International Journal of Production Research
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tprs20

Twenty-six years of operations management research (1985-2010): authorship patterns and research constituents in eleven top rated journals

Guangzhi Shang[a], Brooke Saladin[b], Tim Fry[c] & Joan Donohue[c]
[a] College of Business, Florida State University, Tallahassee, FL, USA
[b] School of Business, Wake Forest University, Winston-Salem, NC, USA
[c] Moore School of Business, University of South Carolina, Columbia, SC, USA
Published online: 05 May 2015.

International Journal of Production Research, 2015
http://dx.doi.org/10.1080/00207543.2015.1037935

Taylor & Francis
Taylor & Francis Group

Twenty-six years of operations management research (1985–2010): authorship patterns and research constituents in eleven top rated journals

Guangzhi Shang[a], Brooke Saladin[b], Tim Fry[c]* and Joan Donohue[c]

[a]*College of Business, Florida State University, Tallahassee, FL, USA;* [b]*School of Business, Wake Forest University, Winston-Salem, NC, USA;* [c]*Moore School of Business, University of South Carolina, Columbia, SC, USA*

(*Received 20 January 2015; accepted 30 March 2015*)

This paper investigates the research contributions over a 26-year time frame (1985–2010) of academic institutions and individual authors to the field of operations management (OM). We use two measures, shared articles and distributed articles, to assess the research productivity of institutions as well as individual researchers. Further we assess the contribution of institutions based on affiliated author research as well as the research of their PhD graduates. In order to accomplish this, we utilise the published OM research articles in 11 top-rated and well-known academic journals over the time period from 1985 to 2010. In addition to the research, contributions of academic institutions and individual authors, we look at several bibliometric statistics related to this body of published research. These measures indicate that the research constituency is growing as evidenced by increasing numbers of researchers and institutions represented. Lastly, the collaboration between researchers appears to be increasing as evidenced by an increasing percentage of articles with three or more authors and the average number of authors per article published.

Keywords: operations management; research constituents; collaboration

1. Introduction

Since its infancy in the late 1960s, the field of operations management (OM) has evolved into a widely recognised business function. Originally known as production management, OM was associated with the application of operations research techniques to such topical areas as inventory control, forecasting, scheduling and process layout/location. During the mid-1980s, production management came to be known as Production and Operations Management (POM) or simply OM with the inclusion of service operations into the then well-established factory management focus of the prior two decades. It is during this time period when OM began its emergence as a separate field of management (Buffa 1980; Neely 1993) and the Association to Advance Collegiate Schools of Business (AACSB) introduced the requirement that all business schools must cover, somewhere in their curricula, the topics normally associated with an OM course.

The evolution of the OM field has been driven in large part by the research published by individual academics and the institutions where they are affiliated and were trained. In any discipline, the body of knowledge is generally represented in the academic journals in which its research is published as journals are the major avenue for the dissemination of knowledge and future research efforts. While publication outlets such as books, dissertations and conference proceedings may be important sources of knowledge, the reputation of academic researchers is determined largely by the number of articles they publish in a set of academic journals. Given that OM became recognised as a stand-alone discipline in the mid 1980s, the purpose of this paper is to analyse the origins of OM research from 1985 through 2010 to identify the individuals and institutions that have had the greatest contribution to the field.

The most obvious source of contribution by any institution, and the one most studied, is the research generated by its affiliated faculty. Another important source of an institution's contribution that is less studied and less readily available is the research generated by an institution's PhD graduates. While each institution provides the support necessary for its affiliated faculty to conduct research through reduced teaching loads, grants, tenure and promotion requirements, etc., each institution also provides the research training necessary for its PhD graduates. The PhD-granting institution is where each researcher was introduced to the pedagogy of the field, was trained in various research methodologies, and developed their research networks. As such, each institution can contribute to the field in different ways, through the research of its affiliated faculty and through the research of its PhD graduates. We are also interested in those

*Corresponding author. Email: timfry@moore.sc.edu

individuals who have authored OM research as it is their efforts that created the body of knowledge that ultimately led to the current state of the field.

This study is important and interesting for several reasons. First, it is important to recognise those institutions that have had a significant contribution to the OM literature through the research of their affiliated faculty as well as the research of their PhD graduates. Those institutions that encourage, maintain and reward active research agendas by their faculty, and have trained the most productive PhD graduates have significantly contributed to the development and evolution of OM. Second, it is important that those individuals who have made significant contributions to the OM literature be recognised as it is their research efforts that have defined the field. Third, this study provides data that can easily be used by institution administrators to assess the quality and productivity of their OM faculty and PhD graduates in comparison to the most productive researchers in the field. Lastly, the data we provide can be used by prospective PhD students to assess the quality of various graduate programmes. It is important for prospective PhD students to be aware of those faculty and institutions that have significantly impacted the discipline as they choose where to pursue their studies and, later, where to begin their academic careers.

2. Related literature

There have been several studies of institutional and individual research productivity using author affiliation in various business-related academic disciplines such as Finance (Heck 2007; Heck, Cooley, and Hubbard 1986; Sousa and Vieira 2011) and Accounting (Chan, Chen, and Cheng 2005; Mathieu and McConomy 2003) to cite just a couple. Typically, these studies first identify a set of discipline-related journals and then, based on author affiliation, institutions or individuals are ranked based on the number of articles published in the defined set of journals. In OM, Young, Baird, and Pullman (1996) evaluated individual research productivity in a set of 21 journals identified by Barman, Tersine, and Buckley (1991) as being important outlets for OM research. Their study provided a ranking of the top 100 researchers based on the quality and quantity of their research programme for the five year period (1989–1993). The research productivity of selected institutions was studied by Malhotra and Kher (1996). These authors selected five journals, *Management Science (MS), International Journal of Production Research (IJPR), Decision Sciences (DS), Journal of Operations Management (JOM)* and *Institute of Industrial Engineers Transactions (IIE)* as being the most influential in the OM discipline. A ranking of 50 business schools based on the research productivity of their affiliated authors in these five selected journals for the 15-year period (1980–1994) was provided. Since three of these five journals were not dedicated to the field of OM, the authors carefully reviewed each article published in these journals and included only those articles felt to be related to OM. Agrawal (2002) identified the top five most productive institutions that had published in each of three OM specific journals: *Manufacturing & Operations Management (MSOM), POM* and *JOM.* Hsieh and Chang (2009) ranked the top individual researchers based on their publications in 20 journals felt to be outlets for OM research from 1959 through 2008. However, several of these journals have been classified in other recent studies (Holsapple and Lee-Post 2010; Meredith, Steward, and Lewis 2011) as being interdisciplinary, engineering or operations research and not OM specific since they often published many papers that were not OM related. Unfortunately, Hsieh and Chang (2009) made no effort to identify which articles in these non-OM specific journals was mainstream OM, and which articles were more closely related to other disciplines. Fry et al. (2013) identified the most productive institutions and authors that had published in *International Journal of Production Research* for the time period 1985 through 2010. In their paper, the top 100 authors based on research productivity were identified as well as the top 50 institutions based on the research by affiliated authors and PhD graduates. Other than Fry et al. (2013), no prior study considered the research contribution of an institution's PhD graduates and that study was limited to a single journal.

3. Focus of this study

The focus of this paper is to identify those individuals and institutions that have played major roles in the development of the OM field. As such, this paper will assess the research productivity of various institutions and individual researchers in the field of OM over the past 26 years (1985–2010). We choose 1985 as our starting year since: (1) it is approximately when the discipline became known as OM and was recognised as a separate stand-alone discipline; (2) it is close to when the AACSB required the teaching of an OM course at accredited business schools; (3) it was when Saladin (1985) first raised the issue of differentiating OM research from OR/MS research and posed the question concerning where OM research should be published; (4) 26 years of academic research published in 11 of the leading OM-related research outlets should provide ample data to ascertain how the field has developed, and to identify who the major contributors to the field have been.

This current study is interested in identifying those institutions and individuals that have played a major role in developing the entire field of OM through their research. As such, this paper considers the research contribution by institutions based on the productivity of its affiliated faculty and PhD graduates in 11 top-rated outlets for OM research. The specific outlets and justification for their inclusion is discussed below. As in Fry et al. (2013), we argue that the contribution of an institution, in addition to research by affiliated authors, should also include the research of its PhD graduates as an institution that trains many doctoral students who go on to other institutions and develop their own research programmes, will have a larger impact on the field than one that has fewer doctoral graduates. In addition to institutional research productivity, we also assess individual research contributions to the field for the same time period. As academics may move from one institution to another, it is not sufficient to solely consider institutional contributions to the field. It is the individual researchers, with the support of and training by the institutions, who have maintained prolific research programmes that have done much to define the OM discipline. With this in mind, it is important that those individuals will be recognised for their contributions.

This study differs from Young, Baird, and Pullman (1996) and Hsieh and Chang (2009), in that the journals we consider are those shown in prior studies to be the most respected outlets for OM research. While their studies considered a larger set of journals, many of those journals were not ranked highly in the journal ranking literature and further, no effort was made to identify articles that were OM specific. Lastly, the research contribution of an institution's PhD graduates was not considered. This study differs from Malhotra and Kher (1996) in that we consider a larger more inclusive set of top-rated journals that publish OM-related research over a much longer time period. Further, while Fry et al. (2013) focused on a single journal, this current paper considers 11 of the most respected outlets for OM research to better represent the entire field of OM. In addition, this current research considers the research of an institution's PhD graduates as contributing to its impact on the field and we study a much longer time frame in order to provide a more comprehensive picture.

4. Methodology

We have adopted an approach that is similar to what has been used in previous studies to assess research productivity (e.g. Malhotra and Kher 1996; Young, Baird, and Pullman 1996). First, we identify a set of research outlets that is representative of the field. Second, we develop a set of metrics that can be used to measure levels of research output. Third, since many of the journals that publish OM research are interdisciplinary in nature, it is necessary to identify those articles that are OM specific (highly pertinent to the OM discipline). Our method of journal selection, our measures of research output and our process to identify pertinent OM research papers are discussed below.

Our unit of analysis in this paper is the individual article published in one of 11 OM-related research outlets. For each OM specific article considered, we collect author name(s) and institutional affiliation(s) at the time the article was published. In cases where more than one affiliation was listed for an author, only the first listed affiliation is considered. In total, between 1985 and 2010, there were 14,526 OM-related articles published by 14,127 unique authors who were affiliated with 1994 different institutions. When we consider that some authors have multiple articles, there were 33,102 author/article combinations. For each of the 14,127 unique authors, a 23-month internet search was conducted by three faculty and six graduate students at two US universities to discover where each author received their PhD training. In cases where the PhD-granting institution could not be found, inquiries were sent to the author's and co-author's last known e-mail address. After these efforts, we were able to discover the PhD-granting institution for 96.5 per cent of the authors, which resulted in the identification of 1340 PhD-granting institutions.

4.1 *Selection of research outlets*

Since the pioneer study by Saladin (1985), which posed the question of where OM research should be published, there have been several studies that have attempted to rank order various OM research outlets. Most of these studies used a survey from a selected group of researchers or some type of citation-based methodology to assess journal quality. Appendix 1 identifies 16 such studies that rank OM-related journals, the methodology used in each study and the data we used from each study. In the 16 published journal ranking studies combined, 147 different journals that publish OM-related research have been ranked. Given that more than 20 years have passed since the initial ranking study in 1991, some journals have ceased publication while others have changed their names. When journals change names, we used the results given to the journal both under its earlier name(s) and its current name. For example, the *Journal of Supply Chain Management (JSCM)* was previously published under the names of *International Journal of Purchasing and Materials Management (IJPMM)* and the *Journal of Purchasing and Materials Management (JPMM)*. For example, *JSCM* was included in six studies, *JPMM* was included in five studies and *IJPMM* was included in three studies.

Therefore, the number of times *JSCM* or one of its predecessors was included in a study is 14. After combining the journals that changed names and removing from consideration those journals that have ceased publication, we identify 132 different journals that have been studied in the literature and were currently being published as of 2010.

Appendix 2 presents the rankings and quality scores for these journals across the 16 studies. As suggested by Meredith, Steward, and Lewis (2011), the frequency with which a journal is included in studies is indicative of its acceptance amongst researchers as a top outlet for OM research. A journal that is studied 10 times would be more visible than a journal studied only once. Therefore, as a measure of journal visibility, we order the journals in Appendix 2 according to the number of studies in which it was included.

For purposes of this present research, it is necessary to identify a reduced set of journals that represents the most visible and highly regarded journals that publish OM research. Due to factors such as researcher methodology, geographic location of a researcher and researcher publishing record, it is likely that no set of journals will be universally accepted by OM researchers as the most visible and widely accepted. However, choosing a representative set of the most visible journals in the field may tend to lessen any criticism since a researcher's 'favourite' journal may likely be included.

With this in mind, we present in Appendix 3 all of the journals that were included in six or more of the published studies as we contend that this is a good indicator of the visibility of each journal. For each of the journals, we present a rank based on the relative quality scores given by each study in which it was evaluated. These relative quality scores are calculated by dividing each journal's quality score in a given study by the highest quality score for any journal included in that study. Lastly, an average rank is calculated for each journal by summing up the relative quality scores and then dividing by the number of ranking studies that *could have* included in the journal. In this way, newer journals such as *MSOM* will not be penalised since it was not included in the earlier studies. The journals in Appendix 3 are ordered by this average rank (the last column in the table).

While there will never be complete agreement on the number nor identity of the journals selected, based on the results presented in Appendix 3, we have selected the following 11 journals as being the most visible and representative of the field: *MS, Operations Research (OR), POM, JOM, MSOM, DS, IIE, IJPR, Naval Research Logistics (NRL), European Journal of Operations Research (EJOR)* and *International Journal of Operations and Production Management (IJOPM).* Based on our analysis, these journals are felt to be the highest perceived quality and most consistently ranked journals that publish OM research.

4.2 *Measuring research contribution*

To determine the level of research output for individuals and institutions, our unit of analysis is the individual article published in one of the 11 identified journals. To measure research contributions, we use the same approach as Young, Baird, and Pullman (1996), which used two metrics to assess individual research productivity. In their shared metric, each individual is given $1/n$ credit for each article in which they are an author, where n is the number of authors on the article. In their distributed metric, full credit is given to all authors of an article. This metric is particularly important to academics as most institutions do not discount for multiple authored papers in promotion and tenure decisions. We provide results for both the 'shared articles' and 'distributed articles' measures of research productivity.

In this research, institutional contribution is measured as follows. We determine the number of articles published by authors who were affiliated with an institution at the time the article was published. These are the author affiliation results. We also determine the number of articles published by authors according to where they received their terminal degrees. This is the PhD graduates results. We show the distributed articles measure as well as the shared articles measure for each institution and individual. Lastly, we calculate a total contribution for each institution by averaging the number of distributed articles and shared articles for both author affiliation and PhD graduates results. This is the 'combination articles' measure. If, as we have suggested, the contribution of an institution to the field should include the research of its PhD graduates as well as the research of its affiliated authors, then the combination articles measure captures this contribution to a greater degree than measures used in previous research studies.

4.3 *Selection of articles*

Since several of the selected journals, *OR, MS, IIE, EJOR, DS* and *NRL*, are considered interdisciplinary in nature (Holsapple and Lee-Post 2010; Meredith, Steward, and Lewis 2011), it is necessary to evaluate each article to determine if it is pertinent to the field of OM. Determining whether an article is pertinent to OM is subjective at best, and it is doubtful that complete agreement amongst researchers could be reached. However, we choose to adopt a similar approach as that used by Malhotra and Kher (1996) and accept their conjecture that OM evolved from the statistical

and operations research fields during the 1980s into its present state. As such, we choose to include those articles that may primarily focus on a mathematical solution technique yet is used to solve an OM-related problem. To reduce subjectivity, all articles published in *MS, DS, EJOR, OR*, *NRL* and *IIE* were reviewed by one author of this paper by looking at keywords, title and abstract. Independent of this review, another author conducted a similar analysis. Both reviews were then compared. Any contradictions over article inclusion were discussed with a third reviewer until a consensus was reached. Based on the stated editorial policies of *JOM, IJPR*, *IJOPM, POM*, and *MSOM*, no review was made of these journals as all of these articles were felt to be pertinent to the OM field.

5. Results

In this section, the results for patterns of authorship and degree of research collaboration are discussed in Section 5.1. Section 5.2 presents the results for individual researchers and Section 5.3 presents the results for institutional contribution.

5.1 *Authorship patterns and collaboration*

In this section, we discuss various authorship patterns along with trends in research collaboration. As previously stated, during the time frame of this study from 1985 to 2010, there were 14,127 different authors who accounted for 14,526 total articles published in the 11 selected journals. Of these authors, only 36.2% published more than one article. A majority of these authors, 63.8%, published just one article. Table 1 provides frequency data indicating the number of authors who published at specific article count levels ranging from just one article to over twenty. Despite the fact that a majority of authors only published one article in the 11 journals, there are a very small number of prolific researchers accounting for multiple publications. For example, 3.7% of all authors published 10 or more articles, 1.7% published 15 or more articles, and only 0.8% published 20 or more articles.

Table 2 and Figure 1 present by year commonly used bibliometric statistics (Ajiferuke, Burrel, and Tague 1988; Savanur and Srinkanth, 2010). Looking at the results, we see that four dominant trends have occurred between 1985 and 2010. There has been a steady increase since 1985 in: (1) the number of papers being published per year; (2) the total number of authors on those papers; (3) the number of academic affiliations represented; (4) the number of countries represented.

While these four trends certainly indicate a significant increase in the OM research constituency throughout the past 26 years, the data in Table 2 also indicates an increase in research collaboration. As we see pictured in Figure 2, the

Table 1. Frequency data for number of authors and articles.

Distirbuted articles	Number authors	% of Total authors	Cumulative per cent
>20	102	0.73	0.73
20	14	0.10	0.82
19	18	0.13	0.95
18	22	0.16	1.11
17	20	0.14	1.25
16	19	0.14	1.39
15	46	0.33	1.71
14	43	0.31	2.02
13	40	0.28	2.30
12	51	0.36	2.67
11	66	0.47	3.13
10	84	0.60	3.73
9	93	0.66	4.39
8	133	0.95	5.34
7	183	1.30	6.64
6	236	1.68	8.32
5	362	2.57	10.89
4	530	3.77	14.66
3	933	6.63	21.29
2	2092	14.87	36.16
1	8980	63.84	100.00

Table 2. Summary of bibliometric statistics by year.

Year	Number articles	Number authors	Number institutions	Number countries	% Articles with non-academic authors	% Single authored articles	% Dual authored articles	% Articles w/>3 Authors	Mean authors per article
1985	282	539	181	31	10.28	30.14	52.13	17.73	1.91
1986	296	562	181	28	14.19	36.82	43.92	19.26	1.90
1987	276	537	185	34	13.04	33.70	46.01	20.29	1.95
1988	340	647	227	33	15.00	33.82	45.88	20.29	1.90
1989	362	713	232	32	14.36	29.56	49.17	21.27	1.97
1990	398	800	251	29	9.30	25.38	53.02	21.61	2.01
1991	419	856	283	34	12.41	23.87	53.22	22.91	2.04
1992	495	1045	309	38	11.52	26.67	44.65	28.69	2.11
1993	488	1010	306	35	9.02	21.93	53.69	24.39	2.07
1994	509	1052	336	34	9.82	25.15	49.71	25.15	2.07
1995	552	1189	361	37	10.33	22.46	48.37	29.17	2.15
1996	594	1249	391	41	10.77	20.71	55.05	24.24	2.10
1997	551	1243	377	38	11.07	18.51	50.82	30.67	2.26
1998	548	1169	381	40	10.22	21.53	50.55	27.92	2.13
1999	605	1253	379	48	13.88	29.09	44.30	26.61	2.07
2000	658	1481	429	49	10.94	19.60	45.74	34.65	2.25
2001	626	1432	424	43	10.06	16.13	47.92	35.94	2.29
2002	582	1408	454	47	10.31	14.95	44.16	40.89	2.42
2003	583	1360	426	48	11.32	16.30	45.45	38.25	2.33
2004	656	1593	448	54	14.18	13.87	41.46	44.66	2.43
2005	682	1671	478	48	12.02	15.10	42.08	42.82	2.45
2006	701	1744	486	50	11.13	15.41	39.09	45.51	2.49
2007	805	1973	522	47	7.83	13.17	41.61	45.22	2.45
2008	862	2170	589	49	10.79	10.09	43.85	46.06	2.52
2009	808	2071	578	54	11.26	9.90	41.34	48.76	2.56
2010	848	2252	608	54	9.55	9.79	39.03	51.18	2.66

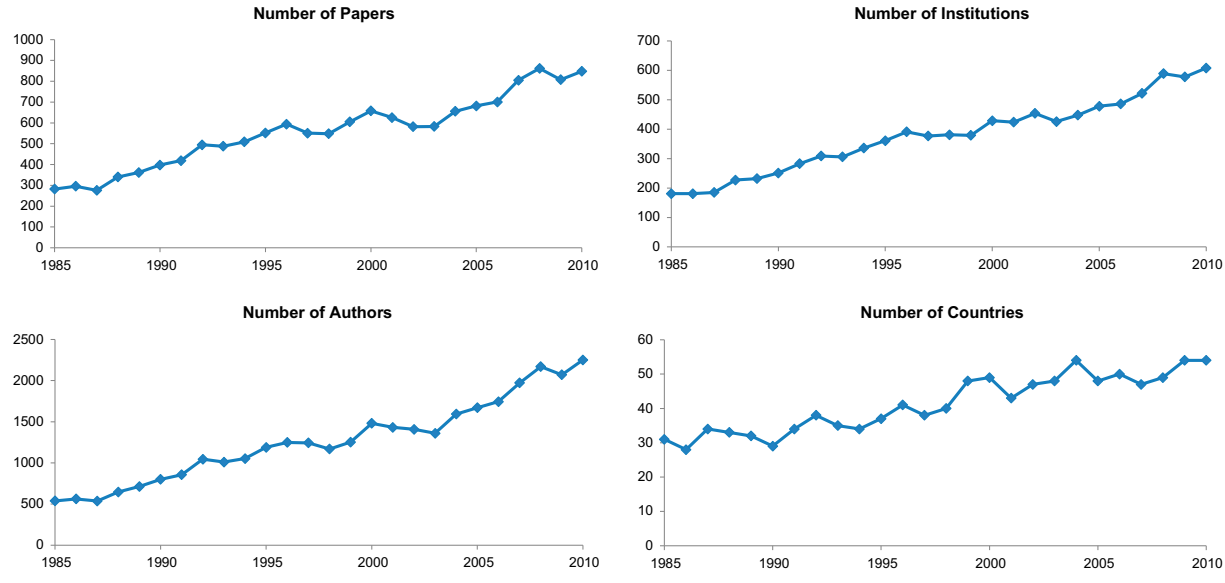

Figure 1. Number of papers, institutions, authors, and countries (1985–2010).

average number of authors per article, a commonly accepted measure of collaboration (Savanur and Srinkanth 2010), has steadily increased from 1.91 in 1985 to 2.66 authors in 2010. We see that the percentage of single authorship articles has steadily declined over the period from about 30% in 1985 to just below 10% in 2010. The largest change has been in the percentage of papers with three or more authors. The steady rise from about 20% in 1985 to 51% in

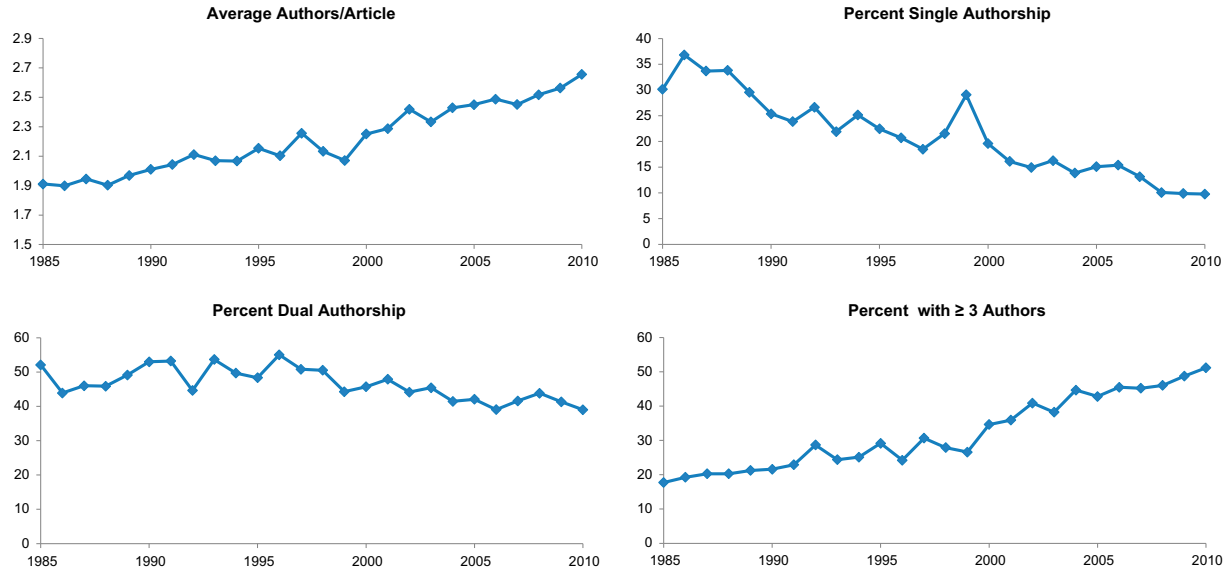

Figure 2. Patterns of authorship (1985–2010).

2010 indicates a 189% increase in the number of papers with three or more authors. It is clear that OM researchers are collaborating with more authors on their research projects.

5.2 *Research by individual authors*

In this section, we present the top 100 individual researchers who have had the greatest overall contribution to the field of OM as measured by the number of distributed and shared articles published in the 11 designated journals. Table 3 provides the list of the top 100 authors (and ties) along with their associated article counts. The first column in Table 3 provides the rank order with respect to the distributed articles measure, and the fourth column provides the rank order with respect to the shared articles measure. The most prolific author in terms of both the distributed and shared measures is T. C. E. Cheng with a total of 81 distributed articles and 39.2 shared articles. Hau L. Lee ranked second in both the distributed measure with 60 articles and in the shared measure with 28.8. Other prolific authors include Chung-Yee Lee, Luk N. van Wassenhove, Panagiotis Kouvelis, Manoj Kumar Tiwari, Roger G. Schroeder, Christos P. Koulamas and Suresh P. Sethi. This data provides a useful benchmark for individual researchers in the OM field to compare their research productivity to the top researchers in the field. As well, it provides the deserved recognition to those researchers who have had the greatest impact on shaping the OM body of knowledge. Of course, authors whose research career was most active before 1985 may not receive the full credit they deserve since our study was limited to 1985–2010 for reasons cited above.

We also look at research contributions across smaller time blocks to see who has exhibited 'staying power', who are the 'up and comers' and who are beginning to 'phase out' as their careers may be winding down. Tables 4 presents the top 100 ranked authors based on distributed articles across five time periods. Since there are 26 years of data included in this paper, the first time period represents a six-year period from 1985 to 1990, and the remaining four time periods each include five years.

As we can see, T. C. E. Cheng has not only been the most prolific researcher overall, he has also been very consistent in his research productivity across each of the time periods in terms of both measures. Chung-Yee Lee and Luk N. van Wassenhove have also been consistently strong across the five time periods. There is evidence that some of the top researchers, such as Hau L. Lee and Meir J. Rosenblatt, are winding down their careers as they, perhaps, get closer to retirement. On the other hand, there has been an emergence in the past 10 years of authors such as Manoj Kumar Tiwari with 44 distributed articles and Felix T. S. Chan with 35 articles in the last 10 years. This places them in second and third place, respectively, as the most productive researchers over the last 10 years, behind T. C. E. Cheng. Other strong research performers with respect to our distributed articles metric over the last 10 years (2001–2010) include such authors as Roger Schroeder with 27; Ram Narasimhan with 26; Aleda Roth and Christos P. Koulamas with 23 and Suresh P. Sethi with 21.

Table 3. Top 100 authors: distributed and shared articles (1985–2010).

Rank	Distributed articles	Author	Rank	Shared articles	Author
1	81	Cheng, T. C. E.	1	39.2	Cheng, T. C. E.
2	60	Lee, Hau L.	2	28.8	Lee, Hau L.
3	56	Lee, Chung-Yee	3	28.7	Koulamas, Christos P.
4	53	van Wassenhove, Luk N.	4	24.2	Lee, Chung-Yee
5	46	Kouvelis, Panagiotis	5	23.5	Zipkin, Paul H.
5	46	Tiwari, Manoj Kumar	6	21.7	Axsäter, Sven
7	44	Schroeder, Roger G.	7	20.7	Yano, Candace Arai
8	42	Koulamas, Christos P.	8	20.2	Kouvelis, Panagiotis
9	41	Sethi, Suresh P.	9	19.7	Goyal, Suresh Kumar
10	40	Federgruen, Awi	10	19.3	Rosenblatt, Meir J.
11	39	Goyal, Suresh Kumar	10	19.3	van Wassenhove, Luk N.
12	38	Rosenblatt, Meir J.	12	19.2	Federgruen, Awi
12	38	Sriskandarajah, Chelliah	13	18.8	Malmborg, Charles J.
14	37	Yano, Candace Arai	14	18.4	Voss, Christopher A.
15	36	Chan, Felix T. S.	15	18.1	Kusiak, Andrew
15	36	Hopp, Wallace J.	16	17.8	Meredith, Jack R.
15	36	Meredith, Jack R.	17	17.5	Kim, Yeong-Dae
15	36	Simchi-Levi, David	18	17.4	Benton, W. C.
15	36	Zipkin, Paul H.	19	16.8	Chakravarty, Amiya K.
20	35	Kim, Yeong-Dae	19	16.8	Egbelu, Pius J.
21	34	Narasimhan, Ram	21	16.5	Gallego, Guillermo M.
22	33	Kusiak, Andrew	22	16.3	Miltenburg, John
22	33	Tanchoco, J. M. A.	22	16.3	Sawik, Tadeusz J.
22	33	Voss, Christopher A.	24	16.0	Sarker, Bhaba R.
25	32	Gallego, Guillermo M.	24	16.0	Silver, Edward A.
25	32	Shtub, Avraham	24	16.0	Tanchoco, J. M. A.
27	32	Song, Jing-Sheng	27	15.7	Rajendran, Chandrasekharan
28	31	Benton, W. C.	28	15.5	Chen, Fangruo
28	31	Uzsoy, Reha	28	15.5	Shtub, Avraham
30	30	Fry, Timothy D.	28	15.5	Song, Jing-Sheng
30	30	Gupta, Jatinder N. D.	31	15.4	Tiwari, Manoj Kumar
30	30	Handfield, Robert B.	32	15.1	Sriskandarajah, Chelliah
30	30	Li, Chung-Lun	32	15.1	Moinzadeh, Kamran
30	30	Rajendran, Chandrasekharan	34	15.0	Schroeder, Roger G.
30	30	Roth, Aleda V.	35	14.7	Gupta, Jatinder N. D.
30	30	Sarker, Bhaba R.	35	14.7	Hopp, Wallace J.
37	29	Chakravarty, Amiya K.	37	14.6	Li, Chung-Lun
37	29	Silver, Edward A.	38	14.2	Sethi, Suresh P.
39	28	Egbelu, Pius J.	39	14.2	Hall, Nicholas G.
39	28	Gunasekaran, Angappa	39	14.2	Mosheiov, Gur
39	28	Moinzadeh, Kamran	41	14.1	Tang, Christopher S.
39	28	Tang, Christopher S.	42	13.9	Simchi-Levi, David
43	27	Bard, Jonathan F.	43	13.7	Bard, Jonathan F.
43	27	Cohen, Morris A.	43	13.7	Lau, Hon-Shiang
43	27	Gerchak, Yigal	45	13.6	Narasimhan, Ram
43	27	Melnyk, Steven A.	46	13.4	Roth, Aleda V.
43	27	Nee, A. Y. C.	47	13.2	Parlar, Mahmut
48	26	Axsäter, Sven	47	13.2	Webster, Scott
48	26	Berman, Oded	49	13.0	Weng, Z. Kevin
48	26	Hall, Nicholas G.	49	13.0	Chan, Felix T. S.
48	26	Lau, Hon-Shiang	51	12.6	Fry, Timothy D.
48	26	Malhotra, Manoj K.	52	12.5	Mabert, Vincent A.
48	26	Malmborg, Charles J.	52	12.5	Wemmerlv, Urban
48	26	Philipoom, Patrick R.	54	12.4	Uzsoy, Reha
48	26	Pinedo, Michael L.	55	12.3	Kogan, Konstantin
56	25	Boyer, Kenneth K.	55	12.3	Gerchak, Yigal
56	25	Dallery, Yves	57	12.2	Boyer, Kenneth K.
56	25	Mabert, Vincent A.	57	12.2	Porteus, Evan L.
56	25	Potts, Chris N.	59	12.1	Handfield, Robert B.

(*Continued*)

Table 3. (*Continued*).

Rank	Distributed articles	Author	Rank	Shared articles	Author
60	24	Buzacott, J. A.	60	12.0	So, Kut C.
60	24	Kovalyov, Mikhail Yakovlevich	60	12.0	Wacker, John G.
60	24	Mosheiov, Gur	62	11.9	Ho, Chrwan-Jyh
60	24	Mukhopadhyay, Samar K.	62	11.9	Wilhelm, Wilbert E.
60	24	Sarkis, Joseph	64	11.8	Tapiero, Charles S.
60	24	Vakharia, Asoo J.	64	11.8	Inman, Robert R.
60	24	Yao, David D.	64	11.8	Sarkis, Joseph
60	24	Yih, Yuehwern	67	11.7	Rajagopalan, Sampath
68	23	Chen, Fangruo	68	11.6	Gunasekaran, Angappa
68	23	Duenyas, Izak	69	11.5	Boctor, Fayez Fouad
68	23	Kyparisis, George J.	69	11.5	Dowlatshahi, Shad
68	23	Moskowitz, Herbert	69	11.5	Potts, Chris N.
68	23	Sabuncuoglu, Ihsan	72	11.3	Kyparisis, George J.
68	23	Sohal, Amrik S.	72	11.3	Suresh, Nallan C.
68	23	Wemmerlv, Urban	72	11.3	Tagaras, George
75	22	Chand, Suresh	75	11.2	Cachon, Gérard P.
75	22	Hodgson, Thom J.	75	11.2	de Koster, Rene B. M.
75	22	Hwang, Hark-Chin	75	11.2	Yih, Yuehwern
75	22	Inman, Robert R.	78	11.0	Buzacott, J. A.
75	22	Miltenburg, John	79	10.8	Duenyas, Izak
75	22	Parlar, Mahmut	79	10.8	Hwang, Hark-Chin
75	22	Shanthikumar, J. George	79	10.8	Yao, David D.
75	22	Swink, Morgan L.	82	10.7	Schmenner, Roger W.
75	22	Talluri, Srinivas	82	10.7	Zheng, Yu-Sheng
75	22	Wang, Hsu-Pin (Ben)	84	10.6	Sabuncuoglu, Ihsan
75	22	Webster, Scott	85	10.5	Pinedo, Michael L.
75	22	Wilhelm, Wilbert E.	85	10.5	Azizoğlu, Meral
87	21	Akturk, M. Selim	85	10.5	Graves, Stephen C.
87	21	Askin, Ronald G.	88	10.3	Gupta, Diwakar
87	21	Azizoğlu, Meral	88	10.3	Benjaafar, Saifallah
87	21	Cai, Xiaoqiang	90	10.2	Swink, Morgan L.
87	21	Gershwin, Stanley B.	91	10.1	Malhotra, Manoj K.
87	21	Guide, V. Daniel R.	91	10.1	Chen, Zhi-Long
87	21	Gupta, Yash P.	93	10.0	Cohen, Morris A.
87	21	Herroelen, Willy S.	93	10.0	Shanthikumar, J. George
87	21	Montgomery, Douglas C.	93	10.0	Sohal, Amrik S.
87	21	Proth, Jean-Marie	93	10.0	Spearman, Mark L.
87	21	So, Kut C.	93	10.0	Wang, Hsu-Pin (Ben)
87	21	Tayur, Sridhar R.	98	9.9	Gupta, Yash P.
87	21	Zheng, Yu-Sheng	98	9.9	Karmarkar, Uday S.
100	20	Benjaafar, Saifallah	100	9.8	Berman, Oded
100	20	Berry, William L.	100	9.8	Philipoom, Patrick R.
100	20	Chu, Chengbin	100	9.8	Tempelmeier, Horst
100	20	de Koster, Rene B. M.	100	9.8	Urban, Timothy L.
100	20	Elsayed, E. A.	100	9.8	Wein, Lawrence M.
100	20	Erengüç, Selçuk			
100	20	Hausman, Warren H.			
100	20	Kogan, Konstantin			
100	20	Rungtusanatham, Manus			
100	20	Strusevich, Vitaly A.			
100	20	Suresh, Nallan C.			
100	20	Swaminathan, Jayashankar M.			
100	20	Tagaras, George			
100	20	Ventura, José A.			
100	20	Vonderembse, Mark A.			
100	20	Ward, Peter T.			

Table 4. Top 100 authors over five time periods based on distributed articles.

Rank	# Articles	Author	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010
1	81	Cheng, T. C. E.	10	11	15	19	26
2	60	Lee, Hau L.	27	10	12	6	5
3	56	Lee, Chung-Yee	2	13	14	16	11
4	53	van Wassenhove, Luk N.	14	9	6	9	15
5	46	Kouvelis, Panagiotis	0	16	10	8	12
5	46	Tiwari, Manoj Kumar	0	0	2	17	27
7	44	Schroeder, Roger G.	7	5	5	15	12
8	42	Koulamas, Christos P.	5	10	4	7	16
9	41	Sethi, Suresh P.	3	9	8	7	14
10	40	Federgruen, Awi	4	10	11	6	9
11	39	Goyal, Suresh Kumar	9	12	5	3	10
12	38	Rosenblatt, Meir J.	21	6	6	4	1
12	38	Sriskandarajah, Chelliah	3	7	9	4	15
14	37	Yano, Candace Arai	7	16	6	4	4
15	36	Chan, Felix T. S.	0	1	0	9	26
15	36	Hopp, Wallace J.	4	9	7	9	7
15	36	Meredith, Jack R.	11	11	8	1	5
15	36	Simchi-Levi, David	1	5	7	14	9
15	36	Zipkin, Paul H.	7	10	9	1	9
20	35	Kim, Yeong-Dae	1	7	14	8	5
21	34	Narasimhan, Ram	0	1	7	12	14
22	33	Kusiak, Andrew	12	8	8	2	3
22	33	Tanchoco, J. M. A.	9	15	6	1	2
22	33	Voss, Christopher A.	5	4	4	11	9
25	32	Gallego, Guillermo M.	4	8	6	9	5
25	32	Shtub, Avraham	15	8	6	1	2
27	32	Song, Jing-Sheng	2	3	7	10	10
28	31	Benton, W. C.	6	10	4	7	4
28	31	Uzsoy, Reha	0	11	5	5	10
30	30	Fry, Timothy D.	10	10	5	3	2
30	30	Gupta, Jatinder N. D.	4	5	10	4	7
30	30	Handfield, Robert B.	0	5	14	3	8
30	30	Li, Chung-Lun	0	4	10	8	8
30	30	Rajendran, Chandrasekharan	1	5	11	10	3
30	30	Roth, Aleda V.	1	4	2	9	14
30	30	Sarker, Bhaba R.	3	3	8	9	7
37	29	Chakravarty, Amiya K.	14	5	6	4	0
37	29	Silver, Edward A.	9	4	2	12	2
39	28	Egbelu, Pius J.	7	8	7	6	0
39	28	Gunasekaran, Angappa	2	7	3	7	9
39	28	Moinzadeh, Kamran	9	5	6	5	3
39	28	Tang, Christopher S.	4	9	7	4	4
43	27	Bard, Jonathan F.	6	9	4	4	4
43	27	Cohen, Morris A.	7	5	5	6	4
43	27	Gerchak, Yigal	6	5	6	8	2
43	27	Melnyk, Steven A.	4	7	6	8	2
43	27	Nee, A. Y. C.	1	1	7	9	9
48	26	Axsäter, Sven	7	3	5	6	5
48	26	Berman, Oded	1	4	5	4	12
48	26	Hall, Nicholas G.	5	3	5	7	6
48	26	Lau, Hon-Shiang	4	10	5	5	2
48	26	Malhotra, Manoj K.	1	7	9	6	3
48	26	Malmborg, Charles J.	3	3	9	6	5
48	26	Philipoom, Patrick R.	11	7	6	1	1
48	26	Pinedo, Michael L.	6	3	5	3	9
56	25	Boyer, Kenneth K.	0	0	8	9	8
56	25	Dallery, Yves	2	2	8	8	5
56	25	Mabert, Vincent A.	10	5	2	2	6
56	25	Potts, Chris N.	6	6	5	7	1

(*Continued*)

Table 4. (*Continued*).

Rank	# Articles	Author	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010
60	24	Buzacott, J. A.	11	5	0	8	0
60	24	Kovalyov, Mikhail Yakovlevich	0	0	5	11	8
60	24	Mosheiov, Gur	0	2	3	9	10
60	24	Mukhopadhyay, Samar K.	1	8	7	5	3
60	24	Sarkis, Joseph	0	1	6	9	8
60	24	Vakharia, Asoo J.	3	6	7	4	4
60	24	Yao, David D.	11	2	3	6	2
60	24	Yih, Yuehwern	0	8	6	7	3
68	23	Chen, Fangruo	1	4	9	7	2
68	23	Duenyas, Izak	0	6	8	4	5
68	23	Kyparisis, George J.	0	1	3	5	14
68	23	Moskowitz, Herbert	4	5	8	4	2
68	23	Sabuncuoglu, Ihsan	0	2	6	7	8
68	23	Sohal, Amrik S.	6	2	6	7	2
68	23	Wemmerlv, Urban	11	7	3	1	1
75	22	Chand, Suresh	5	7	3	4	3
75	22	Hodgson, Thom J.	3	5	6	7	1
75	22	Hwang, Hark-Chin	5	4	5	5	3
75	22	Inman, Robert R.	2	9	3	5	3
75	22	Miltenburg, John	5	6	4	2	5
75	22	Parlar, Mahmut	3	5	7	2	5
75	22	Shanthikumar, J. George	8	5	5	1	3
75	22	Swink, Morgan L.	0	2	4	4	12
75	22	Talluri, Srinivas	0	0	2	10	10
75	22	Wang, Hsu-Pin (Ben)	10	8	4	0	0
75	22	Webster, Scott	0	5	7	6	4
75	22	Wilhelm, Wilbert E.	8	5	6	1	2
87	21	Akturk, M. Selim	0	0	6	7	8
87	21	Askin, Ronald G.	3	8	5	4	1
87	21	Azizoğlu, Meral	0	0	7	5	9
87	21	Cai, Xiaoqiang	0	1	7	8	5
87	21	Gershwin, Stanley B.	3	4	5	3	6
87	21	Guide, V. Daniel R.	0	1	7	6	7
87	21	Gupta, Yash P.	8	9	4	0	0
87	21	Herroelen, Willy S.	1	1	6	9	4
87	21	Montgomery, Douglas C.	1	4	5	7	4
87	21	Proth, Jean-Marie	3	6	7	2	3
87	21	So, Kut C.	5	6	5	0	5
87	21	Tayur, Sridhar R.	0	6	7	4	4
87	21	Zheng, Yu-Sheng	1	11	4	5	0
100	20	Benjaafar, Saifallah	0	1	6	4	9
100	20	Berry, William L.	5	8	5	2	0
100	20	Chu, Chengbin	1	3	3	3	10
100	20	de Koster, Rene B. M.	6	0	2	5	7
100	20	Elsayed, E. A.	5	7	3	3	2
100	20	Erengüç, Selçuk	6	3	6	5	0
100	20	Hausman, Warren H.	1	5	5	4	5
100	20	Kogan, Konstantin	0	1	6	7	6
100	20	Rungtusanatham, Manus	0	0	2	9	9
100	20	Strusevich, Vitaly A.	0	4	3	7	6
100	20	Suresh, Nallan C.	4	8	3	4	1
100	20	Swaminathan, Jayashankar M.	0	1	5	7	7
100	20	Tagaras, George	6	4	1	3	6
100	20	Ventura, José A.	3	5	4	5	3
100	20	Vonderembse, Mark A.	0	0	5	10	5
100	20	Ward, Peter T.	1	4	5	5	5

5.3 *Research by institutions*

This section presents the top 100 institutions, and ties, that have had the greatest overall contribution to the field of OM as measured by the number of articles published across the 11 designated journals. As discussed earlier, the true impact of an institution should not be limited to just the research of authors who were affiliated with that institution at the time an article was published. We argue that the institutions where researchers received their research training also have an impact on the OM field. With this in mind, we look at institutional contribution levels, with respect to both our districted articles and shared articles metrics, from three different perspectives: (1) affiliated author research; (2) PhD graduate research and (3) combination measure. The combination measure is the average of the research productivity measures for affiliated authors and PhD graduates, and it provides an overall measure of an institution's contribution to the field.

Table 5 presents, in rank order, the top 100 institutions across all three categories with respect to both distributed and shared articles. For sake of brevity, we present in Appendix 4 the full name of each institution corresponding to the abbreviation used in this paper. In addition, Table 5 provides the number of unique affiliated authors for each institution as well as the number of unique PhD graduates from each institution that have published at least one article. For the 26 year time period studied in this paper, we see that Purdue ranks first in terms of affiliated author research, second in terms of PhD graduate research and first in terms of the combination measure. Perhaps not so surprising is the consistency in rankings across all three measures that top-ranked institutions such as Purdue, Penn State, GA Tech and U. Michigan demonstrate. Clearly these institutions have a research active faculty as well as a mature and well established PhD programme.

We can also use this data to assess the average research productivity of affiliated authors at each institution. Consider Purdue and Columbia with 147 and 61 different affiliated authors, respectively. If we divide the total number of distributed articles by the number of different authors, we see that authors at Purdue averaged 3.2 (470/147) articles each while Columbia averaged 4.6 (278/61).

Using a similar analysis, we can determine the average productivity of an institution's PhD graduates, which is a measure of the quality of its PhD programme in OM. Although, the number of PhD graduates is also a measure of the quality and size of a PhD programme, the average number of articles for each graduate may be indicative of the quality of the students admitted and/or the quality of the training they receive in the programme. Clearly, MIT, Purdue and Stanford have graduated the largest number of PhD students who have published at least one article, 278, 250 and 240, respectively. The average number of articles per PhD author from MIT is 2.7 (748/278), for Purdue the average is 3.1 (763/250) and for Stanford the average is 3.9 (944/240).

Table 5 also demonstrates how various institutions contribute differently to the development of the field of OM. Comparing the rankings of Carnegie Mellon and the NU Singapore across each of the three measures, we see Carnegie Mellon ranking high on the PhD graduate research with a rank of 6th. However, it only ranks 29th based on research by affiliated authors. The high PhD graduate ranking is enough to place Carnegie Mellon 9th on the combination measure. In contrast, we see the NU Singapore ranked 3rd in the affiliated author measure but much lower, 43rd, based on research by PhD graduates. This results in an overall contribution rank of 20th. Clearly each of these institutions has had a significant impact on the field of OM; for example, Carnegie Mellon through its PhD graduates and the NU Singapore through its affiliated faculty.

In addition to looking at the total institutional contributions from 1985 through 2010, it is also interesting to see if there have been any significant shifts in contributions from individual institutions across smaller time periods. Positive shifts in the research by affiliated authors may be indicative of an institution that is shifting towards a more research oriented focus, has hired prolific researchers, or has recognised these 11 journals as being preferred outlets for research. In order to identify any changes in the contribution of affiliated authors, Table 6 shows the number of distributed articles and shared articles for each institution across the same five time blocks used for affiliated authors.

Consider that Purdue, while ranked number one in distributed and shared articles by affiliated authors, has shown a decline in contributions over the last two five-year periods, whereas Penn State shows an increasing trend. There have been some dramatic increases in contributions from institutions such as Shanghai JTU, which had zero distributed articles in the first two time periods, then 6 from 1996 to 2000, 30 from 2001to 2005 and 109 from 2006 to 2010.

Table 7 presents the top 100 institutions based on PhD graduate research across the five time periods for both distributed and shared articles. It is clear that some institutions are showing an increasing trend in research by PhD graduates. Consider Stanford, ranked number one overall, shows an increasing trend in research over the more recent time periods as had MIT, U. Michigan and U. Penn, ranked 3rd, 4th, and 5th, respectively overall. PhD graduates from GA Tech have increased their research productivity almost 400% from 1985 to 1990 through 2006 to 2010. An increasing pattern in the research by PhD graduates may be indicative of an institution improving its PhD programme through a

Table 5. Institution research: affiliated author, PhD graduate, and combination articles (1985–2010).

Affiliated author research					PhD graduate research					Combination measure			
Rank	School	# Affiliated authors	Distributed articles	Shared articles	Rank	School	# PhD authors	Distributed articles	Shared articles	Rank	School	Distributed articles	Shared articles
1	Purdue	147	470	200.9	1	Stanford	240	944	470.9	1	Purdue	616.5	273.7
2	Penn State	137	395	162.7	2	Purdue	250	763	346.5	2	Stanford	589.0	292.6
3	NU Singapore	147	366	143.0	3	MIT	278	748	333.2	3	MIT	502.5	222.1
4	GA Tech	122	311	130.0	4	U. Michigan	215	600	260.0	4	Penn State	452.5	191.8
5	Michigan State	70	302	120.1	5	U. Penn.	139	563	263.3	5	U. Michigan	444.5	196.0
6	U. Michigan	119	289	132.1	6	Carnegie Mellon	156	529	234.3	6	GA Tech	417.5	182.2
7	U. Minnesota	81	282	116.4	7	GA Tech	194	524	234.4	7	U. Penn.	392.0	181.1
8	Arizona State	116	281	104.3	8	Penn State	192	510	220.8	8	Ohio State	359.0	164.4
9	Columbia	61	278	142.9	9	Ohio State	135	468	214.8	9	Carnegie Mellon	351.5	154.6
10	Texas A&M	118	275	120.2	10	Cal. Berkeley	157	451	210.2	10	Columbia	334.0	163.6
11	MIT	124	257	111.1	11	Northwestern	120	446	191.3	11	Northwestern	317.5	137.3
12	HKPU	96	252	98.6	12	IU Bloomington	108	442	213.7	12	U. Minnesota	315.5	130.8
13	Ohio State	83	250	114.0	13	Cornell	112	432	200.0	13	Cornell	307.0	141.2
14	Nanyang Tech	115	248	100.0	14	Columbia	105	390	184.4	14	Cal. Berkeley	304.5	142.7
15	Stanford	62	234	114.3	15	UT Austin	126	378	161.2	15	UT Austin	292.0	125.4
16	Loughborough	92	229	90.7	16	VA Tech	124	361	163.5	16	Michigan State	291.0	117.8
17	Tel Aviv	62	222	112.1	17	U. Minnesota	98	349	145.2	17	Texas A&M	284.0	125.4
18	U. Penn.	58	221	98.8	18	U. Florida	100	321	146.5	18	VA Tech	276.5	122.0
19	UT Austin	68	206	89.6	19	U. Wisc. Madison	117	316	138.4	19	IU Bloomington	272.5	131.7
20	U. Florida	84	199	81.7	20	Texas A&M	104	293	130.5	20	NU Singapore	263.0	101.3
21	HKUST	67	198	90.2	21	Michigan State	92	280	115.4	21	U. Florida	260.0	114.1
22	NCSU	66	193	72.0	22	UNC	74	275	126.4	22	Arizona State	257.0	101.0
23	VA Tech	78	192	80.4	23	KU Leuven	68	250	98.7	23	U. Wisc. Madison	228.5	107.0
24	Northwestern	67	189	83.4	24	Harvard	100	249	112.2	24	UNC	220.0	100.8
25	KU Leuven	62	188	75.2	25	U. Cambridge	61	246	112.9	25	KU Leuven	219.0	87.0
26	Eindhoven	81	187	87.0	26	Arizona State	102	233	97.7	26	Loughborough	215.5	82.4
27	KAIST	88	185	80.8	27	Yale	37	225	110.9	27	NCSU	203.5	80.5
28	Cornell	53	182	82.5	28	UCLA	77	223	94.7	28	Eindhoven	189.0	87.6
29	Carnegie Mellon	76	174	74.9	29	U. Georgia	43	221	98.1	29	U. Manchester	184.5	84.2
30	Erasmus	70	172	67.7	29	U. Manchester	91	221	96.7	30	U. Cambridge	181.5	80.8
31	U. South Carolina	28	168	67.7	31	U. Iowa	78	217	101.5	31	Nanyang Tech	180.0	70.5

(*Continued*)

Table 5. (*Continued*).

Affiliated author research					PhD graduate research					Combination measure			
Rank	School	# Affiliated authors	Distributed articles	Shared articles	Rank	School	# PhD authors	Distributed articles	Shared articles	Rank	School	Distributed articles	Shared articles
32	Technion	63	167	73.2	32	NCSU	79	214	89.1	32	Harvard	178.5	83.0
33	UNC	58	165	75.2	33	Loughborough	97	202	74.2	33	Tel Aviv	177.5	86.6
34	Cranfield	82	163	71.0	34	U. Waterloo	62	199	96.7	34	U. Iowa	175.5	79.7
35	Clemson	58	160	68.7	35	Eindhoven	75	191	88.3	35	Erasmus	174.0	68.8
36	Cal. Berkeley	44	158	75.2	36	U. Toronto	55	190	81.7	36	UCLA	172.5	76.4
37	Bilkent	54	157	69.0	37	Case Western	64	186	96.9	37	HKPU	172.0	65.1
38	U. Hong Kong	50	154	55.9	38	Clemson	64	180	78.0	38	Clemson	170.0	73.3
39	UT Dallas	46	152	54.5	39	Erasmus	69	176	70.0	39	Cranfield	166.5	72.4
40	U. Manchester	68	148	71.6	39	Texas Tech	46	176	89.7	40	U. Toronto	163.5	69.7
41	P. U. Milan	53	147	58.4	41	U. Birmingham	43	174	75.9	41	U. Waterloo	161.0	76.8
42	Shanghai JTU	93	145	54.3	42	Cranfield	76	170	73.7	42	Technion	159.5	74.8
43	SUNY Buffalo	54	143	64.6	43	NU Singapore	84	160	59.7	43	Case Western	153.0	76.6
44	McMaster	39	142	76.4	44	U. Rochester	45	154	66.2	44	KAIST	149.5	65.1
45	U. Wisc. Madison	54	141	75.6	45	Technion	55	152	76.4	45	SUNY Buffalo	144.0	63.6
46	Rutgers	71	138	65.6	46	U. Cincinnati	52	151	69.8	46	P. U. Milan	143.5	56.6
46	U. Maryland	61	138	58.5	47	SUNY Buffalo	64	145	62.6	47	U. Cincinnati	142.5	64.5
48	U. Toronto	56	137	57.7	48	U. Illinois	71	142	62.1	48	U. Georgia	142.0	62.5
49	Duke	40	135	63.1	49	P. U. Milan	49	140	54.8	49	U. South Carolina	141.5	55.3
50	Chinese UHK	50	134	52.4	49	U. Washington	50	140	64.3	50	HKUST	138.5	59.9
50	IIT Madras	54	134	66.0	51	N. Chaio Tung	69	139	58.4	51	N. Chaio Tung	136.5	58.2
50	N. Chaio Tung	76	134	58.0	52	Southern Cal.	42	138	67.0	52	McMaster	135.0	68.5
50	U. Cincinnati	50	134	59.1	53	Tel Aviv	45	133	61.1	53	U. Washington	133.0	62.3
50	U. Iowa	54	134	57.9	53	U. Nottingham	46	133	66.4	54	U. Maryland	131.0	54.1
55	City UHK	72	132	53.5	55	U. Bradford	38	132	60.0	55	IIT Madras	130.5	64.5
56	U. Calgary	42	129	64.8	56	McMaster	45	128	60.6	56	Yale	127.0	63.6
57	Rensselaer	41	128	62.1	57	IIT Madras	44	127	63.1	57	Southern Cal.	124.0	61.2
58	U. Washington	49	126	60.4	58	U. Warwick	48	125	61.0	58	Rensselaer	123.5	56.5
59	Wash. St. Louis	27	125	63.3	59	U. Maryland	51	124	49.7	59	Rutgers	123.0	56.3
60	U. Waterloo	45	123	56.9	60	U. Padua	34	121	56.4	59	U. Hong Kong	123.0	44.2

61	UCLA	41	122	58.1	61	Rensselaer	49	119	50.9	61	Shanghai JTU	122.5	46.2
62	Case Western	52	120	56.3	62	U. South Carolina	33	115	43.0	62	U. Illinois	122.0	53.2
63	Louisiana State	40	117	56.9	63	KAIST	82	114	49.4	63	U. Rochester	113.5	51.0
63	NYU	47	117	49.6	64	Nanyang Tech	75	112	40.9	64	Texas Tech	111.5	54.1
63	U. Cambridge	45	117	48.7	65	Lehigh	38	111	48.4	65	UT Dallas	107.0	38.7
66	Iowa State	52	110	52.6	66	Oklahoma State	38	110	52.7	66	U. Nottingham	106.5	55.0
66	U. Groningen	35	110	48.3	67	Rutgers	64	108	46.9	67	INSEAD	105.5	43.5
66	Southern Cal.	46	110	55.4	68	U. Bath	35	105	35.0	68	NYU	105.0	48.9
69	INSEAD	37	109	45.2	69	U. Missouri	35	103	45.9	69	U. Birmingham	104.5	45.4
70	Harvard	64	108	53.8	69	U. Texas Arlington	25	103	49.7	69	Wash. St. Louis	104.5	50.9
71	Laval U.	42	107	45.2	71	Cardiff	40	102	42.5	71	U. Arizona	103.5	47.2
72	U. Arizona	48	106	47.6	71	INSEAD	26	102	41.8	71	U. Padua	103.5	47.2
73	Auburn	48	104	46.9	73	U. Arizona	47	101	46.9	73	Bilkent	103.0	45.0
74	IU Bloomington	33	103	49.7	73	U. Twente	48	101	42.8	73	U. Bradford	103.0	47.2
75	U. Illinois	46	102	44.3	75	Linkoping	30	100	59.4	75	U. Groningen	102.5	44.0
76	Cardiff	39	101	43.7	75	Shanghai JTU	68	100	38.0	76	Cardiff	101.5	43.1
76	Concordia	31	101	46.8	77	U. Groningen	32	95	39.7	77	City UHK	101.0	40.9
76	N. Cheng Kung	65	101	41.7	78	Tsinghua	36	94	33.6	78	U. Warwick	99.5	51.9
79	U. Windsor	40	99	45.2	79	NYU	45	93	48.3	79	U. Bath	97.0	33.0
80	N. Tsing Hua	62	96	39.0	80	HKPU	55	92	31.5	80	Iowa State	96.0	44.6
81	IIT Delhi	40	95	35.4	80	U. British Col.	28	92	44.5	80	U. Twente	96.0	39.9
81	Yuan Ze	49	95	40.6	80	U. Hong Kong	33	92	32.6	82	Oklahoma State	95.0	47.7
83	U. Wisc. Milkw.	31	94	51.7	80	U. London	33	92	39.0	83	U. Windsor	94.0	43.2
84	Tsinghua	52	92	32.3	80	U. Pittsburgh	56	92	37.2	84	Tsinghua	93.0	33.0
84	U. Pittsburgh	43	92	34.7	85	Kyoto	42	91	32.5	85	Duke	92.0	41.3
86	U. Twente	48	91	37.1	85	U. Chicago	36	91	40.3	85	IIT Delhi	92.0	35.6
87	Middle East TU	39	90	42.8	87	Brunel	36	89	39.8	87	U. Pittsburgh	92.0	35.9
88	U. Bath	46	89	31.1	87	IIT Delhi	35	89	35.7	88	Middle East TU	88.0	40.8
89	Pohang UST	37	87	31.8	87	U. Windsor	32	89	41.2	89	U. Missouri	87.5	40.2
89	Tilburg	43	87	33.5	90	Grenoble	16	87	33.7	90	Auburn	85.0	38.1
91	U. Padua	34	86	38.1	91	Middle East TU	39	86	38.8	91	Louisiana State	84.0	40.1
92	Ben Gurion	34	83	43.0	92	Boston U.	31	85	37.6	92	Chinese UHK	82.5	33.4
93	Florida Int.	14	82	46.4	93	George Wash.	25	84	38.3	92	U. Calgary	82.5	40.8
93	LBS	24	82	43.5	93	Wash. St. Louis	25	84	38.5	94	Linkoping	81.5	45.2

(*Continued*)

Table 5. (*Continued*).

Affiliated author research					PhD graduate research					Combination measure			
Rank	School	# Affiliated authors	Distributed articles	Shared articles	Rank	School	# PhD authors	Distributed articles	Shared articles	Rank	School	Distributed articles	Shared articles
93	N. Taiwan UST	41	82	34.6	95	Iowa State	46	82	36.6	95	Boston U.	81.0	35.6
93	U. W. Ontario	30	82	34.5	95	U. Lancaster	35	82	39.0	96	U. Manitoba	80.5	39.1
97	Northeastern	34	81	36.2	95	U. Manitoba	28	82	36.5	97	Lehigh	80.0	34.7
98	King Fahd UPM	34	80	36.4	98	U. Mass. Amherst	45	80	34.0	98	U. W. Ontario	79.0	33.8
98	Oklahoma State	26	80	42.8	98	U. Seville	44	80	30.6	99	U. Lancaster	78.0	36.7
98	PU Tours	32	80	33.8	100	HKUST	43	79	29.6	100	U. British Col.	77.5	36.5
98	U. Nottingham	43	80	43.5	100	London SEPS	14	79	40.5				

Table 6. Top 100 institutions based on author affiliation (distributed and shared articles by time period).

Distributed articles								Shared articles							
Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010	Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010
1	470	Purdue	82	120	104	87	77	1	200.9	Purdue	34.6	54.3	45.8	35.1	31.1
2	395	Penn State	69	67	64	98	97	2	162.7	Penn State	32.7	31.3	27.9	35.6	35.3
3	366	NU Singapore	14	49	49	138	116	3	143.0	NU Singapore	9.2	22.8	20.4	50.7	39.9
4	311	GA Tech	30	46	72	64	99	4	142.9	Columbia	20.3	29.2	32.3	26.9	34.3
5	302	Michigan State	15	37	69	82	99	5	132.1	U. Michigan	21.1	29.4	29.1	16.9	35.6
6	289	U. Michigan	40	56	59	42	92	6	130.0	GA Tech	14.0	20.1	32.4	26.3	37.2
7	282	U. Minnesota	46	55	39	69	73	7	120.2	Texas A&M	20.8	19.1	32.0	18.5	29.8
8	281	Arizona State	24	26	42	93	96	8	120.1	Michigan State	7.3	17.8	28.0	32.2	34.9
9	278	Columbia	32	54	59	56	77	9	116.4	U. Minnesota	16.8	24.4	17.0	28.9	29.3
10	275	Texas A&M	43	52	65	43	72	10	114.3	Stanford	31.7	13.1	26.3	17.5	25.8
11	257	MIT	38	41	67	48	63	11	114.0	Ohio State	32.4	25.8	21.1	15.0	19.7
12	252	HKPU	0	8	36	84	124	12	112.1	Tel Aviv	21.7	23.8	27.1	22.8	16.8
13	250	Ohio State	57	56	52	36	49	13	111.1	MIT	19.4	21.3	27.8	17.8	24.8
14	248	Nanyang Tech	4	49	45	85	65	14	104.3	Arizona State	11.5	12.5	16.5	30.7	33.1
15	234	Stanford	57	30	54	37	56	15	100.0	Nanyang Tech	2.7	20.4	21.0	31.8	24.2
16	229	Loughborough	34	33	58	62	42	16	98.8	U. Penn.	12.5	18.3	17.7	26.3	24.1
17	222	Tel Aviv	40	39	56	49	38	17	98.6	HKPU	0.0	4.8	16.4	31.3	46.1
18	221	U. Penn.	27	35	41	60	58	18	90.7	Loughborough	15.8	15.0	27.3	21.1	11.4
19	206	UT Austin	46	46	36	35	43	19	90.2	HKUST	1.0	5.7	22.3	30.8	30.5
20	199	U. Florida	22	36	38	40	63	20	89.6	UT Austin	21.9	18.8	16.3	15.4	17.3
21	198	HKUST	1	10	38	77	72	21	87.0	Eindhoven	18.0	14.9	20.8	16.3	17.0
22	193	NCSU	26	26	60	42	39	22	83.4	Northwestern	7.2	13.9	17.5	20.3	24.5
23	192	VA Tech	56	27	33	42	34	23	82.5	Cornell	18.5	14.8	9.8	16.8	22.5
24	189	Northwestern	18	26	38	45	62	24	81.7	U. Florida	11.2	14.9	15.5	15.2	25.0
25	188	KU Leuven	32	20	39	32	65	25	80.8	KAIST	9.2	16.7	28.8	16.3	9.9
26	187	Eindhoven	27	31	48	38	43	26	80.4	VA Tech	23.1	10.8	16.8	17.3	12.5
27	185	KAIST	17	36	65	42	25	27	76.4	McMaster	16.5	16.7	19.4	9.7	14.1
28	182	Cornell	36	29	24	37	56	28	75.6	U. Wisc. Madison	13.7	25.2	17.3	7.9	11.6
29	174	Carnegie Mellon	29	47	42	23	33	29	75.2	UNC	13.4	14.6	9.3	20.6	17.4
30	172	Erasmus	13	23	31	40	65	29	75.2	KU Leuven	14.1	8.0	17.1	14.2	21.8
31	168	U. South Carolina	38	42	35	22	31	29	75.2	Cal. Berkeley	14.1	20.8	8.6	13.3	18.4
32	167	Technion	45	24	24	43	31	32	74.9	Carnegie Mellon	16.2	20.0	15.9	7.9	14.9
33	165	UNC	28	32	21	45	39	33	73.2	Technion	22.3	10.9	10.4	15.5	14.0
34	163	Cranfield	8	20	31	46	58	34	72.0	NCSU	13.7	10.3	18.8	14.2	15.0
35	160	Clemson	32	23	29	34	42	35	71.6	U. Manchester	21.5	10.0	13.3	16.5	10.3
36	158	Cal. Berkeley	26	45	20	29	38	36	71.0	Cranfield	5.2	10.8	15.2	20.9	18.9
37	157	Bilkent	3	16	33	42	63	37	69.0	Bilkent	1.5	8.7	16.7	16.5	25.7
38	154	U. Hong Kong	4	4	15	60	71	38	68.7	Clemson	14.6	11.3	12.9	13.5	16.3

(*Continued*)

Table 6. (*Continued*).

Distributed articles								Shared articles							
Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010	Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010
39	152	UT Dallas	4	3	25	37	83	39	67.7	Erasmus	4.7	7.5	14.0	16.0	25.5
40	148	U. Manchester	39	20	27	34	28	39	67.7	U. South Carolina	15.0	16.3	14.5	8.4	13.4
41	147	Poly. Milan	7	20	49	39	32	41	66.0	IIT Madras	9.0	19.5	21.8	11.0	4.7
42	145	Shanghai JTU	0	0	6	30	109	42	65.6	Rutgers	14.4	15.9	11.0	7.0	17.3
43	143	SUNY Buffalo	32	34	35	22	20	43	64.8	U. Calgary	5.5	10.8	12.0	20.3	16.2
44	142	McMaster	27	33	32	21	29	44	64.6	SUNY Buffalo	14.8	16.2	15.3	9.3	9.1
45	141	U. Wisc. Madison	25	41	31	17	27	45	63.3	Wash. St. Louis	6.3	9.2	18.9	14.5	14.3
46	138	Rutgers	27	38	22	16	35	46	63.1	Duke	6.0	9.0	14.7	9.5	24.0
46	138	U. Maryland	11	19	28	38	42	47	62.1	Rensselaer	4.0	17.1	19.5	13.1	8.4
48	137	U. Toronto	11	29	28	20	49	48	60.4	U. Washington	13.8	8.9	15.2	12.8	9.8
49	135	Duke	12	20	29	24	50	49	59.1	U. Cincinnati	17.8	10.7	9.7	13.5	7.5
50	134	Chinese UHK	4	11	33	41	45	50	58.5	U. Maryland	6.2	7.7	12.0	15.5	17.2
50	134	IIT Madras	19	39	42	23	11	51	58.4	Poly. Milan	3.2	9.3	22.4	14.2	9.4
50	134	N. Chaio Tung	6	17	21	40	50	52	58.1	UCLA	10.0	14.1	7.5	13.4	13.1
50	134	U. Cincinnati	41	23	19	31	20	53	58.0	N. Chaio Tung	2.8	6.5	10.3	16.8	21.5
50	134	U. Iowa	20	63	22	15	14	54	57.9	U. Iowa	9.4	27.8	9.3	6.0	5.5
55	132	City UHK	2	9	23	43	55	55	57.7	U. Toronto	5.7	12.0	11.6	8.6	19.8
56	129	U. Calgary	10	17	21	40	41	56	56.9	Louisiana State	17.7	8.8	12.8	10.8	6.8
57	128	Rensselaer	8	34	34	32	20	56	56.9	U. Waterloo	21.5	14.8	8.8	6.3	5.6
58	126	U. Washington	32	18	28	23	25	58	56.3	Case Western	17.0	9.7	12.7	13.3	3.8
59	125	Wash. St. Louis	11	16	38	28	32	59	55.9	U. Hong Kong	3.0	1.7	6.8	20.5	23.9
60	123	U. Waterloo	43	30	20	15	15	60	55.4	Southern Cal.	5.3	9.8	16.2	7.6	16.5
61	122	UCLA	16	30	17	31	28	61	54.5	UT Dallas	2.0	1.7	10.1	13.8	27.0
62	120	Case Western	33	17	35	27	8	62	54.3	Shanghai JTU	0.0	0.0	2.4	12.9	39.1
63	117	Louisiana State	38	17	26	21	15	63	53.8	Harvard	7.5	5.6	12.5	13.0	15.2
63	117	NYU	17	9	14	32	45	64	53.5	City UHK	0.8	4.0	10.7	16.6	21.4
63	117	U. Cambridge	6	22	33	32	24	65	52.6	Iowa State	10.9	13.2	10.3	9.3	9.0
66	110	Iowa State	21	28	20	18	23	66	52.4	Chinese UHK	2.8	6.2	13.1	15.7	14.7
66	110	U. Groningen	1	6	16	35	52	67	51.7	U. Wisc. Milkw.	15.5	13.1	12.0	3.7	7.3
66	110	Southern Cal.	10	19	30	15	36	68	49.7	IU Bloomington	14.5	7.7	10.4	5.0	12.1
69	109	INSEAD	11	11	12	29	46	69	49.6	NYU	10.1	3.1	6.0	13.4	16.9
70	108	Harvard	14	8	23	27	36	70	48.7	U. Cambridge	4.0	10.8	11.6	12.2	10.0
71	107	Laval	8	32	18	17	32	71	48.3	U. Groningen	0.3	2.0	7.5	15.8	22.6
72	106	U. Arizona	25	30	20	20	11	72	47.6	U. Arizona	12.6	13.6	9.1	8.3	4.0
73	104	Auburn	15	27	18	25	19	73	46.9	Auburn	7.7	12.9	8.0	9.6	8.8
74	103	IU Bloomington	25	18	22	11	27	74	46.8	Concordia	10.2	11.1	6.5	5.9	13.2
75	102	U. Illinois	12	20	15	26	29	75	46.4	Florida Int.	3.6	10.8	4.8	8.7	18.5
76	101	Cardiff	8	13	17	33	30	76	45.3	Monash	4.5	9.6	10.8	14.9	5.5
76	101	Concordia	18	25	13	12	33	77	45.2	U. Windsor	11.5	12.7	8.5	4.2	8.3
76	101	N. Cheng Kung	0	6	14	25	56	77	45.2	Laval	4.8	13.9	9.2	6.2	11.0

79	99	U. Windsor	25	28	19	10	17	77	45.2	INSEAD	7.3	5.2	4.5	10.8	17.4
80	96	N. Tsing Hua	2	14	18	33	29	80	44.3	U. Illinois	6.2	10.1	6.7	9.3	12.2
81	95	IIT Delhi	9	15	9	22	40	81	43.7	Cardiff	4.0	6.0	8.7	13.9	11.1
81	95	Yuan Ze	1	2	15	23	54	82	43.5	LBS	3.3	9.5	7.7	13.8	9.3
83	94	U. Wisc. Milkw.	26	21	25	6	16	82	43.5	U. Nottingham	7.8	11.0	11.8	6.0	6.9
84	92	Tsinghua	0	1	14	27	50	84	43.0	Ben Gurion	7.9	6.8	12.9	7.7	7.7
84	92	U. Pittsburgh	2	17	19	24	30	85	42.8	Middle East Tech	2.8	5.0	7.4	15.5	12.1
86	91	U. Twente	11	13	38	18	11	85	42.8	U. Warwick	8.0	3.2	12.6	13.9	5.1
87	90	Middle East Tech	4	9	18	30	29	85	42.8	Oklahoma State	7.5	15.9	7.7	4.7	7.0
88	89	U. Bath	2	5	27	11	44	88	41.7	N. Cheng Kung	0.0	1.6	5.5	10.6	24.1
89	87	Pohang UST	1	9	9	39	29	88	41.7	U. Manitoba	21.8	9.8	6.2	2.2	1.7
89	87	Tilburg	3	28	25	13	18	90	40.6	Yuan Ze	0.2	0.6	10.0	9.6	20.2
91	86	U. Padua	2	7	18	16	43	91	39.0	N. Tsing Hua	1.0	6.0	7.8	13.1	11.1
92	83	Ben Gurion	15	14	22	13	19	92	38.1	U. Padua	0.7	3.7	11.0	6.5	16.2
93	82	Florida Int.	6	16	9	15	36	93	37.1	U. Twente	4.0	6.8	16.2	6.3	3.8
93	82	LBS	5	16	16	27	18	94	36.4	King Fahd UPM	0.5	10.0	9.7	7.0	9.3
93	82	N. Taiwan UST	0	4	13	33	32	95	36.2	Lund	6.5	4.7	8.0	6.7	10.4
93	82	U. W. Ontario	9	5	5	27	36	95	36.2	Northeastern	9.4	10.2	8.0	3.5	5.2
97	81	Northeastern	18	24	20	8	11	97	35.8	U. Rochester	14.8	7.5	2.0	7.0	4.5
98	80	King Fahd UPM	1	22	19	16	22	98	35.4	IIT Delhi	4.7	6.7	3.6	7.9	12.6
98	80	Oklahoma State	11	32	16	7	14	99	34.8	Florida State	5.5	10.4	11.5	1.7	5.8
98	80	Poly. Tours	6	8	24	21	21	100	34.7	U. Pittsburgh	1.0	9.0	7.3	8.0	9.5
98	80	U. Nottingham	11	18	24	9	18								

Table 7. Top 100 institutions based on PhD graduate research (distributed and shared articles by time period).

Distributed articles								Shared articles							
Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010	Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010
1	944	Stanford	144	158	185	197	260	1	470.9	Stanford	84.6	81.4	97.0	94.9	113.1
2	763	Purdue	136	176	171	141	139	2	346.5	Purdue	66.1	85.3	80.3	56.5	58.3
3	748	MIT	84	108	167	185	204	3	333.2	MIT	44.0	51.4	71.0	80.3	86.5
4	600	U. Michigan	62	93	112	134	199	4	263.3	U. Penn.	44.9	40.7	56.5	55.4	65.8
5	563	U. Penn.	81	86	110	124	162	5	260.0	U. Michigan	28.9	42.0	55.5	55.6	78.1
6	529	Carnegie Mellon	70	104	108	107	140	6	234.4	GA Tech	20.7	38.2	56.1	56.2	63.3
7	524	GA Tech	43	81	116	121	163	7	234.3	Carnegie Mellon	38.2	50.3	50.4	43.1	52.3
8	510	Penn State	90	106	87	103	124	8	220.8	Penn State	42.0	48.8	42.7	40.2	47.1
9	468	Ohio State	69	74	107	87	131	9	214.8	Ohio State	37.6	34.2	49.4	37.5	56.1
10	451	Cal. Berkeley	86	90	86	74	115	10	213.7	IU Bloomington	48.7	44.9	51.1	33.2	35.9
11	446	Northwestern	60	68	80	106	132	11	210.2	Cal. Berkeley	48.8	42.6	37.8	31.7	49.4
12	442	IU Bloomington	87	86	102	78	89	12	200.0	Cornell	35.0	39.1	46.6	37.0	42.3
13	432	Cornell	61	80	102	86	103	13	191.3	Northwestern	27.7	34.5	35.6	41.3	52.2
14	390	Columbia	26	59	68	116	121	14	184.4	Columbia	13.1	31.8	32.1	53.0	54.5
15	378	UT Austin	37	80	67	91	103	15	163.5	VA Tech	31.5	38.9	39.3	28.9	25.0
16	361	VA Tech	65	79	86	68	63	16	161.2	UT Austin	16.5	34.3	32.0	36.5	42.0
17	349	U. Minnesota	28	58	62	95	106	17	146.5	U. Florida	19.0	29.3	36.0	26.8	35.5
18	321	U. Florida	39	60	79	63	80	18	145.2	U. Minnesota	9.7	26.8	27.5	39.2	42.1
19	316	U. Wisc. Madison	41	62	60	68	85	19	138.4	U. Wisc. Madison	19.6	31.2	28.1	28.4	31.2
20	293	Texas A&M	24	45	68	73	83	20	130.5	Texas A&M	10.7	21.6	33.6	32.4	32.3
21	280	Michigan State	16	44	55	72	93	21	126.4	UNC	15.0	18.3	31.7	15.8	45.6
22	275	UNC	24	35	69	38	109	22	115.4	Michigan State	7.8	20.0	21.3	30.8	35.7
23	250	KU Leuven	33	28	40	53	96	23	112.9	U. Cambridge	13.3	27.4	22.5	29.9	19.7
24	249	Harvard	40	41	53	51	64	24	112.2	Harvard	19.1	18.8	26.3	21.9	26.2
25	246	U. Cambridge	16	48	58	72	52	25	110.9	Yale	18.4	28.5	28.4	15.8	19.8
26	233	Arizona State	18	33	39	70	73	26	101.5	U. Iowa	9.3	25.1	22.2	22.2	22.8
27	225	Yale	35	52	59	36	43	27	98.7	KU Leuven	14.7	10.9	15.3	22.7	35.1
28	223	UCLA	36	54	39	43	51	28	98.1	U. Georgia	20.0	24.6	21.3	14.6	17.7
29	221	U. Georgia	48	52	41	35	45	29	97.7	Arizona State	8.0	17.4	17.9	27.4	26.9
29	221	U. Manchester	42	31	45	53	50	30	96.9	Case Western	23.3	17.3	23.1	16.0	17.3
31	217	U. Iowa	21	51	44	42	59	31	96.7	U. Manchester	21.4	13.8	19.1	21.2	21.3
32	214	NCSU	40	36	46	50	42	31	96.7	U. Waterloo	17.2	20.3	18.7	16.9	23.7
33	202	Loughborough	17	24	43	60	58	33	94.7	UCLA	15.7	23.6	16.4	16.5	22.5
34	199	U. Waterloo	30	42	35	37	55	34	89.7	Texas Tech	22.7	25.4	12.8	10.7	18.0
35	191	Eindhoven	23	28	51	35	54	35	89.1	NCSU	22.8	14.0	15.5	19.6	17.2

36	190	U. Toronto	31	22	26	48	63	36	88.3	Eindhoven	15.5	13.8	22.8	15.6	20.6
37	186	Case Western	37	31	48	32	38	37	81.7	U. Toronto	16.2	10.2	10.0	20.0	25.4
38	180	Clemson	36	38	39	34	33	38	78.0	Clemson	16.7	17.5	18.4	13.5	11.9
39	176	Erasmus	18	22	32	43	61	39	76.4	Technion	16.5	12.5	13.0	16.7	17.7
39	176	Texas Tech	41	47	28	22	38	40	75.9	U. Birmingham	25.1	15.6	11.8	15.9	7.6
41	174	U. Birmingham	46	37	29	42	20	41	74.2	Loughborough	5.1	10.8	19.3	21.7	17.2
42	170	Cranfield	13	20	37	34	66	42	73.7	Cranfield	6.0	9.3	18.3	14.6	25.5
43	160	NU Singapore	6	10	18	60	66	43	70.0	Erasmus	9.6	8.2	12.5	15.9	23.8
44	154	U. Rochester	23	23	22	37	49	44	69.8	U. Cincinnati	12.1	17.6	14.5	14.7	10.9
45	152	Technion	25	23	25	41	38	45	67.0	Southern Cal.	5.6	17.7	16.8	10.9	16.1
46	151	U. Cincinnati	24	36	28	35	28	46	66.4	U. Nottingham	15.3	7.3	15.5	16.3	12.2
47	145	SUNY Buffalo	20	25	39	33	28	47	66.2	U. Rochester	12.0	8.6	10.9	15.5	19.4
48	142	U. Illinois	12	23	36	30	41	48	64.3	U. Washington	18.8	11.0	14.4	8.3	11.8
49	140	Poly. Milan	6	14	50	33	37	49	63.1	IIT Madras	7.8	16.1	21.3	11.5	6.3
49	140	U. Washington	36	23	34	18	29	50	62.6	SUNY Buffalo	7.6	11.2	18.1	14.3	11.4
51	139	N. Chaio Tung	4	9	13	37	76	51	62.1	U. Illinois	4.9	10.4	17.7	10.9	18.2
52	138	Southern Cal.	10	28	34	28	38	52	61.1	Tel Aviv	2.3	10.5	16.3	13.6	18.3
53	133	Tel Aviv	4	20	33	33	43	53	61.0	U. Warwick	5.7	6.8	14.8	17.0	16.6
53	133	U. Nottingham	23	16	35	32	27	54	60.6	McMaster	9.7	8.1	13.3	13.0	16.5
55	132	U. Bradford	39	24	26	19	24	55	60.0	U. Bradford	20.6	11.6	11.6	7.5	8.8
56	128	McMaster	19	17	26	30	36	56	59.7	NU Singapore	4.3	3.9	8.3	20.5	22.6
57	127	IIT Madras	16	31	40	24	16	57	59.4	Linkoping	11.5	6.0	7.4	17.3	17.2
58	125	U. Warwick	10	13	25	33	44	58	58.4	N. Chaio Tung	1.4	3.5	7.0	14.8	31.7
59	124	U. Maryland	10	20	21	30	43	59	56.4	U. Padua	1.0	5.0	18.0	15.2	17.3
60	121	U. Padua	3	10	29	32	47	60	54.8	Poly. Milan	2.7	6.3	22.2	11.7	12.0
61	119	Rensselaer	5	27	24	26	37	61	52.7	Oklahoma State	13.1	17.6	10.8	6.0	5.3
62	115	U. South Carolina	19	21	31	25	19	62	50.9	Rensselaer	2.1	12.1	11.2	9.9	15.7
63	114	KAIST	10	18	30	29	27	63	49.7	U. Maryland	5.3	7.8	8.5	11.9	16.3
64	112	Nanyang Tech	3	24	21	33	31	63	49.7	UT Arlington	0.5	5.5	12.1	14.7	16.9
65	111	Lehigh	3	15	19	36	38	65	49.4	KAIST	5.2	8.6	12.9	11.5	11.3
66	110	Oklahoma State	21	36	22	16	15	66	48.4	Lehigh	1.3	7.3	9.3	14.5	15.9
67	108	Rutgers	12	19	18	21	38	67	48.3	NYU	21.7	4.9	6.7	5.6	9.5
68	105	U. Bath	3	11	25	20	46	68	46.9	Rutgers	6.1	7.3	8.4	9.2	16.0
69	103	U. Missouri	7	22	23	29	22	68	46.9	U. Arizona	12.3	8.5	9.5	8.9	7.7
69	103	UT Arlington	1	9	20	30	43	70	45.9	U. Missouri	3.0	11.2	9.6	10.9	11.2

(*Continued*)

Table 7. (*Continued*).

Distributed articles								Shared articles							
Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010	Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010
71	102	Cardiff	6	12	11	34	39	71	44.5	U. British Col.	4.7	6.7	7.4	10.5	15.3
71	102	INSEAD	3	7	18	30	44	72	43.0	U. South Carolina	7.8	7.8	11.9	9.1	6.3
73	101	U. Arizona	25	14	20	23	19	73	42.8	U. Twente	4.3	6.3	12.0	12.4	7.8
73	101	U. Twente	10	12	29	30	20	74	42.5	Cardiff	2.2	5.2	5.2	15.0	15.0
75	100	Linkoping	17	10	11	32	30	75	41.8	INSEAD	2.0	2.3	6.8	13.0	17.7
75	100	Shanghai JTU	0	0	4	25	71	76	41.2	U. Windsor	6.8	12.3	10.1	4.8	7.3
77	95	U. Groningen	1	9	12	31	42	77	40.9	Nanyang Tech	1.7	10.1	7.5	10.8	10.9
78	94	Tsinghua	0	1	18	32	43	78	40.5	London SEPS	7.8	8.1	10.6	7.3	6.7
79	93	NYU	36	11	13	10	23	79	40.3	U. Chicago	10.1	8.8	8.2	5.9	7.3
80	92	HKPU	0	3	11	26	52	80	39.8	Brunel	8.2	9.8	7.1	8.2	6.6
80	92	U. British Col.	8	13	16	23	32	81	39.7	U. Groningen	0.5	2.8	6.0	12.8	17.7
80	92	U. Hong Kong	1	1	3	34	53	82	39.0	U. Lancaster	6.5	5.5	5.3	8.8	12.9
80	92	U. London	9	13	9	22	39	82	39.0	U. London	4.9	8.4	3.0	7.9	14.9
80	92	U. Pittsburgh	4	17	20	28	23	84	38.8	LBS	5.2	9.7	5.8	10.0	8.1
85	91	Kyoto	19	16	14	20	22	84	38.8	Middle East Tech	0.0	3.8	4.9	11.7	18.3
85	91	U. Chicago	20	18	18	16	19	86	38.5	Wash. St. Louis	7.6	6.0	9.9	8.4	6.7
87	89	Brunel	13	23	14	20	19	87	38.3	George Wash.	5.9	7.3	4.8	8.3	11.9
87	89	IIT Delhi	6	14	9	23	37	88	38.0	Shanghai JTU	0.0	0.0	1.8	10.6	25.6
87	89	U. Windsor	15	25	21	11	17	89	37.6	Boston U.	3.8	5.2	5.8	14.7	8.2
90	87	Grenoble	7	10	19	17	34	90	37.2	U. Pittsburgh	2.5	7.3	7.8	11.4	8.2
91	86	Middle East Tech	0	7	11	25	43	91	37.1	Chalmers	3.0	14.7	6.7	5.3	7.5
92	85	Boston U.	9	11	14	32	19	92	36.6	Kent State	6.3	4.4	8.9	9.9	7.0
93	84	George Wash.	11	19	11	17	26	92	36.6	Iowa State	3.6	10.0	9.7	7.6	5.8
93	84	Wash. St. Louis	17	12	19	19	17	94	36.5	U. Manitoba	5.8	7.4	8.8	7.3	7.2
95	82	Iowa State	7	21	22	16	16	95	35.7	IIT Delhi	2.4	7.0	3.9	8.6	13.8
95	82	U. Lancaster	14	11	13	18	26	96	35.0	U. Bath	2.5	4.0	7.8	7.0	13.8
95	82	U. Manitoba	11	17	18	18	18	97	34.9	Florida State	4.0	12.6	9.3	3.8	5.3
98	80	U. Mass.	14	14	16	17	19	98	34.0	U. Mass.	7.0	6.4	7.1	5.9	7.6
98	80	U. Seville	0	10	14	33	23	99	33.8	Aston	4.3	3.6	8.7	9.9	7.4
100	79	HKUST	0	3	11	21	44	100	33.65	Grenoble	3.333	4.67	8.083	5.78	11.78
100	79	London SEPS	14	15	20	17	13								

Table 8. Top 100 institutions based on the combination measure (distributed and shared articles by time period).

Distributed articles								Shared articles							
Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010	Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010
1	616.5	Purdue	109.0	148.0	137.5	114.0	108.0	1	292.6	Stanford	58.1	47.2	61.6	56.2	69.4
2	589.0	Stanford	100.5	94.0	119.5	117.0	158.0	2	273.7	Purdue	50.4	69.8	63.0	45.8	44.7
3	502.5	MIT	61.0	74.5	117.0	116.5	133.5	3	222.1	MIT	31.7	36.3	49.4	49.0	55.7
4	452.5	Penn State	79.5	86.5	75.5	100.5	110.5	4	196.0	U. Michigan	25.0	35.7	42.3	36.3	56.8
5	444.5	U. Michigan	51.0	74.5	85.5	88.0	145.5	5	191.8	Penn State	37.3	40.0	35.3	37.9	41.2
6	417.5	GA Tech	36.5	63.5	94.0	92.5	131.0	6	182.2	GA Tech	17.3	29.2	44.2	41.2	50.2
7	392.0	U. Penn.	54.0	60.5	75.5	92.0	110.0	7	181.1	U. Penn.	28.7	29.5	37.1	40.8	44.9
8	359.0	Ohio State	63.0	65.0	79.5	61.5	90.0	8	164.4	Ohio State	35.0	30.0	35.3	26.3	37.9
9	351.5	Carnegie Mellon	49.5	75.5	75.0	65.0	86.5	9	163.6	Columbia	16.7	30.5	32.2	39.9	44.4
10	334.0	Columbia	29.0	56.5	63.5	86.0	99.0	10	154.6	Carnegie Mellon	27.2	35.1	33.2	25.5	33.6
11	317.5	Northwestern	39.0	47.0	59.0	75.5	97.0	11	142.7	Cal. Berkeley	31.4	31.7	23.2	22.5	33.9
12	315.5	U. Minnesota	37.0	56.5	50.5	82.0	89.5	12	141.2	Cornell	26.7	26.9	28.2	26.9	32.4
13	307.0	Cornell	48.5	54.5	63.0	61.5	79.5	13	137.3	Northwestern	17.5	24.2	26.6	30.8	38.3
14	304.5	Cal. Berkeley	56.0	67.5	53.0	51.5	76.5	14	131.7	IU Bloomington	31.6	26.3	30.7	19.1	24.0
15	292.0	UT Austin	41.5	63.0	51.5	63.0	73.0	15	130.8	U. Minnesota	13.2	25.6	22.3	34.1	35.7
16	291.0	Michigan State	15.5	40.5	62.0	77.0	96.0	16	125.4	UT Austin	19.2	26.5	24.2	25.9	29.7
17	284.0	Texas A&M	33.5	48.5	66.5	58.0	77.5	17	125.4	Texas A&M	15.8	20.3	32.8	25.5	31.0
18	276.5	VA Tech	60.5	53.0	59.5	55.0	48.5	18	122.0	VA Tech	27.3	24.8	28.0	23.1	18.7
19	272.5	IU Bloomington	56.0	52.0	62.0	44.5	58.0	19	117.8	Michigan State	7.5	18.9	24.6	31.5	35.3
20	263.0	NU Singapore	10.0	29.5	33.5	99.0	91.0	20	114.1	U. Florida	15.1	22.1	25.7	21.0	30.3
21	260.0	U. Florida	30.5	48.0	58.5	51.5	71.5	21	107.0	U. Wisc. Madison	16.6	28.2	22.7	18.2	21.4
22	257.0	Arizona State	21.0	29.5	40.5	81.5	84.5	22	101.3	NU Singapore	6.8	13.4	14.4	35.6	31.3
23	228.5	U. Wisc. Madison	33.0	51.5	45.5	42.5	56.0	23	101.0	Arizona State	9.8	15.0	17.2	29.1	30.0
24	220.0	UNC	26.0	33.5	45.0	41.5	74.0	24	100.8	UNC	14.2	16.5	20.5	18.2	31.5
25	219.0	KU Leuven	32.5	24.0	39.5	42.5	80.5	25	87.6	Eindhoven	16.8	14.3	21.8	16.0	18.8
26	215.5	Loughborough	25.5	28.5	50.5	61.0	50.0	26	87.0	KU Leuven	14.4	9.5	16.2	18.4	28.5
27	203.5	NCSU	33.0	31.0	53.0	46.0	40.5	27	86.6	Tel Aviv	12.0	17.1	21.7	18.2	17.6
28	189.0	Eindhoven	25.0	29.5	49.5	36.5	48.5	28	84.2	U. Manchester	21.5	11.9	16.2	18.8	15.8
29	184.5	U. Manchester	40.5	25.5	36.0	43.5	39.0	29	83.0	Harvard	13.3	12.2	19.4	17.4	20.7
30	181.5	U. Cambridge	11.0	35.0	45.5	52.0	38.0	30	82.4	Loughborough	10.5	12.9	23.3	21.4	14.3
31	180.0	Nanyang Tech	3.5	36.5	33.0	59.0	48.0	31	80.8	U. Cambridge	8.7	19.1	17.1	21.0	14.9
32	178.5	Harvard	27.0	24.5	38.0	39.0	50.0	32	80.5	NCSU	18.3	12.1	17.2	16.9	16.1
33	177.5	Tel Aviv	22.0	29.5	44.5	41.0	40.5	33	79.7	U. Iowa	9.4	26.4	15.7	14.1	14.2

(*Continued*)

Table 8. (*Continued*).

Distributed articles								Shared articles							
Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010	Rank	Overall	School	1985–1990	1991–1995	1996–2000	2001–2005	2006–2010
34	175.5	U. Iowa	20.5	57.0	33.0	28.5	36.5	34	76.8	U. Waterloo	19.3	17.5	13.7	11.6	14.6
35	174.0	Erasmus	15.5	22.5	31.5	41.5	63.0	35	76.6	Case Western	20.2	13.5	17.9	14.6	10.5
36	172.5	UCLA	26.0	42.0	28.0	37.0	39.5	36	76.4	UCLA	12.9	18.8	12.0	15.0	17.8
37	172.0	HKPU	0.0	5.5	23.5	55.0	88.0	37	74.8	Technion	19.4	11.7	11.7	16.1	15.8
38	170.0	Clemson	34.0	30.5	34.0	34.0	37.5	38	73.3	Clemson	15.7	14.4	15.7	13.5	14.1
39	166.5	Cranfield	10.5	20.0	34.0	40.0	62.0	39	72.4	Cranfield	5.6	10.1	16.8	17.8	22.2
40	163.5	U. Toronto	21.0	25.5	27.0	34.0	56.0	40	70.5	Nanyang Tech	2.2	15.2	14.3	21.3	17.5
41	161.0	U. Waterloo	36.5	36.0	27.5	26.0	35.0	41	69.7	U. Toronto	10.9	11.1	10.8	14.3	22.6
42	159.5	Technion	35.0	23.5	24.5	42.0	34.5	42	68.8	Erasmus	7.1	7.9	13.3	15.9	24.6
43	153.0	Case Western	35.0	24.0	41.5	29.5	23.0	43	68.5	McMaster	13.1	12.4	16.4	11.4	15.3
44	149.5	KAIST	13.5	27.0	47.5	35.5	26.0	44	65.1	KAIST	7.2	12.6	20.9	13.9	10.6
45	144.0	SUNY Buffalo	26.0	29.5	37.0	27.5	24.0	45	65.1	HKPU	0.0	3.1	10.2	20.3	31.5
46	143.5	Poly. Milan	6.5	17.0	49.5	36.0	34.5	46	64.5	IIT Madras	8.4	17.8	21.6	11.3	5.5
47	142.5	U. Cincinnati	32.5	29.5	23.5	33.0	24.0	47	64.5	U. Cincinnati	14.9	14.2	12.1	14.1	9.2
48	142.0	U. Georgia	32.0	37.0	25.0	23.5	24.5	48	63.6	SUNY Buffalo	11.2	13.7	16.7	11.8	10.2
49	141.5	U. South Carolina	28.5	31.5	33.0	23.5	25.0	49	63.6	Yale	10.2	15.9	17.5	9.3	10.8
50	138.5	HKUST	0.5	6.5	24.5	49.0	58.0	50	62.5	U. Georgia	13.2	17.4	12.2	10.3	9.5
51	136.5	N. Chaio Tung	5.0	13.0	17.0	38.5	63.0	51	62.3	U. Washington	16.3	10.0	14.8	10.5	10.8
52	135.0	McMaster	23.0	25.0	29.0	25.5	32.5	52	61.2	Southern Cal.	5.4	13.7	16.5	9.2	16.3
53	133.0	U. Washington	34.0	20.5	31.0	20.5	27.0	53	59.9	HKUST	0.5	3.4	13.4	18.8	23.7
54	131.0	U. Maryland	10.5	19.5	24.5	34.0	42.5	54	58.2	N. Chaio Tung	2.1	5.0	8.7	15.8	26.6
55	130.5	IIT Madras	17.5	35.0	41.0	23.5	13.5	55	56.6	Poly. Milan	2.9	7.8	22.3	12.9	10.7
56	127.0	Yale	19.5	28.5	34.5	20.5	24.0	56	56.5	Rensselaer	3.1	14.6	15.4	11.5	12.0
57	124.0	Southern Cal.	10.0	23.5	32.0	21.5	37.0	57	56.3	Rutgers	10.3	11.6	9.7	8.1	16.7
58	123.5	Rensselaer	6.5	30.5	29.0	29.0	28.5	58	55.3	U. South Carolina	11.4	12.1	13.2	8.7	9.9
59	123.0	Rutgers	19.5	28.5	20.0	18.5	36.5	59	55.0	U. Nottingham	11.5	9.1	13.6	11.1	9.6
60	123.0	U. Hong Kong	2.5	2.5	9.0	47.0	62.0	60	54.1	U. Maryland	5.7	7.8	10.2	13.7	16.7
61	122.5	Shanghai JTU	0.0	0.0	5.0	27.5	90.0	61	54.1	Texas Tech	13.0	17.5	8.6	5.9	9.1
62	122.0	U. Illinois	12.0	21.5	25.5	28.0	35.0	62	53.2	U. Illinois	5.5	10.3	12.2	10.1	15.2
63	113.5	U. Rochester	23.5	19.5	13.5	26.0	31.0	63	51.9	U. Warwick	6.8	5.0	13.7	15.5	10.9
64	111.5	Texas Tech	25.0	34.5	20.0	12.5	19.5	64	51.0	U. Rochester	13.4	8.0	6.4	11.2	11.9
65	107.0	UT Dallas	4.0	2.5	17.5	22.5	60.5	65	50.9	Wash. St. Louis	6.9	7.6	14.4	11.5	10.5

66	106.5	U. Nottingham	17.0	17.0	29.5	20.5	22.5	66	48.9	NYU	15.9	4.0	6.4	9.5	13.2
67	105.5	INSEAD	7.0	9.0	15.0	29.5	45.0	67	47.7	Oklahoma State	10.3	16.8	9.2	5.3	6.2
68	105.0	NYU	26.5	10.0	13.5	21.0	34.0	68	47.2	U. Bradford	18.9	8.0	7.8	5.3	7.2
69	104.5	U. Birmingham	24.5	25.5	18.5	23.0	13.0	69	47.2	U. Padua	0.8	4.3	14.5	10.8	16.7
70	104.5	Wash. St. Louis	14.0	14.0	28.5	23.5	24.5	70	47.2	U. Arizona	12.4	11.0	9.3	8.6	5.8
71	103.5	U. Arizona	25.0	22.0	20.0	21.5	15.0	71	46.2	Shanghai JTU	0.0	0.0	2.1	11.7	32.3
72	103.5	U. Padua	2.5	8.5	23.5	24.0	45.0	72	45.4	U. Birmingham	13.0	10.7	8.1	8.6	4.9
73	103.0	Bilkent	1.5	11.0	21.0	28.0	41.5	73	45.2	Linkoping	8.8	5.0	5.2	13.7	12.6
74	103.0	U. Bradford	35.5	16.5	19.5	12.5	19.0	74	45.0	Bilkent	0.8	6.1	10.4	11.1	16.7
75	102.5	U. Groningen	1.0	7.5	14.0	33.0	47.0	75	44.6	Iowa State	7.2	11.6	10.0	8.5	7.4
76	101.5	Cardiff	7.0	12.5	14.0	33.5	34.5	76	44.2	U. Hong Kong	1.8	1.0	4.1	16.0	21.4
77	101.0	City UHK	1.0	5.5	16.5	32.0	46.0	77	44.0	U. Groningen	0.4	2.4	6.8	14.3	20.2
78	99.5	U. Warwick	11.5	9.5	22.5	28.0	28.0	78	43.5	INSEAD	4.6	3.7	5.7	11.9	17.6
79	97.0	U. Bath	2.5	8.0	26.0	15.5	45.0	79	43.2	U. Windsor	9.2	12.5	9.3	4.5	7.8
80	96.0	Iowa State	14.0	24.5	21.0	17.0	19.5	80	43.1	Cardiff	3.1	5.6	6.9	14.5	13.1
81	96.0	U. Twente	10.5	12.5	33.5	24.0	15.5	81	41.3	Duke	4.1	6.3	8.3	6.4	16.2
82	95.0	Oklahoma State	16.0	34.0	19.0	11.5	14.5	82	41.2	LBS	4.3	9.6	6.8	11.9	8.7
83	94.0	U. Windsor	20.0	26.5	20.0	10.5	17.0	83	40.9	City UHK	0.4	2.4	8.0	12.4	17.7
84	93.0	Tsinghua	0.0	1.0	16.0	29.5	46.5	84	40.8	Middle East Tech	1.4	4.4	6.2	13.6	15.2
85	92.0	Duke	8.5	14.0	16.5	16.5	36.5	85	40.8	U. Calgary	2.8	7.9	8.3	12.3	9.6
86	92.0	IIT Delhi	7.5	14.5	9.0	22.5	38.5	86	40.2	U. Missouri	5.1	10.0	10.0	8.0	7.0
87	92.0	U. Pittsburgh	3.0	17.0	19.5	26.0	26.5	87	40.1	Louisiana State	10.0	7.1	9.1	7.8	6.2
88	88.0	Middle East Tech	2.0	8.0	14.5	27.5	36.0	88	39.9	U. Twente	4.2	6.5	14.1	9.3	5.8
89	87.5	U. Missouri	11.5	19.0	23.5	19.5	14.0	89	39.1	U. Manitoba	13.8	8.6	7.5	4.7	4.4
90	85.0	Auburn	12.5	22.5	13.0	20.0	17.0	90	38.7	UT Dallas	2.0	1.3	6.7	8.5	20.2
91	84.0	Louisiana State	22.0	13.5	18.5	15.5	14.5	91	38.1	Auburn	6.3	11.2	5.6	7.9	7.1
92	82.5	Chinese UHK	3.0	6.5	24.0	24.0	25.0	92	36.7	U. Lancaster	6.3	6.0	4.7	5.9	13.8
93	82.5	U. Calgary	5.0	12.5	15.0	25.5	24.5	93	36.5	U. British Col.	4.2	6.3	5.8	8.1	12.1
94	81.5	Linkoping	14.5	8.5	7.5	27.5	23.5	94	35.9	U. Pittsburgh	1.8	8.1	7.5	9.7	8.8
95	81.0	Boston U.	14.5	13.0	15.0	24.5	14.0	95	35.7	U. Wisc. Milkw.	8.4	8.9	9.5	2.8	6.0
96	80.5	U. Manitoba	21.5	20.0	16.0	11.5	11.5	96	35.6	Boston U.	5.0	6.5	6.7	11.0	6.5
97	80.0	Lehigh	2.0	14.0	12.5	26.0	25.5	97	35.6	IIT Delhi	3.5	6.8	3.8	8.3	13.2
98	79.0	U. W. Ontario	9.5	6.0	8.5	25.5	29.5	98	35.5	Monash	3.6	6.9	8.1	11.7	5.2
99	78.0	U. Lancaster	14.0	11.5	11.0	12.5	29.0	99	34.8	Florida State	4.7	11.5	10.4	2.7	5.5
100	77.5	U. British Col.	7.0	13.0	12.0	18.5	27.0	100	34.7	Lehigh	0.9	6.2	6.0	11.0	10.6

more research focused curricula or one that has increased the size of its PhD programme. This information is particularly important to prospective PhD students as they decide where to pursue their graduate studies, and is also important to institutions who wish to assess the quality of their PhD programmes. Although the productivity of its PhD graduates is not the only measure of quality of an institution's graduate programme, it does provide information as to which institutions are training the most authors and the most productive authors.

In Table 8, institutional rankings are provided with respect to the combination measure for both distributed and shared articles across the five time periods covered by this study. The combination measure is an average of the research productivity of an institution's affiliated authors and their PhD graduates. As such, it represents a more rounded indicator of an institution's contribution to the field. Based on these results, the 10 institutions that have had the greatest overall contribution to the field of OM from 1985 through 2010, through the research from affiliated authors and their PhD graduates, are Purdue, Stanford, MIT, Penn State, U. Michigan, GA Tech, U. Penn., Ohio State, Carnegie Melon and Columbia. All of these institutions, with the exception of Purdue, demonstrate an increasing contribution to the field across the five time periods. Table 8 provides the opportunity to identify those institutions that, through the efforts of their affiliated authors and/or its PhD graduates, are increasing their impact on the OM field. This, as noted earlier, provides useful information to academic administrators who wish to assess the overall quality of their OM groups (faculty and PhD graduates).

6. Conclusion

In this paper, we wanted to recognise those individuals and institutions that have had a significant influence on the development of the field of OM over the period 1985 through 2010. During the course of our investigation, we were able to identify many outstanding authors such as T. C. E. Cheng and Hau L. Lee, along with institutions such as Purdue, Stanford, Penn State, U. Michigan and MIT that have contributed a great deal to the field of OM. An important contribution of this paper was the manner in which institutional contributions were measured. We recognised the importance of measuring not only the contribution of an institution's affiliated authors, but also measuring the contribution of its PhD graduates. The combination of these two sources of contribution led to different impact rankings for the institutions identified in this study as shown by our combination measure results.

This study also identified some interesting trends concerning the research that is being published. We have learned that over the time period studied, the total number of articles per year is increasing along with the number of institutions that are contributing to this research. Furthermore, the number of countries and international institutions contributing OM research is also increasing. Finally, there is a trend towards an increasing number of authors per article, which demonstrates the growing level of collaboration between researchers.

Much of the data, statistics and results presented in this study are useful for institution administrators who wish to assess the quality and contribution of their OM group. The contribution of affiliated authors is a good indicator of the research activity from current and past OM faculty. The contribution of PhD graduates is a good indicator of the quality of an institution's PhD programme in OM, while the combination measure is a good indicator of the overall impact of the OM group. The contribution of individual researchers provides a benchmark that can be used to see how individual faculty members stack up with the most prolific researchers in the field. Lastly, the various bibliometric statistics show how the volume of research, research constituency and research collaboration has changed from 1985 to 2010. Future research in this area could include additional journals to provide a broader coverage of the literature. While this study was limited to 11 top journals, there are many more journals that publish OM research, which could be included. Another interesting study would be to discover why the degree of collaboration between authors is increasing. Is it because of promotion and tenure requirements that generally count the number of publications or is it because of the ease at which authors in different locations can collaborate? Lastly, it would be interesting to compare various popular press rankings of institutions with the research rankings found in this paper to see if the most prolific research contributors are the most highly ranked.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Agrawal, V. K. 2002. "*Constituen*cies of Journals in Production and Operations Management: Implications on Reach and Quality." *Production and Operations Management* 11 (2): 101–108.

Ajiferuke, I., Q. Burrel, and J. Tague. 1988. "Collaborative Coefficient: A Single Measure of the Degree of Collaboration in Research." *Scientometrics* 14: 421–433.

Barman, S., R. J. Tersine, and M. R. Buckley. 1991. "An Empirical Assessment of the Perceived Relevance and Quality of POM-related Journals by Academicians." *Journal of Operations Management* 10 (2): 194–212.

Barman, S., M. D. Hanna, and R. L. LaForge. 2001. "Perceived Relevance and Quality of POM Journals: A Decade Later." *Journal of Operations Management* 19 (3): 367–385.

Buffa, E. S. 1980. "Research in Operations Management." *Journal of Operations Management* 1 (1): 1–7.

Chan, K. C., C. R. Chen, and L. T. W. Cheng. 2005. "Ranking Research Productivity in Accounting for Asia-Pacific Universities." *Review of Quantitative Finance and Accounting* 24: 47–64.

Donohue, J. M., and J. B. Fox. 2000. "A Multi-method Evaluation of Journals in the Decision and Management Sciences by US Academics." *Omega* 28 (1): 17–36.

Fry, T. D., and J. M. Donohue. 2013. "Outlets for Operations Management Research: A DEA Assessment of Journal Quality and Rankings." *International Journal of Production Research* 51 (23–24): 7501–7526.

Fry, T. D., J. M. Donohue, B. A. Saladin, and G. Shang. 2013. "The Origins of Research and Patterns of Authorship in the International Journal of Production Research." *International Journal of Production Research* 51 (23–24): 7470–7500.

Goh, C.-H., C. W. Holsapple, L. E. Johnson, and J. R. Tanner. 1996. "An Empirical Assessment of Influences on POM Research." *Omega* 24 (3): 337–345.

Goh, C.-H., C. W. Holsapple, L. E. Johnson, and J. R. Tanner. 1997. "Evaluating and Classifying POM Journals." *Journal of Operations Management* 15 (2): 123–138.

Gorman, M. F., and J. J. Kanet. 2005. "Evaluating Operations Management-related Journals via the Author Affiliation Index." *Manufacturing and Service Operations Management* 7 (1): 3–19.

Heck, J. L. 2007. "Establishing a Pecking Order for Finance Academics: Ranking of US Finance Doctoral Programs." *Review of Pacific Basin Financial Markets and Policies* 10 (4): 479–490.

Heck, J. L., P. L. Cooley, and C. M. Hubbard. 1986. "Contributing Authors and Institutions to the *Journal of Finance*: 1946–1985." *Journal of Finance* 41: 1129–1140.

Holsapple, C. W., and A. Lee-Post. 2010. "Behavior-based Analysis of Knowledge Dissemination Channels in Operations Management." *Omega* 38 (3–4): 167–178.

Hsieh, P.-N., and P.-L. Chang. 2009. "An Assessment of World-wide Research Productivity in Production and Operations Management." *International Journal of Production Economics* 120 (2): 540–551.

Malhotra, M. K., and H. V. Kher. 1996. "Institutional Research Productivity in Production and Operations Management." *Journal of Operations Management* 14: 55–77.

Mathieu, R., and B. J. McConomy. 2003. "Productivity in 'Top-Ten' Academic Accounting Journals by Researchers at Canadian Universities." *Canadian Accounting Perspectives* 2 (1): 43–76.

Meredith, J. R., M. D. Steward, and B. R. Lewis. 2011. "Knowledge Dissemination in Operations Management: Published Perceptions versus Academic Reality." *Omega* 39 (4): 435–446.

Neely, A. 1993. "Production/Operations Management: Research Process and Content during the 1980s." *International Journal of Operations and Production Management* 13 (1): 5–18.

Olson, J. E. 2005. "Top-25-Business-school Professors Rate Journals in Operations Management and Related Fields." *Interfaces* 35 (4): 323–338.

Petersen, C. G., G. R. Aase, and D. R. Heiser. 2011. "Journal Ranking Analyses of Operations Management Research." *International Journal of Operations & Production Management* 31 (4): 405–422.

Saladin, B. A. 1985. "Operations Management Research: Where Should We Publish?" *Operations Management Review* 3 (4): 3–9.

Savanur, K., and R. Srinkanth. 2010. "Modified Collaborative Coefficient: A New Measure for Quantifying the Degree of Research Collaboration." *Scientometrics* 84: 365–371.

Soteriou, A. C., G. C. Hadjinicola, and K. Patsia. 1999. "Assessing Production and Operations Management Related Journals: The European Perspective." *Journal of Operations Management* 17 (2): 225–238.

Sousa, P. S. A., and P. C. C. Vieira. 2011. "Universities and Authors: A Ranking for International Finance." *Economics Bulletin* 31 (1): 507–518.

Theoharakis, V., C. Voss, G. C. Hadjinicola, and A. C. Soteriou. 2007. "Insights into Factors Affecting Production and Operations Management (POM) Journal Evaluation." *Journal of Operations Management* 25 (4): 932–955.

Vokurka, R. J. 1996. "The Relative Importance of Journals Used in Operations Management Research: A Citation Analysis." *Journal of Operations Management* 14 (4): 345–355.

Xu, Z., B. Cheang, A. Lim, and Q. Wen. 2011. "Evaluating OR/MS Journals via PageRank." *Interfaces* 41 (4): 375–388.

Young, S. T., B. C. Baird, and M. E. Pullman. 1996. "POM Research Productivity in U.S. Business Schools." *Journal of Operations Management* 14: 41–53.

Zsidisin, G. A., M. E. Smith, R. C. McNally, and T. J. Kull. 2007. "Evaluation Criteria Development and Assessment of Purchasing and Supply Management Journals." *Journal of Operations Management* 25 (Jan.): 165–183.

Appendix 1. Journal ranking studies and data used in this research.

Count	Year	First author	Journal study published in	Data type	Table used	Scores used
1	1991	Barman	Journal of Operations Management	Perceptions	2	Mean quality scores
2	1996	Vokurka	Journal of Operations Management	Cite ranks	4	Per cent of total citations
3	1996	Goh	Omega	Citations	4	Normalised total – cite-based
4	1997	Goh	Journal of Operations Management	Cite ranks	6	Intensity index averaged over five years
5	1999	Soteriou	Journal of Operations Management	Perceptions	4	Mean quality scores
6	2000	Donohue	Omega	Perceptions	3	Mean quality scores – POM researchers
7	2001	Barman	Journal of Operations Management	Perceptions	4	Mean quality scores
8	2005	Gorman	Manuacturing and Service Operations Management	Author Affiliation Index	2	Author Affiliation Index
9	2005	Olson	Interfaces	Perceptions	5	Mean quality scores – OM researchers in top 25 Bschools
10	2007	Theoharakis	Journal of Operations Management	Perceptions	4	Mean quality scores – worldwide
11	2007	Zsidisin	Journal of Operations Management	Perceptions	5	Mean rating
12	2010	Holsapple	Omega	Behaviour Publication Counts	4	Intensity score
13	2011	Meredith	Omega	Percentile Average	8	Weighted mean of top journals listed at AACSB universities
14	2011	Petersen	International Journal of Operations and Production Management	Citations	4	Average normalised indices
15	2011	Xu	Interfaces	Citations	5	Google PageRank Quality Index
16	2013	Fry	International Journal of Production Research	DEA	5	DEA Efficiencies with weight ratio = 10

Appendix 2. Summary of ranking and quality scores for 16 journal ranking studies.

#	Number studies	Journal	Barman, Tersine, and Buckley (1991)		Vokurka (1996)		Goh et al. (1996)		Goh et al. (1997)		Soteriou, Hadjinicola, and Patsia (1999)		Donohue and Fox (2000)		Barman, Hanna, and LaForge (2001)		Gorman and Kanet (2005)		Olson (2005)		Theoharakis et al. (2007)		Zsidisin et al. (2007)		Holsapple and Lee-Post (2010)		Petersen, Aase, and Heiser (2011)		Meredith, Steward, and Lewis (2011)		Xu et al. (2011)	
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
1	16	Decision Sciences/DS	2	2.6	4	201.0	8	0.1	8	1.7	10	6.4	6	100.0	4	2.8	19	0.4	20	3.3	7	5.1	9	5.6	7	1.1	7	2.8	5	13.4	37	0.9
2	16	European Journal of Operational Research/ EJOR	10	3.7	10	64.0	10	0.1	11	1.1	7	6.6	9	95.1	9	3.6	13	0.5	13	2.7	5	5.3	23	4.9	3	1.9	9	2.1	10	9.7	18	2.0
3	16	International Journal of Operations and Production Management/IJOPM	12	3.9	12	36.0	9	0.1	9	1.5	4	6.8	15	73.9	16	4.4	25	0.2	28	4.1	9	4.5	13	5.5	11	0.5	4	4.5	11	9.5	62	0.2
4	16	International Journal of Production Research/ IJPR	5	2.9	2	229.0	2	0.5	1	11.1	5	6.7	13	89.1	11	3.8	16	0.5	22	3.8	8	4.9	20	5.1	4	1.3	11	1.8	6	13.2	38	0.9
5	16	Journal of Operations Management/JOM	3	2.6	5	152.0	7	0.2	6	2.1	3	6.9	7	99.4	3	2.7	10	0.5	19	3.0	4	5.4	1	6.1	1	1.9	2	6.7	1	22.0	10	2.4
6	16	Management Science/ MS	1	2.3	1	554.0	1	0.5	2	6.0	1	7.7	1	129.6	1	2.1	5	0.8	1	1.0	1	6.3	17	5.2	2	1.9	1	7.2	2	18.0	1	7.2
7	15	IIE Transactions/IIE	4	2.9	6	125.0	3	0.2	3	3.0	16	6.1	3	107.6	7	3.2	6	0.7	7	2.3	3	5.4			6	1.1	21	1.0	14	8.2	16	2.1
8	15	Interfaces/INT	11	3.9	11	45.0	15	0.1	19	0.6	20	5.8	14	86.6	10	3.7	9	0.6	11	2.6			22	4.9	10	0.5	22	0.9	13	8.9	11	2.4
9	15	Journal of the Operational Research Society/JORS	13	4.3	15	32.0	11	0.1	16	0.7	11	6.3	8	95.2	13	4.2	21	0.3	21	3.3			27	4.3	16	0.3	31	0.6	15	8.1	19	1.9
10	15	Omega/OMG	14	4.4	13	35.0	17	0.1	17	0.7	19	5.9	12	89.4	15	4.3	24	0.2	30	4.3			24	4.9	18	0.2	27	0.7	9	10.1	21	1.7
11	15	Journal of Supply Chain Management/ JSCM (* see JPMM, ** IJPMM)		*		**		*		*		*		**		*	14	0.5	23	3.8	11	3.8	3	5.8		**	20	1.2	19	5.1		
12	14	Naval Research Logistics/NRL	8	3.2	9	66.0	12	0.1	15	0.8	14	6.2	4	106.9	8	3.3	15	0.5	8	2.3					9	0.8	38	0.4	7	10.8	15	2.1
13	14	Operations Research/ OR	7	3.2	3	225.0	4	0.2	5	2.6	2	7.6	2	122.5	2	2.6	3	0.8	2	1.1					5	1.3	14	1.6	3	17.1	2	6.5
14	13	Computers and Operations Research/ COR	17	4.9	20	21.0	39	0.0	45	0.1	21	5.5	16	73.1	19	5.1	22	0.3	27	4.1					19	0.2			18	6.5	29	1.3
15	13	Production and Inventory Management Journal/PIMJ	19	5.2	7	80.0	6	0.2	7	2.0	23	5.2			18	5.1	26	0.2	31	4.3	10	4.0			14	0.4	15	1.5	25	3.9		
16	12	Computers and Industrial Engineering/ CIE	18	5.1	24	13.0	25	0.0	18	0.7	30	4.7	18	61.8	21	5.5			32	4.5					27	0.1			29	2.7	31	1.1
17	12	International Journal of Production Economics/ IJPE (* see ECPE)						*		*	15	6.2			17	4.5	23	0.2	25	4.0			25	4.8	15	0.3	18	1.3	17	6.5	30	1.2
18	12	Production and Operations Management/POM									6	6.6	11	90.6	5	2.8	7	0.6	17	2.9	6	5.1	12	5.5	8	1.0	5	3.8	4	15.8	33	1.1
19	10	Harvard Business Review/HBR	6	3.1	7	80.0	5	0.2	4	2.7	8	6.5			6	3.1							4	5.8			3	5.5	56	0.5		
20	9	Academy of Management Review/ AMR	16	4.8	19	25.0	20	0.0	24	0.4	17	6.1			14	4.2									26	0.1	8	2.2				

(*Continued*)

Appendix 2. (*Continued*).

#	Number studies	Journal	Barman, Tersine, and Buckley (1991)		Vokurka (1996)		Goh et al. (1996)		Goh et al. (1997)		Soteriou, Hadjinicola, and Patsia (1999)		Donohue and Fox (2000)		Barman, Hanna, and LaForge (2001)		Gorman and Kanet (2005)		Olson (2005)		Theoharakis et al. (2007)		Zsidisin et al. (2007)		Holsapple and Lee-Post (2010)		Petersen, Aase, and Heiser (2011)		Meredith, Steward, and Lewis (2011)		Xu et al. (2011)	
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
21	8	Academy of Management Journal/AMJ	15	4.5	13	35.0	28	0.0	31	0.3	9	6.4			12	3.8											13	1.7				
22	8	Annals of Operations Research/AOR					26	0.0	29	0.3							12	0.5	17	2.9					12	0.4			20	4.9	12	2.3
23	8	IEEE Transactions on Engineering Management/IEEE-TEM					41	0.0	39	0.2							17	0.4					26	4.8	23	0.2	30	0.6	35	1.9		
24	8	Sloan Management Review/SMR			25	9.0	23	0.0	25	0.4	12	6.3											6	5.7			10	2.1	66	0.2		
25	8	Strategic Management Journal/SMJ			18	26.0	16	0.1	21	0.6	13	6.2											7	5.7			6	3.0	52	0.8		
26	7	Manufacturing and Service Operations Management/MSOM															4	0.8	4	1.5	2	5.5			13	0.4	40	0.4	8	10.7		
27	7	Mathematics of Operations Research/MOR			17	27.0							5	102.2			2	0.8	3	1.4									22	4.2	3	5.0
28	7	Operations Research Letters/ORL					45	0.0			18	6.0							12	2.6					20	0.2			23	4.1	14	2.2
29	6	Business Horizons/BH					48	0.0	45	0.1															21	0.2	39	0.4	69	0.2		
30	6	Journal of Business Logistics/JBL															18	0.4	24	3.9			2	6.0			26	0.7	12	9.1		
31	6	Journal of Manufacturing Systems/JMS			21	17.0	13	0.1	10	1.4																			30	2.5	39	0.9
32	6	Transportation Science/TS															1	0.9	9	2.3					22	0.2			16	7.7	4	5.0
33	4	California Management Review/CMR					35	0.0	37	0.2																	17	1.3	66	0.2		
34	4	Industrial Engineer/IE (* see JIE)			22	15.0		*		*																			47	1.0		
35	4	Journal of Management/JMGT					42	0.0	43	0.2																	24	0.8	57	0.5		
36	4	Journal of Quality Technology/JQT					22	0.0	32	0.3																			32	2.3	8	3.3
37	3	IEEE Transactions on Systems, Man, Cybernetics/IEEE-SMC					38	0.0	30	0.3																			63	0.3		
38	3	Informs Journal on Computing/IJC																	15	2.8									28	2.8	6	3.4
39	3	International Journal of Flexible Manufacturing Systems/IJFMS																							24	0.1			37	1.7	27	1.5
40	3	International Journal of Logistics Management/IJLM																					5	5.8			37	0.4	24	4.1		
41	3	International Journal of Physical Distribution & Logistics Mgmt./IJPDLM																					10	5.6			25	0.7	21	4.6		

42	3	Journal of Scheduling/ JSCH								8	0.6							58	0.5	36	1.0
43	3	Journal of Service Management/JSM (* see IJSIM)					*									33	0.5				
44	3	Journal of the American Statistical Association/JASA	31	0.0								6	1.7					38	1.6		
45	3	Mathematical and Computer Modelling/ MCM										26	4.0					63	0.3	51	0.5
46	3	Mathematical Programming/MP										5	1.7					26	3.4	5	4.3
47	3	Networks/NETW										14	2.8					40	1.5	28	1.5
48	3	Production Planning and Control/PPC								20	0.4							27	3.3	45	0.7
49	3	Quality Progress/QP	47	0.0	44	0.2												46	1.0		
50	3	Simulation/SIMUL	30	0.0	28	0.3												54	0.6		
51	3	Technometrics/ TECHNO	21	0.0	48	0.1												43	1.3		
52	2	Administrative Sciences Quarterly/ ASQ	46	0.0												19	1.2				
53	2	American Journal of Mathematics and Management Science/ AJMMS										33	4.9					70	0.1		
54	2	Annals of the CIRP/ ACIRP	24	0.0	12	0.9															
55	2	ASME Journal of Engineering for Industry/ASMEJ	33	0.0	20	0.6															
56	2	Communications of the ACM/CACM	36	0.0														39	1.5		
57	2	Decision Support Systems and Electronic Commerce/DSSEC										29	4.3							35	1.0
58	2	Engineering Management Journal/ EMJ								27	0.1							62	0.4		
59	2	IEEE Transactions on Reliability/IEEE-TR	32	0.0														50	0.8		
60	2	International Transactions in Operational Research/ ITOR					24	5.2										44	1.2		
61	2	Journal of Combinatorial Optimization/JCO										18	3.0							42	0.7
62	2	Journal of Global Optimization/JGO																48	1.0	22	1.6
63	2	Journal of Heuristics/ JH																36	1.8	9	2.5
64	2	Journal of Purchasing and Supply Management/JPSM												8	5.7			61	0.4		
65	2	Journal of the ACM/ JACM			41	0.2												53	0.8		
66	2	Logistics and Transportation Review/ LTR								11	0.5							34	1.9		

(*Continued*)

Appendix 2. (*Continued*).

#	Number studies	Journal	Barman, Tersine, and Buckley (1991)		Vokurka (1996)		Goh et al. (1996)		Goh et al. (1997)		Soteriou, Hadjinicola, and Patsia (1999)		Donohue and Fox (2000)		Barman, Hanna, and LaForge (2001)		Gorman and Kanet (2005)		Olson (2005)		Theoharakis et al. (2007)		Zsidisin et al. (2007)		Holsapple and Lee-Post (2010)		Petersen, Aase, and Heiser (2011)		Meredith, Steward, and Lewis (2011)		Xu et al. (2011)	
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
67	2	Management Accounting/MA					40	0.0	33	0.2																						
68	2	Quality Management Journal/QMJ																							25	0.1			33	2.0		
69	2	Service Industries Journal/SIJ									28	4.8																	60	0.5		
70	2	SIAM Review/SIAM																	10	2.4									41	1.5		
71	2	Supply Chain Management Review/SCMR																					15	5.5					45	1.1		
72	2	Supply Chain Management: An International Journal/SCMIJ																					11	5.5					31	2.4		
73	2	TQM Magazine/TQMM									31	4.4																	55	0.6		
74	1	American Economic Review/AER					37	0.0																								
75	1	Applied Mathematical Modelling/AMM																													50	0.5
76	1	Applied Stochastic Models in Business and Industry/ASMBI																													52	0.5
77	1	Asia-Pacific Journal of Operational Research/APJOR																													56	0.4
78	1	ASME Transactions/ASMET							48	0.1																						
79	1	Business Strategy Review/BSR																					18	5.2								
80	1	Computational Optimization and Applications/COA																													20	1.8
81	1	Computer-Aided Design/CAD							35	0.2																						
82	1	Concurrent Engineering: Research and Applications/CERA																													57	0.4
83	1	Discrete Event Dynamic Systems: Theory and Applications/DEDS																													24	1.6
84	1	Econometrica/ECON					44	0.0																								
85	1	Engineering Optimization/EO																													54	0.4
86	1	European Management Journal/EUR-MJ									27	4.9																				
87	1	Expert Systems with Applications/ESA																													59	0.3
88	1	Industrial Marketing Management/IMM																					16	5.4								

89	1	Information Systems and Operations Research/INFOR																			26	1.5	
90	1	International Journal of Advanced Manufacturing Technology/IJAMT			42	0.2																	
91	1	International Journal of Computer Integrated Manufacturing/IJCIM																			55	0.4	
92	1	International Journal of Integrated Supply Chain Management/ IJISCM											14	5.5									
93	1	International Journal of Machine Tool Design and Research/IJMTDR			34	0.2																	
94	1	International Journal of Operations and Quantitative Management/IJOQM																	51	0.8			
95	1	International Journal of Quality and Reliability Management/IJQRM														29	0.6						
96	1	International Journal of Systems Science/IJSS																			44	0.7	
97	1	International Journal of Technology Management/IJTM																			61	0.2	
98	1	Journal of Applied Psychology/JAP														36	0.4						
99	1	Journal of Business and Industrial Marketing/JBIM											19	5.2									
100	1	Journal of Business and Management/JBM					35	3.6															
101	1	Journal of Business Strategy/JBS	50	0.0																			
102	1	Journal of Business to Business Marketing/ JBBM											21	5.0									
103	1	Journal of Intelligent Transportation Systems/JITS																			60	0.2	
104	1	Journal of Marketing/ JMK														12	1.7						
105	1	Journal of Marketing Research/JMR														16	1.4						
106	1	Journal of Optimization: Theory and Applications/JOTA																			23	1.6	
107	1	Journal of Product Innovation Management/JPIM														23	0.9						
108	1	Journal of Productivity Analysis/JPA					33	4.3															
109	1	Journal of Retailing/JR														35	0.4						
110	1	Journal of the Operations Research Society of Japan/ JORSJ																			53	0.5	

(*Continued*)

Appendix 2. (*Continued*).

#	Number studies	Journal	Barman, Tersine, and Buckley (1991)		Vokurka (1996)		Goh et al. (1996)		Goh et al. (1997)		Soteriou, Hadjinicola, and Patsia (1999)		Donohue and Fox (2000)		Barman, Hanna, and LaForge (2001)		Gorman and Kanet (2005)		Olson (2005)		Theoharakis et al. (2007)		Zsidisin et al. (2007)		Holsapple and Lee-Post (2010)		Petersen, Aase, and Heiser (2011)		Meredith, Steward, and Lewis (2011)		Xu et al. (2011)	
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
111	1	Journal of the Royal Statistical Society/JRSS					49	0.0																								
112	1	Location Science/LS									25	5.0																				
113	1	Marketing Science/MKS																									34	0.4				
114	1	Mathematical Methods of Operations Research/MMOR																													41	0.8
115	1	Optimal Control Applications Methods/OCAM																													48	0.6
116	1	Optimization/OPT																													34	1.1
117	1	Optimization Methods and Software/OMS																													32	1.1
118	1	OR Spectrum/ORS																													40	0.9
119	1	Organization Science/OS																									28	0.6				
120	1	Probability in the Engineering Informational Sciences/PEIS																													25	1.6
121	1	Psychological Bulletin/PB																									32	0.5				
122	1	Quality and Reliability Engineering International/QREI																													47	0.6
123	1	Quality Magazine/QM																											65	0.3		
124	1	Queueing Systems/QS																													7	3.4
125	1	RAIRO-Operations Research/RAIRO-OR																													46	0.7
126	1	Reliability Engineering and Systems Safety/RESS																													43	0.7
127	1	Robotics and Computer Integrated Manufacturing/RCIM							36	0.2																						
128	1	Safety Science/SS																													58	0.3
129	1	Systems and Control Letters/SCL																													13	2.3
130	1	Technovation/TV																													63	0.1
131	1	Transportation Research Part B: Methodological/TRBM																													17	2.0
132	1	Transportation Research Part E: Logistics and Transportation/TRELT																													49	0.6

Appendix 3. Average rank across all previous studies for 32 most visible journals.

#	Journal	Possible number studies	Number studies included	Barman, Tersine, and Buckley (1991)	Vokurka (1996)	Goh et al. (1996)	Goh et al. (1997)	Soteriou, Hadjinicola, and Patsia (1999)	Donohue and Fox (2000)	Barman, Hanna, and LaForge (2001)	Gorman and Kanet (2005)	Olson (2005)	Theoharakis et al. (2007)	Zsidisin et al. (2007)	Holsapple and Lee-Post (2010)	Petersen, Aase, and Heiser (2011)	Meredith, Steward, and Lewis (2011)	Xu et al. (2011)	Fry and Donohue (2013)	Average rank
1	MS	16	16	1	1	1	0.96	1	1	1	0.83	1	1	0.47	0.96	1	0.97	1	1	0.95
2	JOM	16	16	0.89	0.83	0.78	0.81	0.92	0.65	0.9	0.65	0.5	0.73	1	1	0.96	1	0.81	0.88	0.83
3	OR	16	14	0.68	0.91	0.89	0.85	0.96	0.94	0.95	0.91	0.96	0	0	0.83	0.52	0.93	0.95	0.88	0.76
4	IIE	16	15	0.84	0.78	0.93	0.92	0.38	0.88	0.71	0.78	0.83	0.82		0.79	0.36	0.57	0.57	0.72	0.68
5	DS	16	16	0.95	0.87	0.74	0.73	0.63	0.71	0.86	0.3	0.46	0.5	0.65	0.75	0.76	0.87	0.19	0.72	0.67
6	POM	12	12					0.79	0.47	0.81	0.74	0.56	0.5	0.59	0.71	0.84	0.9	0.24	0.8	0.66
7	IJPR	16	16	0.79	0.96	0.96	1	0.83	0.35	0.52	0.43	0.38	0.36	0.41	0.88	0.6	0.83	0.14	0.8	0.64
8	EJOR	16	16	0.58	0.61	0.67	0.62	0.75	0.53	0.62	0.57	0.63	0.64	0.29	0.92	0.68	0.7	0.52	0.68	0.62
9	NRL	16	14	0.63	0.65	0.59	0.58	0.46	0.82	0.67	0.48	0.79			0.67	0.12	0.8	0.62	0.53	0.53
10	MSOM	9	7								0.87	0.88	0.91		0.52	0.04	0.77		0.58	0.51
11	IJOPM	16	16	0.47	0.52	0.7	0.69	0.88	0.24	0.29	0.09	0.28	0.27	0.53	0.58	0.88	0.67	0.1	0.35	0.47
12	INT	16	15	0.53	0.57		0.42	0.21	0.29	0.57	0.7	0.71		0.35	0.63	0.32	0.6	0.66	0.45	0.42
13	HBR	16	10	0.54	0.72	0.65	0.78	0.71		0.58				0.82		0.92	0.1		0.24	0.41
14	JORS	16	15	0.42	0.39	0.63	0.54	0.58	0.59	0.43	0.26	0.42		0.06	0.4	0.16	0.53	0.48	0.48	0.39
15	OMG	16	15	0.37	0.46	0.44	0.5	0.25	0.41	0.33	0.13	0.13		0.24	0.31	0.24	0.73	0.43	0.46	0.34
16	MOR	16	7		0.3				0.76		0.96	0.92					0.33	0.9	0.56	0.3
17	PIMJ	16	13	0.11	0.72	0.81	0.77	0.13		0.19	0.04	0.08	0.18		0.46	0.48	0.27		0.45	0.29
18	JSCM	16	15	0.05	0.35	0.22	0.23	0.08	0.12	0.1	0.52	0.33	0.09	0.88	0.36	0.4	0.4		0.31	0.28
19	IJPE	16	12			0.41	0.35	0.42		0.24	0.17	0.25		0.18	0.4	0.44	0.47	0.33	0.41	0.25
20	TS	16	6								1	0.75			0.17		0.5	0.86	0.65	0.24
21	SMJ	16	8		0.26	0.48	0.38	0.5						0.71		0.8	0.13		0.2	0.22
22	AOR	16	8			0.26	0.19				0.61	0.56			0.52		0.37	0.71	0.24	0.22
23	AMJ	16	8	0.32	0.46	0.19	0.15	0.67		0.48						0.56			0.23	0.19
24	JBL	16	6								0.35	0.29		0.94		0.28	0.63		0.54	0.19
25	AMR	16	9	0.26	0.22	0.37	0.31	0.33		0.38					0.06	0.72			0.23	0.18
26	COR	16	13	0.21	0.17	0.15	0.06	0.17	0.18	0.14	0.22	0.21			0.31		0.43	0.38	0.2	0.18
27	SMR	16	8		0.04	0.33	0.27	0.54						0.76		0.64	0.07		0.09	0.17
28	ORL	16	7			0.07		0.29				0.67			0.25		0.3	0.67	0.21	0.15
29	CIE	16	12	0.16	0.09	0.3	0.46	0.04	0.06	0.05		0.04			0.06		0.23	0.29	0.2	0.12
30	JMS	16	6		0.13	0.56	0.65										0.2	0.1	0.12	0.11
31	IEEE	16	8			0.11	0.12				0.39			0.12	0.13	0.2	0.17		0.12	0.08
32	BH	16	6			0.04	0.06								0.21	0.08	0.03		0.04	0.03

Appendix 4. Institution abbreviations.

Abbreviation	Institution	Abbreviation	Institution	Abbreviation	Institution
Arizona State	Arizona State University	Lund	Lund University	U. Florida	University of Florida
Aston	Aston University	McGill	McGill University	U. Georgia	University of Georgia
Auburn	Auburn University	McMaster	McMaster University	U. Groningen	University of Groningen
Ben Gurion	Ben Gurion University of the Negev	Michigan State	Michigan State University	U. Hong Kong	University of Hong Kong
Bilkent	Bilkent University	Middle East Tech	Middle East Technical University	U. Houston	University of Houston
Boston U.	Boston University	MIT	Massachusetts Institute of Technology	U. Illinois	University of Illinois at Urbana Champaign
Brunel	Brunel University	Monash	Monash University	U. Iowa	University of Iowa
Cal. Berkeley	University of California at Berkeley	N. Chaio Tung	National Chiao Tung University	U. Lancaster	University of Lancaster
Cardiff	Cardiff University	N. Cheng Kung	National Cheng Kung University	U. London	University of London
Carnegie Mellon	Carnegie Mellon University	N. Taiwan UST	National Taiwan University of Science and Technology	U. Manchester	University of Manchester
Case Western	Case Western Reserve University	N. Tsing Hua	National Tsing Hua University	U. Manitoba	University of Manitoba
Chalmers	Chalmers University of Technology	Nanyang Tech	Nanyang Technological University	U. Maryland	University of Maryland at College Park
Chinese UHK	Chinese University of Hong Kong	NCSU	North Carolina State University	U. Mass.	University of Massachusetts at Amherst
City UHK	City University of Hong Kong	Northeastern	Northeastern University	U. Miami	University of Miami
Clemson	Clemson University	Northwestern	Northwestern University	U. Michigan	University of Michigan at Ann Arbor
Columbia	Columbia University	NU Singapore	National University of Singapore	U. Minnesota	University of Minnesota at Twin Cities
Concordia	Concordia University	NYU	New York University	U. Missouri	University of Missouri at Columbia
Cornell	Cornell University	Ohio State	Ohio State University	U. Navarra	University of Navarra
Cranfield	Cranfield University	Oklahoma State	Oklahoma State University	U. Nottingham	University of Nottingham
Dartmouth	Dartmouth College	Penn State	Pennsylvania State University at State College	U. Padua	University of Padua
Duke	Duke University	Pohang UST	Pohang University of Science and Technology	U. Penn.	University of Pennsylvania
EC Paris	Ecole Centrale de Paris	Poly. Milan	Polytechnic University of Milan	U. Pittsburgh	University of Pittsburgh
Eindhoven	Eindhoven University of Technology	Poly. Tours	Polytechnic University of Tours	U. Rochester	University of Rochester
Erasmus	Erasmus University Rotterdam	Purdue	Purdue University	U. Seville	University of Seville
Florida Int.	Florida International University	Rensselaer	Rensselaer Polytechnic Institute	U. South Carolina	University of South Carolina at Columbia
Florida State	Florida State University	Rice	Rice University	U. Toronto	University of Toronto
GA Tech	Georgia Institute of Technology	Rutgers	Rutgers University	U. Twente	University of Twente

(*Continued*)

Appendix 4. (*Continued*).

Abbreviation	Institution	Abbreviation	Institution	Abbreviation	Institution
George Wash.	George Washington University	Shanghai JTU	Shanghai Jiao Tong University	U. Utah	University of Utah
Georgetown	Georgetown University	Singapore MU	Singapore Management University	U. Virginia	University of Virginia
Grenoble	Grenoble Institute of Technology	Southern Cal.	University of Southern California	U. W. Ontario	University of Western Ontario
Harvard	Harvard University	Stanford	Stanford University	U. Warwick	University of Warwick
HKPU	Hong Kong Polytechnic University	SUNY Buffalo	State University of New York at Buffalo	U. Washington	University of Washington
HKUST	Hong Kong University of Science and Technology	Technion	Technion - Israel Institute of Technology	U. Waterloo	University of Waterloo
IIT Delhi	Indian Institute of Technology at Delhi	Tel Aviv	Tel Aviv University	U. Windsor	University of Windsor
IIT Madras	Indian Institute of Technology at Madras	Texas A&M	Texas A&M University	U. Wisc. Madison	University of Wisconsin at Madison
INSEAD	INSEAD	Texas Tech	Texas Tech University	U. Wisc. Milkw.	University of Wisconsin at Milwaukee
Iowa State	Iowa State University	Tilburg	Tilburg University	UC Irvine	University of California at Irvine
IU	Bloomington	Indiana University at Bloomington	Tsinghua	Tsinghua University	
UCLA	University of California at Los Angeles				
KAIST	Korea Advanced Institute of Science and Technology	U. Amsterdam	University of Amsterdam	UNC	University of North Carolina at Chapel Hill
Kent State	Kent State University	U. Arizona	University of Arizona	UT Arlington	University of Texas at Arlington
King Fahd UPM	King Fahd University of Petroleum and Minerals	U. Bath	University of Bath	UT Austin	University of Texas at Austin
KU Leuven	Catholic University of Leuven (K. U. Leuven)	U. Birmingham	University of Birmingham	UT Dallas	University of Texas at Dallas
Kyoto	Kyoto University	U. Bradford	University of Bradford	VA Tech	Virginia Tech
Laval	Laval University	U. British Col.	University of British Columbia	Vanderbilt	Vanderbilt University
LBS	London Business School	U. Calgary	University of Calgary	VU Amsterdam	VU University Amsterdam
Lehigh	Lehigh University	U. Cambridge	University of Cambridge	Wash. St. Louis	Washington University in St. Louis
Linkoping	Linkoping University	U. Chicago	University of Chicago	Yale	Yale University
London SEPS	London School of Economics and Political Science	U. Cincinnati	University of Cincinnati	Yuan Ze	Yuan Ze University
Loughborough	Loughborough University	U. Connecticut	University of Connecticut		
Louisiana State	Louisiana State University	U. Dayton	University of Dayton		