2005
Learning from adopters' experiences with ERP: Problems encountered and success achieved	139	Markus, ML; Axline, S; Petrie, D; Tanis, SC.	Journal of Information Technology	2000
Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management	134	Liang, H; Saraf, N; Hu Q; Xue, Y	MIS Quarterly	2007
Investment in Enterprise Resource Planning: Business impact and productivity measures	131	Hitt, LM; Wu, DJ; Zhou, X	Journal of Management Information Systems	2002
Vicious and virtuous cycles in ERP implementation: A case study of interrelations between critical success factors	124	Akkermans, H; van Helden, K	European Journal of Information Systems	2002
The random oracle methodology, revisited	123	Canetti, R; Goldreich, O; Halevi, S	Journal of the ACM	2004
Enterprise resource planning: A taxonomy of critical factors	119	Al-Mashari, M; Al-Mudimigh, A; Zairi, M	European Journal of Operational Research	2003
Enterprise resource planning: Multisite ERP implementations	112	Markus, ML; Tanis C; van Fenema, PC	Communications of the ACM	2000

4.1 Ranking of the articles based on the number of citations

We used an adjusted calculation method to determine the number of citations for each article of the most frequently cited articles based on the articles listed in Table 1. The highest-ranked article is "Putting the enterprise into the enterprise system" with a total of 471 citations followed by "The critical success factors for ERP implementation: an organizational fit perspective" with 98.5 citations. "Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management" are in Fifteenth place with 33.5 citations. The Communications of the ACM, European Journal of Operational Research, Journal of Management Information Systems and MIS Quarterly, each of the four journals included two articles. The ranking of the articles is shown in Table 2 below.

Table 2 Highly cited ERP articles based on the number of citations

Title	Journal	Adjusted Count
Putting the enterprise into the enterprise system	Harvard Business Review	471
The critical success factors for ERP implementation: An organizational fit perspective	Information & Management	98.5
A critical success factors model for ERP implementation	IEEE Software	84
Enterprise resource planning: Cultural fits and misfits: Is ERP a universal solution?	Communications of the ACM	68.33
Critical issues affecting an ERP implementation	Information Systems Management	67.33
Enterprise resource planning: Implementation procedures and critical success factors	European Journal of Operational Research	67.33
Learning to implement enterprise systems: An exploratory study of the dialectics of change	Journal of Management Information Systems	66.67
Vicious and virtuous cycles in ERP implementation: a case study of interrelations between critical success factors	European Journal of Information Systems	62
Antecedents of knowledge transfer from consultants to clients in enterprise system implementations	MIS Quarterly	52
Investment in Enterprise Resource Planning: Business impact and productivity measures	Journal of Management Information Systems	43.76
The random oracle methodology, revisited	Journal of the ACM	41
Enterprise resource planning: A taxonomy of critical factors	European Journal of Operational Research	39.67
Enterprise resource planning: Multisite ERP implementations	Communications of the ACM	37.33
Learning from adopters' experiences with ERP: Problems encountered and success achieved	Journal of Information Technology	34.75
Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management	MIS Quarterly	33.5

4.2 Research topics analysis

After classifying the 15 most frequently cited articles by the year of publication, we discovered that the research topics of highly cited articles varied considerably according to the year of publication as shown in Table 3 below. From the table it can be seen that early articles that were published in 1998 mostly discussed ERP concepts, while the focus started to shift to the key factors of success of ERP implementation and the impact on traditional organizations in 1999 to 2002. After 2003, researchers started to discuss the integration of ERP with other systems such as Enterprise Application Integration (EAI) or Supply Chain Management (SCM) and started to pay closer attention to how ERP changes the operational flow of an organization. After 2005, ERP researchers started to integrate knowledge management into their research and started to apply knowledge management concepts to ERP implementation problems in addition to exploring organizational structures and ERP adaptations. On the other hand, many studies still

focus on the key factors in the implementation of ERP, while a considerable number of studies examine how ERP affects organizational performance and how to measure ERP performance.

Table 3 Highly cited articles in the order of the year of publication

Title	WOS	Authors	Journal	Publication Year
Putting the enterprise into the enterprise system	471	Davenport, TH	Harvard Business Review	1998
Critical issues affecting an ERP implementation	202	Bingi, P; Sharma, MK; Godla, JK	Information Systems Management	1999
A critical success factors model for ERP implementation	168	Holland, CP; Light, B	IEEE Software	1999
Enterprise resource planning: Cultural fits and misfits: Is ERP a universal solution?	205	Soh, C; Kien, SS; Tay-Yap, J	Communications of the ACM	2000
Learning from adopters' experiences with ERP: Problems encountered and success achieved	139	Markus, ML; Axline, S; Petrie, D; Tanis, SC	Journal of Information Technology	2000
Enterprise resource planning: Multisite ERP implementations	112	Markus, ML; Tanis C; Van Fenema, PC	Communications of the ACM	2000
Learning to implement enterprise systems: An exploratory study of the dialectics of change	200	Robey, D; Ross, JW; Boudreau, MC	Journal of Management Information Systems	2002
The critical success factors for ERP implementation: An organizational fit perspective	197	Hong, KK; Kim, YG	Information & Management	2002
Investment in enterprise resource planning: Business impact and productivity measures	131	Hitt, LM; Wu, DJ; Zhou, X	Journal of Management Information Systems	2002
Vicious and virtuous cycles in ERP implementation: A case study of interrelations between critical success factors	124	Akkermans, H; van Helden, K	European Journal of Information Systems	2002
Enterprise resource planning: Implementation procedures and critical success factors	202	Umble, EJ; Haft, RR; Umble, MM	European Journal of Operational Research	2003
Enterprise resource planning: A taxonomy of critical factors	119	Al-Mashari, M; Al-Mudimigh, A; Zairi, M	European Journal of Operational Research	2003
The random oracle methodology, revisited	123	Canetti, R; Goldreich, O; Halevi, S	Journal of the ACM	2004
Antecedents of knowledge transfer from consultants to clients in enterprise	156	Ko, DG; Kirsch, LJ; King, WR	MIS Quarterly	2005

system implementations				
Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management	134	Liang, H ; Saraf, N; Hu Q; Xue, Y	MIS Quarterly	2007

The number of citations is closely related to the age of an article. From the tables above it can be seen that all of the most frequently cited ERP articles that we examined in this study were published before 2008. However, hundreds of ERP-related articles were published after 2008. We therefore selected articles that were published between 2008 and 2012 and have been cited more than five times to get a better understanding of the current state and future trends of ERP (as shown in Table 4). From the table below, it can be inferred that in 2008 studies on ERP started to focus on organizational culture, leadership properties, and ERP implementation.

There are also a large number of studies that analyze the success factors for IT governance of ERP implementation based on the technology acceptance model (TAM). On the other hand, many studies still focus on the key factors in the implementation of ERP, while a considerable number of studies examine how ERP affects organizational performance and how to measure ERP performance. In the latest studies, researchers discuss ERP models for supplier selection. While the order of the most frequently cited articles is based on the actual year of publication, there might be a discrepancy between the publication date and the time while the problem actually occurred. Since it is often hard to determine when exactly certain issues actually became relevant, we based our time classification on the publication date of the journal. Furthermore, the time sequence is mainly meant to make researchers aware of the order in which certain issues appeared during the development process of ERP.

Table 4 Articles cited more than five times (2008 - 2012)

Title	Authors	Source Title	Publication Year	Total Citations
Detection and prediction of errors in EPCs of the SAP reference model	Mendling, J; Verbeek, HMW; van Dongen, BF; van der Aalst, WMP; Neumann, G	Data & Knowledge Engineering	2008	35
TQM-A predecessor of ERP implementation	Li, L; Markowski, C; Xu, L; Markowski, E	International Journal of Production Economics	2008	24
Assessing the effects of manufacturing infrastructure preparation prior to enterprise information-systems implementation	Li, L; Markowski, EP; Markowski, C; Xu, L	International Journal of Production Research	2008	22
Examining the critical success factors in the	Ngai, EWT; Law, CCH; Wat, FKT	Computers in Industry	2008	20

adoption of enterprise resource planning				
Organizational culture and leadership in ERP implementation	Ke, W; Wei, KK	Decision Support Systems	2008	18
Determinants of the adoption of enterprise resource planning within the technology-organization-environment framework: Taiwan's communications	Pan, MJ; Jang, WY	Journal of Computer Information Systems	2008	17
Understanding ERP system adoption from the user's perspective	Chang, MK; Cheung, W; Cheng, CH; Yeung, JHY	International Journal of Production Economics	2008	15
The role of readiness for change in ERP implementation: Theoretical bases and empirical validation	Kwahk, KY; Lee, JN	Information & Management	2008	15
A Web-based ERP system for business services and supply chain management: Application to real-world process scheduling	Tarantilis, CD; Kiranoudis, CT; Theodorakopoulos, ND	European Journal of Operational Research	2008	14
Active ERP implementation management: A real options perspective	Wu, LC; Ong, CS; Hsu, YW	Journal of Systems and Software	2008	14
IT governance for enterprise resource planning supported by the DeLone-McLean model of information systems success	Bernroider, EWN	Information & Management	2008	12
TAM-based success modeling in ERP	Bueno, S; Salmeron, JL	Interacting with Computers	2008	12
The implementation factors that influence the ERP (enterprise resource planning) benefits	Chou, SW; Chang, YC	Decision Support Systems	2008	12
ERP and SCM systems integration: The case of a valve manufacturer in China	Bose, I; Pal, R; Ye, A	International Journal of Information Management	2008	11
Implications of the fit between organizational structure and ERP: A structural contingency theory perspective	Morton, NA; Hu, Q	International Journal of Information Management	2008	11
Examining technology, structure and identity during an Enterprise System implementation	Alvarez, R	Information Systems Journal	2008	10

Fuzzy AHP-based decision support system for selecting ERP systems in textile industry by using balanced scorecard	Cebeci, U	Expert Systems with Applications	2009	26
An integrated decision making approach for ERP system selection	Karsak, EE; Ö zogul, CO	Expert Systems with Applications	2009	24
From Business Process Models to Process-Oriented Software Systems	Ouyang, C; Dumas, M; van der Aalst, WMP; Ter Hofstede , AHM; Mendling, J	ACM Transactions on Software Engineering and Methodology	2009	15
ERP implementation at SMEs: Analysis of five Canadian cases	Snider, B; da Silveira , GJC; Balakrishnan, J	International Journal of Operations & Production Management	2009	11
Stable Recovery of Sparse Signals and an Oracle Inequality	Cai, TT; Wang, L; Xu, G	IEEE Transactions on Information Theory	2010	10
An ERP model for supplier selection in electronics industry	Lin, CT ; Chen, CB; Ting, YC	Expert Systems with Applications	2011	5

4.3 Key words of highly cited ERP articles

The key words of the most frequently cited ERP articles are shown in Table 5 below. Sometimes keywords have overlapping meanings, so we analyzed and arranged them in order of frequency. It can be seen that ERP is the word with the highest frequency followed by Information Technology and ERP Implementation.

Table 5 Key words of highly cited ERP articles

Keywords
ERP
Enterprise Resource Planning
Enterprise Resource Planning systems
Enterprise Systems
Information Technology
ERP Implementation
Implementation
Implementation Procedures
Technology Implementation
Adaptation
ERP Adaptations
Critical Success Factors

Information
Knowledge
Knowledge Transfer
Organizational Learning
Organizational Innovation
Management
Top Management
Software
Software-development

4.4 Academic institutions analysis

Through a better understanding of the distribution of academic institutions that published frequently cited ERP articles we can also obtain a better picture of which academic or research institutions publish high-quality ERP articles. The distribution of academic institutions was determined based on the institutional affiliation of the first author. The result is shown in Table 6 below. As is evident from the table, each article was published by a different institution. This also shows that academic and research institutions attach great importance to ERP research as a sub-discipline of IS.

Table 6 Distribution of academic institutions that have published highly cited ERP articles

Affiliation Distribution	Recorded Count
Baylor Univ, Dept Management, Hankamer Sch Business, USA	1
Boston Univ, Sch Management, USA	1
City Univ Hong Kong, Dept Informat Syst, Peoples R China	1
Eindhoven Univ Technol, Netherlands	1
Florida Atlantic Univ, Dept Informat Technol & Operat Management, USA	1
Georgia State Univ, Dept Comp Informat Syst, USA	1
IBM Corp, TJ Watson Res Ctr, USA	1
Indiana Univ Purdue Univ, Dept Management & Mkt, USA	1
Indiana Univ, Kelley Sch Business, USA	1
King Saud Univ, Dept Informat Syst, Coll Comp & Informat Sci, Saudi Arabia	1
Manchester Business Sch, England	1
Nanyang Technol Univ, Nanyang Business Sch, Singapore	1
Univ Penn, Wharton Sch, Dept Operat & Informat Management, USA	1

4.5 Geographic locations of authors

Through a better understanding of the distribution of countries that published frequently cited ERP articles, we can also get a better picture of which regions publish high-quality ERP articles. Our research shows that the US published a total of eight articles, while the other countries released one article each. When sorted by geographical regions, we obtain the following numbers: America 8, Asia 3, Europe 2, and Africa 1 as shown in Table 7 below. The higher count for America could be explained by the fact that it leads other countries in the implementation of ERP which means it had to deal with more issues at an earlier date. Another possible explanation could be that most of the 81 journals that we selected for this study are published in America.

Table 7 Geographic locations of authors of frequently cited ERP articles

Affiliation Distribution	Recorded Count
USA	8
England	1
Netherlands	1
Peoples R China (Hong Kong)	1
Saudi Arabia	1
Singapore	1
South Korea	1

4.6 Ranking of the journals

The results of this study reveal which journals have published the highest number of ERP-related articles. The ten highest-ranked journals are, in descending order of publications: Industrial Management & Data Systems with a total of 49 articles, followed by Information Systems Management with 29 and Enterprise Information Systems with 28. European Journal of Information Systems, International Journal of Production Research, Information & Management, and Journal of Information Technology published 27 articles each, while Computers in Industry, Journal of Computer Information Systems, and International Journal of Production Economics each contributed 24 articles. The results are shown in Table 8 below.

Table 8 Ranking of journals based on the number of published ERP articles

Journal	Record Count
Industrial Management & Data Systems	49
Information Systems Management	29

Enterprise Information Systems	28
European Journal of Information Systems	27
International Journal of Production Research	27
Information & Management	27
Journal of Information Technology	27
Computers in Industry	24
Journal of Computer Information Systems	24
International Journal of Production Economics	24

5. CONCLUSION

5.1 Contribution

This study provided a ranking of the article titles of ERP articles based on the number of publications and of the journals based on the number of ERP articles in addition to a ranking of ERP articles based on the number of citations. The geographical location of articles of highly cited ERP articles and the distribution of the academic institutions that published highly cited ERP articles were also examined. At the same time, we determined the key words of these articles and the journals where they were originally published. Finally, we compiled articles to learn more about the current state and future trends of ERP and sorted frequently cited ERP articles by the year of publication. We also included a ranking of article titles based on the number of citations. We hoped that this would give us a clear picture of the number of journal publications and which IS journals that had the greatest impact in terms of publishing ERP articles. We hope that this study can provide an overview of the field and serve as an orientation for selecting a research topic.

5.2 Research limitations and future research directions

There are several limitations in our study. Our study is based on articles that appear in the SSCI/SCIE and doesn't include articles of academic symposia or articles that were not published in journals. It might therefore not be completely representative of all research areas of ERP. Furthermore, our key words are based on key terms that were pointed out in past studies on ERP. However, we limited our search to article titles only and were therefore probably not able to detect all ERP-related articles.

As far as our research methods are concerned, we only employed an analytical method based on the number of citations to reflect ERP research trends or other properties by examining quantities, characteristics, and time aspects. Future research should carry out in-depth study by

employing surveys, interviews, and other related research methods. Future research can compare the results of this study with their analysis of the development trends of ERP research in domestic journals or in degree theses.

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APPENDIX: A MIS journals listed in association for information systems (AIS)

Journal Title
ACM Computing Surveys

Journal Title
ACM Transactions on Information and System Security
ACM Transactions on Software Engineering and Methodology
Advanced Engineering Informatics
Algorithmica
Asia-Pacific Journal of Operational Research
Behaviour & Information Technology
Computer Journal
Computers & Industrial Engineering
Computers & Security
Data & Knowledge Engineering
Decision Sciences
Decision Support Systems
Enterprise Information Systems
European Journal of Information Systems
Expert Systems with Applications
Government Information Quarterly
Harvard Business Review
IBM Systems Journal
IEEE Internet Computing
IEEE Software
IEEE Transactions on Engineering Management
IEEE Transactions on Information Theory
IEEE Transactions on Knowledge and Data Engineering
IEEE Transactions on Systems Man and Cybernetics Part A: Systems and Humans
Industrial Management & Data Systems
Information and Computation
Information & Management
Information and Software Technology
Information Sciences
Information Systems
Information Systems Frontiers
Information Systems Journal
Information Systems Management

Journal Title
Information Systems Research
Interacting with Computers
Interfaces(INFORMS)
International Journal of Human-Computer Interaction
International Journal of Production Economics
International Journal of Technology Management
Journal of Computer Information Systems
Journal of Database Management
Journal of Global Information Management
Journal of Information Technology
Journal of Management Information Systems
Journal of Operations Management
Journal of Strategic Information Systems
Journal of the ACM
Journal of the American Medical Informatics Association
Journal of the American Society for Information Science and Technology
Journal of the Association for Information Systems
Management Science
MIS Quarterly
MIS Quarterly Executive
MIT Sloan Management Review
Omega
Online Information Review
Operations Research Letters
Organization
Organization Studies
Presence: Teleoperators and Virtual Environments
Production and Operations Management
Telecommunication Systems
The Information Society
Total Quality Management & Business Excellence
Transportation Research Part E-Logistics and Transportation Review

Appendix: B SCI/SSCIE Indexed journals dedicating ERP outside the AIS journal list

Journal Title
Communications of the ACM
Computers in Human Behavior
Computers in Industry
European Journal of Operational Research
International Journal of Advanced Manufacturing Technology
International Journal of Computer Integrated Manufacturing
International Journal of Information Management
International Journal of Operations & Production Management
International Journal of Production Research
Journal of Software Maintenance and Evolution: Research and Practice
Journal of Systems and Software
New Technology Work and Employment
Production Planning & Control
Systems Research and Behavioral Science
Technovation

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