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The superstar phenomenon in the knowledge management and intellectual capital academic discipline

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ABSTRACT

This paper reports on the first documented attempt to investigate the presence of the superstar (or Matthew) effect in the knowledge management and intellectual capital (KM/IC) scholarly discipline. The Yule–Simon model and Lotka's square law were applied to the publication data obtained from 2175 articles from 11 KM/IC journals. Based on the findings, it was concluded that the KM/IC discipline represents a very young, attractive academic field that welcomes contributions from a variety of academics and practitioners. In their paper acceptance decisions, KM/IC journal editors are not biased towards a small group of highly productive researchers, which is a positive sign that the field has been progressing in the right direction. The discipline is driven more by academics than by practitioners, and the distribution of articles is more concentrated among a few academic but not practitioner institutions. It was also observed that the Yule–Simon model and Lotka's square law may produce different distributions with respect to institutions.

1. Introduction

Knowledge management and intellectual capital (KM/IC) is a relatively new business-related discipline yet it has already attracted the attention of the academic research community. Initially, the KM/IC field was advanced by industry professionals, but gradually, academic researchers have been transforming it into a respectable field of academic endeavour. Early research employed the case study methodology, focused primarily on Scandinavia and concentrated on the financial sector. Since then scientific rigour from areas as disparate as information systems, strategic management, human resources, accounting and finance has been brought to bear on problems and issues in KM/IC. By the mid-1990s, academic conferences started to attract KM/IC researchers from around the world. Prior research demonstrates that there are many successful and prolific individuals and institutions producing novel, interesting, and high-quality KM/IC works published in refereed journals (Gu, 2004a, 2004b; Ma & Yu, 2010; Serenko, Bontis, Booker, Sadeddin, & Hardie, 2010) or conference proceedings (Serenko, Bontis, & Grant, 2009). With the launch of several peer-reviewed journals, an increase in empirical investigations and a significant increase in doctoral dissertations, the field of KM/IC developed a strong foundation from which it has now flourished.

It is critical to understand the identity of any scientific field. Only when the identity of the KM/IC domain becomes clearly established, can it be fully recognized as a respectable field of science (Rodríguez-Ruiz & Fernández-Menéndez, 2009). There are several arguments that support this claim (Sidorova, Evangelopoulos, Valacich, & Ramakrishnan, 2008).

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First, a discipline's identity affects the behaviors of all participants, such as academics, practitioners, editors, and students. For example, a prospective doctoral program applicant may take into consideration the state, evolution, and potential future of a scholarly domain when making a decision whether to enrol in a program or select a specific dissertation topic. Second, discipline identity is closely related to the overall image and prestige of the field. Third, powerful players, such as journal editors, reviewers, conference organizers and leading researchers, consider current discipline identity when they control its development by making decisions what papers to publish, which inquiry methods to favour, and what topics to investigate.

This investigation focuses on the KM/IC domain for the following reasons. First, it is one of the youngest management disciplines, and it is vital to establish the identity of a new field to ensure it will progress in a desirable direction (Serenko, Cocosila, & Turel, 2008). Second, previous scientometric projects identified a number of very productive KM/IC individuals and institution that may potentially dominate journal space (Serenko & Bontis, 2004). Third, since its emergence, the field has been growing exponentially, with many new journals launched and new works appearing continuously. For example, 10 years ago, there were only a few pure-KM/IC peer-reviewed journals. Currently, 20 KM/IC outlets exist and their number is predicted to grow even further (Bontis & Serenko, 2009). Fourth, journal editors may be potentially biased towards accepting papers from the pioneers and founders of the discipline than from new authors from unknown institutions. However, it is critical to insure that the research output is distributed equally; this wider participation allows generating new ideas, theories, methods, and perspectives.

As a step towards understanding the identity of the KM/IC scholarly discipline, this study explores the superstar effect in KM/IC by using a stochastic model of Yule (1924) and Simon (1955), and Lotka's square law (Lotka, 1926). They present the probability mechanism explicating journal article production in the field and predict that the article distribution will be concentrated among a few institutions, practitioners and academics. Knowing whether the superstar effect exists may help the key discipline gatekeepers reconsider the existing principles or introduce new rules governing the field of science.

The remainder of this paper is organized as follows. The following section presents an overview of the superstar phenomenon, a stochastic model of superstardom advanced by Yule (1924) and Simon (1955), and Lotka's square law (Lotka, 1926). The next section outlines the methodology and offers empirical results. The paper ends with a number of implications and concluding remarks.

2. Theoretical background

2.1. Phenomenon overview

For centuries, people have observed that wealth, resources, benefits and fame are not distributed equally among all society members. The same phenomenon has also been discovered in science when a minority of scholars produce the most works, attract an enormous number of citations, hold prestigious academic positions, and form the discipline's identity. This phenomenon, referred to as the superstar effect (Rosen, 1981) or the Matthew effect (Merton, 1968, 1988), exists in most academic fields (Price, 1963; Zuckerman, 1977), including business (Erkut, 2002). The first studies exploring unequal academic productivity distributions appeared over a century ago (Cattell, 1903, 1910), and research still continues (Egghe, 2005).

The superstar phenomenon emerges when a comparatively small number of participants excel, surpass others in their field and reap much greater rewards (MacDonald, 1988). Rosen's (1981) superstar model suggests that small differences in talent are magnified into disproportionate levels of success. In other words, those who achieved initial success tend to become extremely successful in the future, whereas most of those who did not succeed in the early days remain unsuccessful. This phenomenon has been observed in virtually all categories of human activities, for example, in sports (Lucifora & Simmons, 2003), music (Krueger, 2005), entertainment (Frank & Cook, 1996), word frequency (Booth, 1967), and science (Rossiter, 1993).

There are three hypotheses that may explain the extreme differences in the productivity and impact of scholars: sacred spark, cumulative advantage, and search costs minimization by the editors (Adler, 1985; Allison & Stewart, 1974; Cole & Cole, 1972; Fox, 1983). According to the sacred spark view, scientists differ in their research abilities, talent, skills, prior training, persistence, work habits, motivation, creativity, long-term orientation, gratification deferral, and openness to criticism (see Fig. 1). These factors determine overall research productivity multiplicatively rather than additively. In other words, they interact with one another and produce a synergy effect when the outcome is more than a sum of individual component actions. For instance, some scholars may possess all productivity-influencing factors listed above, but if they are unable to delay gratification (i.e., not being able to resist an urge to see the paper in print as soon as possible), they may rush through the study by compromising its quality, or send their manuscripts to lower-tier journals that are likely to accept the paper faster without multiple time-consuming revisions.

In fact, the extant literature advocates that people differ in their scientific abilities, which are defined as the most critical methods, procedures, and processes that scientists use when they create knowledge and solve experimental problems (Etkina et al., 2006). For example, prolific scholars may be able to identify the most important issues, apply scientific thinking based on their previous training, persist until the problem is solved, and ensure the results appear in the highest-ranked outlet available for this topic. They would produce a series of publications over longer periods of time, compared with other

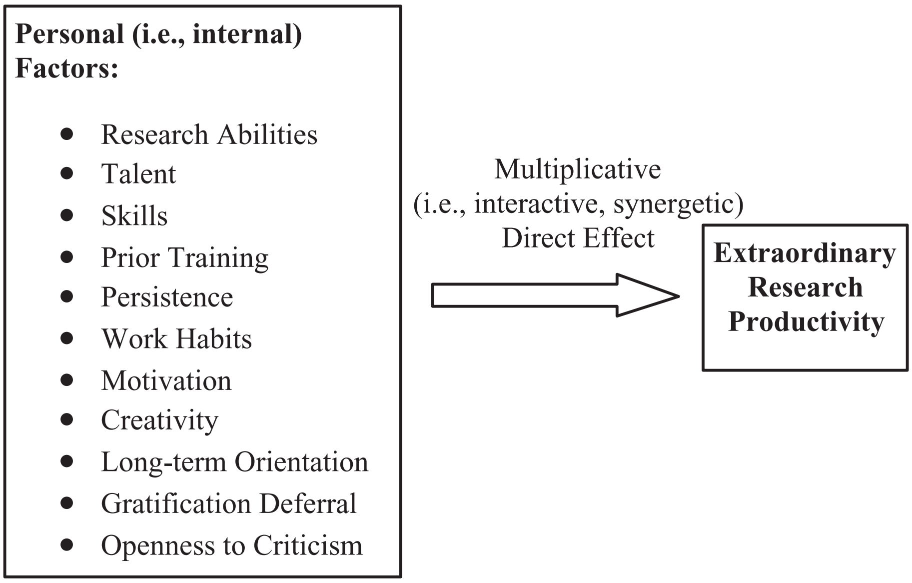

Fig. 1. The sacred spark explanation of dramatic research productivity differences.

less productive scholars. Even though the nature of scientific talent and other contributing factors is not fully understood (Simonton, 2008), evidence suggests the validity of this viewpoint.

According to the cumulative advantage approach, initial research success due to, for instance, collaboration with a field leader, selection of a hot topic or only luck, leads to a number of rewards, such as institutional prestige, personal prestige, name recognition, encouragement of colleagues, higher research self-efficacy, and expert power within an institution (DiPrete & Eirich, 2006). For example, future research potential is one of the key characteristics that academic hiring committees, especially those from prestigious research-intensive universities, look for. Therefore, even a slight advantage during an earlier research career may dramatically improve the scholar's chances for long-term success. The overall effect of these rewards is multiplicative (see Fig. 2). Successful researchers may transform these rewards into a number of resources and advantages. First, they may become research chairs, enjoy course release, obtain ample financial support in the form of internal and external grants, get access to the best graduate students and research assistants, be able to collaborate with other prolific scholars, and use expensive research facilities. Second, many administrators tend to put up with teaching or service deficiencies as long as exceptional research output is demonstrated. This is not a reward for past achievements; instead, these benefits are provided to ensure future productivity. Institutions employing very productive faculty also benefit because they are able to attract more research funding, hire prestigious scholars, attract higher-calibre graduate students, and increase their name awareness. Third, productive and/or well-cited academics usually serve on the editorial boards or as reviewers for leading journals. As a result, they become familiar with the quality standard of major outlets and use this knowledge in their work. Fourth, journal editors and reviewers may be more likely to accept a paper from a well-established scholar, or at least invite 'revise-and-resubmit' in case of mixed reviews instead of a rejection. The multiplicative effect of these resources and advantages helps previously successful scientists become even more productive, which in turn leads to further rewards, greater resources and advantages, and more research output. As such, the cumulative advantage hypothesis suggests that even minor differences in the earlier careers of scholars may be detrimental to their long-term academic success. The contemporary literature from other domains also describes the cumulative advantage effect under a variety of labels. Examples include first-mover advantage (Lieberman & Montgomery, 1988), halo effect (Nisbett & Wilson, 1977), and cumulative discrimination (Blank, Dabady, & Citro, 2004).

Search costs minimization by the editors occurs because editors may minimize their search costs by selecting the most popular individuals or institutions (Adler, 1985). Especially, this effect is maximized during complex decisions that require extensive learning processes. In the current context, this mechanism can be summarized as follows. Suppose that editors choosing papers for publication believe at first that all authors or institutions are equally likely to become stars, and that each editor picks one author or institution without any personal bias. Assume further that editors are in their position for a certain number of periods. After each issue is published, they introduce biases by revising their opinion of who the most productive authors and institutions are. This implies that the reputation of some authors and institutions increases after each publication period. Therefore, if there were editors that select specific authors or institutions, who are slightly more known or productive than others, as their choice, those authors or institutions would eventually become a star. Even though after each time period an author or institution had a market share of editors only marginally larger than everybody else, this share would increase steadily, like a snowball rolling downhill, and ultimately the author or institution becomes a star. As such, editors minimize the cost of searching for information by choosing the most prolific authors or well-known institutions.

It is too early to hypothesize the superiority of a particular theory (i.e., sacred spark, cumulative advantage or editors' search cost minimization) in the KM/IC academic domain. There is no evidence to suggest that the editors of KM/IC journals

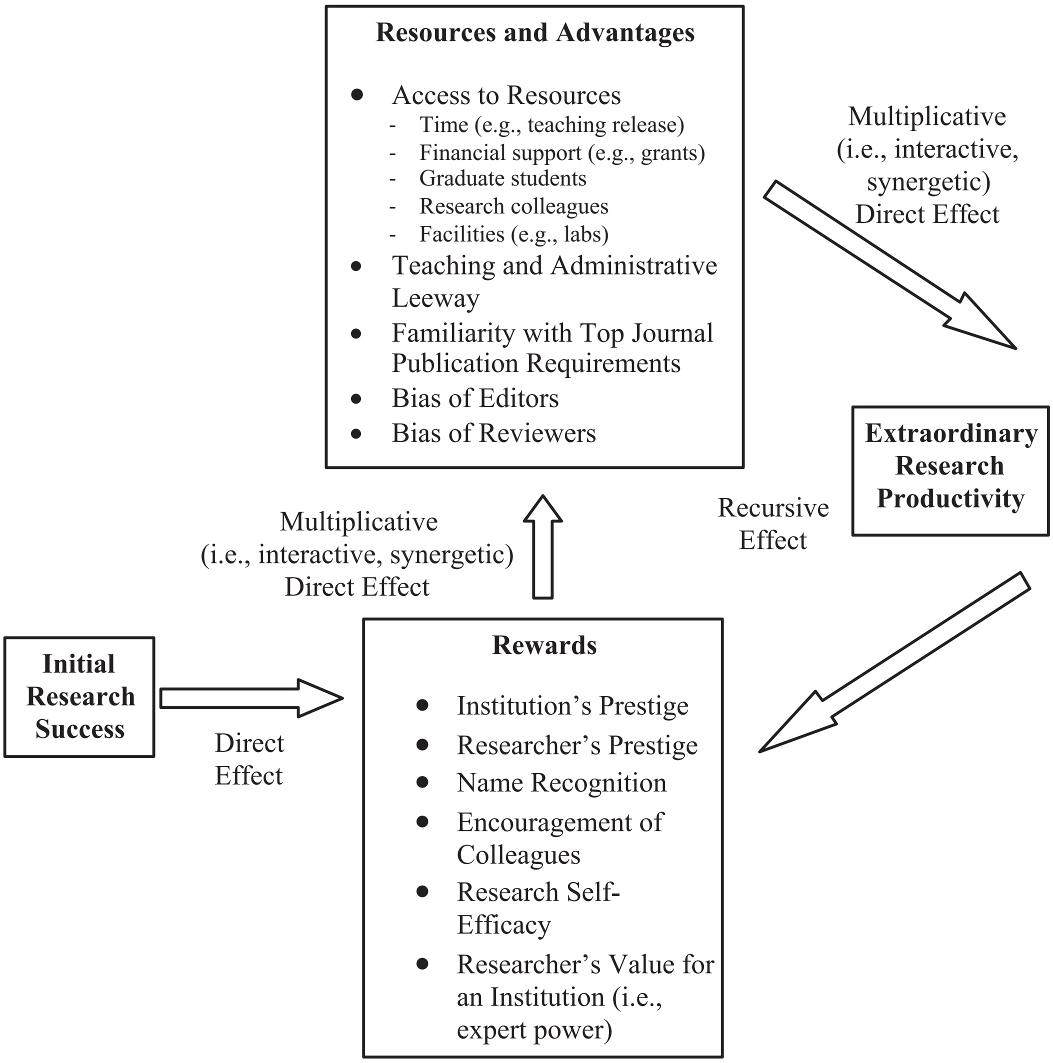

Fig. 2. The cumulative advantage explanation of dramatic research productivity differences.

tend to favour submissions from well-known academics with established research records. The field is very new and little is known about the publishing behavior of its scholars and preferences of its gatekeepers. At the same time, those who are somewhat familiar with the domain may easily identify a number of individuals who are considered the founders, leaders or trendsetters, and who frequently publish in KM/IC outlets. But do these people dominate the KM/IC research arena? Does the superstar (or Matthew) effect exist in KM/IC? A stochastic model of superstardom and Lotka's square law serve as a valuable tool to empirically investigate this issue.

2.2. A stochastic model of superstardom

The Rosen–MacDonald theory of superstar focuses on a comparison of success relative to talent (MacDonald, 1988; Rosen, 1981). The model by Yule–Simon (Simon, 1955; Yule, 1924) fits a variety of sociological, biological, and economic phenomena. It has been applied to investigate the distributions of cities by population (Zipf, 1949), DNA frequencies (Martindale & Konopka, 1996), musical artists by number of gold and platinum records (Chung & Cox, 1994), and golfers by number of Professional Golf Association Tournaments won (Cox & Falls, 1998). These prior projects demonstrate that empirical data conform well to a class of distributions which can be obtained from stochastic processes similar to those yielding negative binominal or log series distributions. In this study, the following model of the superstar phenomenon is applied to identify number of authors or institutions that published i articles (i.e., $f(i)$):

$$f(i) = \varphi\beta(i, p+1) \quad (1)$$

where φ and p are constants and $\beta(i, p+1)$ is the beta function of i and $p+1$, i.e.,

$$\beta(i, p+1) = \int_0^1 \lambda^{i-1}(1-\lambda)^p d\lambda = \frac{\Gamma(i)\Gamma(p+1)}{\Gamma(i+p+1)}, \qquad 0 < i, \quad 0 < p < \infty \quad (2)$$

Given that the KM/IC discipline is in its embryonic stage of development, it is critical to obtain as much insight as possible on the state of the discipline. Therefore, the Yule–Simon model was applied to six panels of data: (1) practitioner and academic researchers; (2) practitioner researchers only; (3) academic researchers only; (4) practitioner and academic institutions; (5) practitioner institutions only; and (6) academic institutions only. This was done to test the existence of the superstar effect with respect to all field participants separately and in aggregate. If the Yule–Simon distribution explains the relative frequency of articles published in the KM/IC domain with respect to some or all categories above, the superstar effect will be observed in a specific segment of field players or in general.

Suppose each article slot available in peer-reviewed KM/IC journals is vied for by the same number of authors or institutions. Further, assume all journal articles available for publication are selected for the article slots and assigned to an author or institution. After the journal issue is filled with articles having been chosen, the selection process repeats itself for the next journal issue. This process may be characterized by the Yule–Simon distribution, which in turn demonstrates the existence or absence of the superstar effect, if the following two assumptions describe the probability of each author or institution being selected for publication in a journal:

Assumption 1. There is the probability that journal issue $k+1$ selects an author or institution for the available article slot who already published in exactly i of the k previous journal issues. In other words, the probability of an author or institution being selected for publication in the journal is proportional to the number of times the author or institution previously published in this outlet.

Assumption 2. There is a constant probability that an author or institution is selected for journal issue $k+1$ who was not yet chosen for any previous issues. An alternative way of stating this assumption is that the probability of an author or institution who has never published an article being chosen for publication is the same for all such authors or institutions.

2.3. *Lotka's square law*

In addition to the Yule–Simon mechanism, another inverse square law of scientific productivity is Lotka's square law. Lotka observed that by plotting the number of chemistry authors against the number of contributions made by each author on a logarithmic scale a straight line with a slope of approximately negative two appears.

Thus, Lotka's empirical finding is represented by the equation:

$$a_n = \frac{a_1}{n^2}, \quad n = 1, 2, 3 \ldots, \tag{3}$$

where a_n is the number of authors publishing n papers, and a_1 is the number of authors publishing one paper.

Lotka's square law has found empirical support in various domains, for example, in finance (Chung & Cox, 1990), accounting (Chung, Park, & Cox, 1992), economics (Cox & Chung, 1991) and risk insurance (Chung & Puelz, 1992). It has been extended to other bibliometric distributions (Price, 1976) and frequency data (Rousseau & Rousseau, 2000). Therefore, Lotka's square law may also be applied to explore the patterns of productivity in the KM/IC field.

The superstar generating mechanism emerges as a result of three factors: (1) sacred spark; (2) cumulative advantage; and (3) search costs minimization by the editors. It is possible that these mechanisms have a multiplicative effect. It is also probable that sacred spark serves as an input for the cumulative advantage effect, which in turn creates biases among the editors who try to minimize their search costs. The purpose of this study is not to argue what cause-and-effect mechanism takes place, but to observe whether the superstar phenomenon exists in the KM/IC domain.

3. Methodology and results

3.1. *Dataset*

In this study, the dataset collected by Serenko et al. (2010) was utilized. It included meta-data of 2175 articles from 11 KM/IC journals for the 1994–2008 period: Electronic Journal of Knowledge Management (135 articles); International Journal of Knowledge and Learning (109); International Journal of Knowledge Management (73); International Journal of Knowledge Management Studies (52); International Journal of Learning and Intellectual Capital (121); Journal of Intellectual Capital (270); Journal of Knowledge Management (482); Journal of Knowledge Management Practice (151); Knowledge and Process Management (293); Knowledge Management Research and Practice (127); and the Learning Organization (362). All these outlets are solely devoted to KM/IC topics and included in the ranking of KM/IC journals by Bontis and Serenko (2009) and Serenko and Bontis (2009). Book reviews, editorials, and conversations were eliminated, and works by the editors were retained only if they appeared in the form of regular peer-reviewed articles (i.e., commentaries were excluded). Since this dataset contains at least 70% of all works that appeared in pure KM/IC outlets, it was concluded that the results will be generalizable to the entire KM/IC discipline.

3.2. Method

To measure the productivity distribution of authors, the direct count method was applied so that each author gets a score of one (1) every time he/she published an article regardless of the number of authors or authorship order. It was selected over the equal credit and author position approaches because the purpose was to identify all papers which each individual authored or co-authored rather than calculate his/her personal productivity score. To measure the productivity distribution of institutions, the same method was applied. However, when two or more authors from the same institution co-authored a paper, this institution received a score of one (1) regardless of the number of authors who listed this affiliation on the paper. For example, when the affiliations were listed as University A, University B, University A and University C, the scores were allocated as follows: University A (score of 1), University B (score of 1), and University C (score of 1). Note that this approach is consistent with those employed in prior investigations that applied the Yule–Simon distribution and Lotka's square law in productivity distribution studies.

To examine the distribution of published journal articles in KM/IC journals by authors, and then by institutions, the Yule–Simon model and Lotka's square law were employed. The Yule–Simon's empirical approximation assumes the probability that for journal issue $k+1$ the editor selects an author or institution who has not yet been chosen by the previous k editors so that ρ is close to one. Therefore, the Yule–Simon distribution can be approximated by

$$f(i) = \frac{1}{i(i+1)}, \quad \sum f(i) = 1, \tag{4}$$

where $f(i)$ may be interpreted as the number of authors or institutions with i selected articles. Thus, the number of authors or institutions publishing one article is given by

$$f(1) = \frac{1}{1(1+1)} = 0.500. \tag{5}$$

In a similar manner, the number with two and three articles published is given by

$$f(2) = \frac{1}{2(2+1)} = 0.167, \tag{6}$$

$$f(3) = \frac{1}{3(3+1)} = 0.083. \tag{7}$$

Note that since authors work for institutions, in a similar vein the editor may select an institution as opposed to an author. That is, in the development of the superstar model and underlying probability mechanism one can substitute the word author with institution. This helps to understand whether institutions are publishing powerhouses where the superstar phenomenon flourishes. In addition, there are two categories of authors: academics and practitioners. On the one hand, it was the practitioners who initiated the first KM/IC projects, conceived ideas, developed concepts, and launched the field. On the other hand, as observed by Serenko et al. (2010), the role of practitioners has been dramatically diminishing. From 1994 to 1998 when the first peer-reviewed KM/IC works appeared, practitioners generated over 30% of all publications. Unfortunately, by 2008, this number was a low as 10%. But does the superstar effect exist with respect to only academics? Only practitioners? Both? Do the editors treat all authors regardless of the nature of their affiliation equally? To answer these questions, the Yule–Simon distribution was applied to the datasets of only academics, only practitioners, and both. The same type of analysis was done for institutions.

In a similar vein, Lotka's square law was applied to the same dataset. The theoretical frequency of Lotka's square law can be found as follows:

$$\sum_{i=1}^{\infty} a_i = a_1 \sum_{i=1}^{\infty} \frac{1}{i^2} \tag{8}$$

However, we know that

$$\sum_{i=1}^{\infty} \frac{1}{i^2} = \frac{\pi^2}{6} \tag{9}$$

Therefore, the proportion of contributors publishing one paper should be

$$\frac{a_1}{\sum_{i=1}^{\infty} 1/i^2} = \frac{6}{\pi^2} = 0.6074 \tag{10}$$

Table 1
Yule–Simon model fit – overall results.

Source	Observed χ^2	Critical χ^2	Yule–Simon model supported/not supported
Both practitioner and academic researchers	944.817	16.013	Not supported
Practitioner researchers only	202.889	7.378	Not supported
Academic researchers only	671.781	14.450	Not supported
Both practitioner and academic institutions	106.891	17.535	Not supported
Practitioner institutions only	182.441	7.378	Not supported
Academic institutions only	11.175	16.013	Supported

Table 2
Lotka's square law fit – overall results.

Source	Observed χ^2	Critical χ^2	Lotka's square law supported/not supported
Both practitioner and academic researchers	409.978	14.070	Not supported
Practitioner researchers only	124.111	5.990	Not supported
Academic researchers only	271.507	12.590	Not supported
Both practitioner and academic institutions	12.258	15.510	Supported
Practitioner institutions only	92.442	5.990	Not supported
Academic institutions only	31.869	14.070	Not supported

Likewise, the proportions of contributors publishing two, three, and n papers should be

$$\frac{a_2}{\sum_{i=1}^{\infty} 1/i^2} = \frac{6}{\pi^2} \cdot \frac{1}{2^2} = 0.152 \tag{11}$$

$$\frac{a_3}{\sum_{i=1}^{\infty} 1/i^2} = \frac{6}{\pi^2} \cdot \frac{1}{3^2} = 0.0675 \tag{12}$$

and

$$\frac{a_n}{\sum_{i=1}^{\infty} 1/i^2} = \frac{6}{\pi^2} \cdot \frac{1}{n^2} \tag{13}$$

3.3. Findings

The χ^2 goodness of fit test using the actual and predicted number of authors and institutions was used to measure whether the Yule–Simon model and Lotka's square law describe the observed data. Tables 1 and 2 outline the overall results, and Appendix A shows the actual paper distribution.

2491 authors published 1 article, 402 – 2 articles, 110 – 3, etc. down to 1 author publishing 20 articles. With respect to the authors who are both practitioners and academics, the Yule–Simon model generates χ^2 of 944.817 which rejects the hypothesis that the Yule–Simon model explains the distribution of articles published by all authors (i.e., both academics and practitioners) at a one-tail test with alpha of 1%. In terms of the number of articles published by only practitioners and only by academics, again, the Yule–Simon Model was not supported. In fact, it was observed that over 78% of all authors published only once whereas the Yule–Simon distribution assumes that this number should be close to 50%.

Similar analysis was done for institutions. There were 964 institutions producing 1 article, 216 institutions producing 2 articles and so forth to 1 institution producing 44 papers (see Appendix A). Again, the Yule–Simon was not supported ($\chi^2 = 106.891 >$ critical $\chi^2 = 17.535$). The Yule–Simon model also did not fit the productivity distribution of practitioner institutions because 89% of them published only a single article. At the same time, it fits the productivity distribution of academic institutions. Therefore, the production of articles by universities/colleges appears to follow the superstar phenomenon as theorized by the Yule–Simon model.

For Lotka's square law, the χ^2 test requires each cell to have five or more observations when computing the test statistic. Only the category with statistically significant evidence that supports Lotka's square law was both practitioner and academic institutions ($\chi^2 = 12.258 <$ critical $\chi^2 = 15.510$). In all the other cases, the empirical evidence did not fit Lotka's square law.

4. Implications and conclusions

The purpose of this study was to test whether the superstar (or Matthew) effect exists in the KM/IC scholarly discipline. For this, the Yule–Simon model and Lotka's square law were applied to the publication data obtained from 11 KM/IC journals. Based on the findings, several important implications emerged that warrant discussion.

Implication #1. The KM/IC discipline represents a very young, attractive academic field that welcomes contributions from a variety of academics and practitioners.

It is concluded that the superstar (or Matthew) effect does not exist with respect to KM/IC practitioner and academic researchers. There are far more incidents of authors publishing a single paper than would be predicted by the superstar effect. Also, there are far fewer authors publishing more than three papers. Several revelations can be gleaned from these facts. First, there are few barriers to prevent people from publishing in this domain. This suggests the KM/IC field has not selected a set of research topics or inquiry methods that exclusively define the field. Authors are not required to learn all the nuances of this field before they are allowed to publish on KM/IC. Second, fewer researchers have selected the KM/IC area as their exclusive area of expertise. It is possible that researchers specializing in non-KM/IC fields occasionally contribute to the body of knowledge by embarking on single projects or by co-operating with their KM/IC colleagues. Third, these findings reflect the youth of the KM/IC field. There are still opportunities for researchers to establish themselves as KM/IC academics.

Implication #2. In their paper acceptance decisions, KM/IC journal editors are not biased towards a small group of highly productive researchers.

The KM/IC journal editors are not biased towards a specific group of scholars who have already established a strong publication track in the field. The data reveal that the field of KM/IC is clearly growing from a wide variety of authors as opposed to a select few dominant group of scholars. This can be attributed to a variety of factors. First, the field has a wide global appeal and thus there is a tendency to accept manuscripts from a variety of international contexts as opposed to more traditionally dominant (i.e., Anglophonic) countries. Second, the KM/IC field benefits from a wide following of researchers in various disciplines. This multi-functional perspective lends to the diversity of the author base without a clear dominant group or discipline establishing any core thrust of research.

Implication # 3. The KM/IC discipline is driven more by academics than by practitioners.

Even though the superstar effect was not observed with respect to practitioner or academic researchers, it was found that 88% of practitioner and 79% of academic researchers contributed only once to the literature, and fewer practitioners published multiple papers than academics. Therefore, an average practitioner researcher contributes less frequently to the KM/IC body of knowledge than an average academic researcher, and the field is driven by academics more than by industry professionals. On the one hand, this is a sign that the discipline has been moving towards academic maturity when a great degree of scholarly expertise is required to publish in peer-reviewed journals. Generally, academics, whose primary objective is to engage in teaching and research activities, tend to outperform practitioners. On the other hand, even though a wide assortment of practitioners has contributed to the establishment of the KM/IC field, fewer of them have become prolific KM/IC journal contributors. It is possible that the KM/IC field may lose touch with the state of practice and produce highly theoretical, rigorous research output which would be of little, if any, value to the practitioner community. This would negatively affect the future of the entire KM/IC discipline (Andriessen, 2004; Booker, Bontis, & Serenko, 2008; Ferguson, 2005).

Implication #4. In KM/IC, the distribution of articles is more concentrated among a few academic but not practitioner institutions.

In this project, the application of the Yule–Simon model revealed the existence of the superstar effect with respect to academic institutions only. Lotka's square law showed that this effect exists for institutions in general, but not for each group (i.e., only academic or only practitioner institutions) separately. Therefore, the superstar phenomenon may potentially exist in academic institutions. In addition, dramatic differences were discovered between the publication patterns of universities/colleges and non-educational organizations. 89% and 55% of all practitioner and academic institutions contributed only once. This disparity may be explained theoretically. Most non-educational institutions tend to hire very few employees who have the skills to engage in research. Practitioner authors are rewarded to a lesser extent compared to academics, and they have limited, if any, research budgets. As a result, in most professional organizations, it is difficult for someone to establish an internal research network, and practitioners either work on their own or collaborate with academics when the opportunity presents itself.

The potential emergence of the superstar effect with respect to academic institutions should be considered by the discipline's stakeholders and gatekeepers. It is possible that a number of universities have established clusters of KM/IC research excellence by hiring, retaining and rewarding prolific KM/IC contributors. Cranfield University, UK is a good example of such an institution. Whereas this study does not explain why specific academic institutions dominate the KM/IC journal space, it is still possible that even though journal editors exhibit no bias towards previously productive researchers, they consciously or subconsciously favour submissions from the leading KM/IC academic institutions. It is recommended that editors seek to promote the opportunities for publishing in KM/IC journals to a more diverse group of university researchers. A potentially productive approach is to sponsor doctoral consortia at large management conferences where future academic researchers are grooming their skills. This will yield more manuscripts from the same doctoral candidates when they secure permanent academic positions at non-superstar institutions.

Furthermore, editors may also target non-Anglophonic and non-traditional research settings by establishing novel special issue papers that target relatively sparse research settings. These types of projects help accelerate the development of the field while focusing on unique country or industry settings.

Implication # 5. The Yule–Simon model and Lotka's square law may produce different distributions with respect to institutions.

The application of Lotka's square law to explain the fit of the distributions was conducted. None of the data conformed to Lotka's square law except for both practitioners and academic institutions. Thus, this inverse square law of scientific productivity elucidates the publishing frequency of organizations collectively only. This is in contrast to the Yule–Simon model that fits academic institutions only. The difference between the Yule–Simon and Lotka predicted distributions results from the skewness. That is, Lotka's square law forecasts a higher number of one time appearances by institutions and authors and smaller frequencies of multiple appearances. Because practitioner institutions were disproportionately more represented relative to academic institutions, this caused the split in the findings. More research is needed to understand differences in the distributions obtained by the Yule–Simon model and Lotka's square law that predict institutional productivity collectively (both practitioner and academic institutions) and individually (only practitioner and only academic institutions).

This study has several limitations. First, even though the 11 examined journals contain a large proportion of the articles published in KM/IC outlets, many papers have appeared in journals from other disciplines, such as information systems, organizational behavior, and accounting. Second, this study tested the existence of the superstar effect, but it did not explain why it takes place with respect to academic institutions. Third, there are other scientometric laws that may be applied to test this phenomenon. Fourth, the existence of the superstar effect may be considered a norm in established scholarly domains or even a sign of discipline maturity. However, even if this effect is unavoidable in the future of KM/IC, the discipline's gatekeepers should be aware of it and take proactive measures to facilitate a wide participation of both academics and practitioners in the field's development.

In conclusion, this study represents the first comprehensive examination of the superstar effect in the KM/IC field. Although the results show that the superstar effect is more evident within academic versus practitioner authors, the corollary implication bodes well for the field of KM/IC since both ends of the academic/practitioner spectrum have embraced the field as worthy for future study. As more and more KM/IC doctoral programs are launched around the world, the supervisors and their corresponding students will end up at different institutions (and countries) thus increasing the breadth of the field even further. Editors of KM/IC journals should also continue to provide adequate opportunities for non-traditional authors (i.e., non-Anglophonic researchers from lesser known academic institutions) to submit manuscripts so that a systemic breadth of research inventory helps support the field's global diversity.

Appendix A.

See Tables A1–A6.

Table A1
Yule–Simon model fit – both practitioner and academic researchers, $\chi^2 = 944.817$ (critical $\chi^2 = 16.013$); Lotka's square law fit – $\chi^2 = 409.978$ (critical $\chi^2 = 14.070$).

# of papers	Actual # of authors	Predicted # of authors for Yule–Simon model	Actual % of authors	Predicted # of authors for Lotka's square law
1	2491	1544.500	80.122	1888.407
2	402	518.167	12.962	472.568
3	110	259.083	3.438	209.858
4	50	155.450	1.608	118.142
5	18	103.633	0.579	75.549
6	7	74.024	0.225	52.542
7	13	55.518	0.418	38.552
8	5	43.181	0.161	29.536
9	3	34.544	0.096	23.318
10	3	28.264	0.096	18.965
11	1	23.553	0.032	15.545
12	2	19.929	0.064	13.058
13	0	17.082	0.000	11.192
14	0	14.805	0.000	9.638
15	1	12.954	0.032	8.394
16	1	11.430	0.032	7.462
17	0	10.160	0.000	6.529
18	0	9.091	0.000	5.907
19	0	8.182	0.000	5.285
20	1	7.402	0.032	4.664

Table A2
Yule–Simon model fit – practitioner researchers only, $\chi^2 = 202.889$ (critical $\chi^2 = 7.378$); Lotka's square law fit – $\chi^2 = 124.111$ (critical $\chi^2 = 5.990$).

# of papers	Actual # of authors	Predicted # of authors for Yule–Simon model	Actual % of authors	Predicted # of authors for Lotka's square law
1	476	272.000	87.500	306.130
2	49	90.685	9.007	76.608
3	8	45.315	1.471	34.020
4	4	27.200	0.735	19.152
5	2	18.115	0.368	12.247
6	1	12.947	0.184	8.518
7	0	9.738	0.000	6.250
8	2	7.562	0.368	4.788
9	0	6.038	0.000	3.780
10	0	4.950	0.000	3.074
11	1	4.134	0.184	2.52
12	0	3.482	0.000	2.117
13	0	2.992	0.000	1.814
14	0	2.611	0.000	1.562
15	0	2.285	0.000	1.361
16	1	2.013	0.184	1.210

Table A3
Yule–Simon model fit – academic researchers only, $\chi^2 = 671.781$ (critical $\chi^2 = 14.450$); Lotka's square law fit – $\chi^2 = 271.507$ (critical $\chi^2 = 12.590$).

# of papers	Actual # of authors	Predicted # of authors for Yule–Simon model	Actual % of authors	Predicted # of authors for Lotka's square law
1	2015	1282.500	78.558	1557.981
2	354	427.586	13.801	389.880
3	102	213.665	3.977	173.138
4	46	128.250	1.793	97.470
5	16	85.415	0.624	62.330
6	6	61.047	0.234	43.349
7	13	45.914	0.507	31.806
8	3	35.654	0.117	24.368
9	3	28.472	0.117	19.238
10	3	23.342	0.117	15.647
11	0	19.494	0.000	12.825
12	2	16.416	0.078	10.773
13	0	14.108	0.000	9.234
14	0	12.312	0.000	7.952
15	1	10.773	0.039	6.926
16	0	9.491	0.000	6.156
17	0	8.465	0.000	5.387
18	0	7.439	0.000	4.874
19	0	6.669	0.000	4.361
20	1	6.156	0.039	3.848

Table A4
Yule–Simon model fit – both practitioner and academic institutions, $\chi^2 = 106.891$ (critical $\chi^2 = 17.535$); Lotka's square law fit – $\chi^2 = 12.258$ (critical $\chi^2 = 15.510$).

# of papers	Actual # of institutions	Predicted # of institutions for Yule–Simon model	Actual % of institutions	Predicted # of institutions for Lotka's square law
1	964	732.000	65.847	889.234
2	216	244.000	14.754	222.528
3	107	122.000	7.309	98.820
4	53	73.200	3.620	55.632
5	31	48.800	2.117	35.575
6	21	34.857	1.434	24.742
7	17	26.143	1.161	18.154
8	11	20.333	0.751	13.908
9	9	16.267	0.614	10.980
10	4	13.309	0.273	8.930
11	8	11.091	0.546	7.320
12	3	9.385	0.205	6.149
13	4	8.044	0.273	5.270
14	2	6.971	0.137	4.538
15	4	6.100	0.273	3.953
16	3	5.382	0.205	3.514
17	1	4.784	0.068	3.074
18	2	4.281	0.137	2.782
19	0	3.853	0.000	2.489
20	0	3.486	0.000	2.196
21	0	3.169	0.000	2.017
22	0	2.893	0.000	1.837
23	0	2.652	0.000	1.681
24	0	2.440	0.000	1.544
25	1	2.252	0.068	1.423
26	1	2.085	0.068	1.316
27	0	1.937	0.000	1.220
28	1	1.803	0.068	1.134
29	0	1.683	0.000	1.057
30	0	1.574	0.000	0.988
31	0	1.476	0.000	0.925
32	0	1.386	0.000	0.868
33	0	1.305	0.000	0.817
34	0	1.230	0.000	0.769
35	0	1.162	0.000	0.726
37	0	1.041	0.000	0.650
38	0	0.988	0.000	0.616
39	0	0.938	0.000	0.585
40	0	0.893	0.000	0.556
41	0	0.850	0.000	0.529
42	0	0.811	0.000	0.504
43	0	0.774	0.000	0.481
44	1	0.739	0.068	0.459

Table A5
Yule–Simon model fit – practitioner institutions only, $\chi^2 = 182.441$ (critical $\chi^2 = 7.378$); Lotka's square law fit – $\chi^2 = 92.442$ (critical $\chi^2 = 5.990$).

# of papers	Actual # of institutions	Predicted # of institutions for Yule–Simon model	Actual % of institutions	Predicted # of institutions for Lotka's square law
1	402	225.500	89.135	273.937
2	37	75.182	8.204	68.552
3	7	37.568	1.552	30.443
4	1	22.550	0.222	17.138
5	1	15.018	0.222	10.959
6	0	10.734	0.000	7.622
7	0	8.073	0.000	5.592
8	0	6.269	0.000	4.285
9	2	5.006	0.443	3.383
10	0	4.104	0.000	2.751
11	0	3.428	0.000	2.255
12	0	2.886	0.000	1.894
13	0	2.481	0.000	1.624
14	0	2.165	0.000	1.398
15	1	1.894	0.222	1.218

Table A6
Yule–Simon model fit – academic institutions only, $\chi^2 = 11.175$ (critical $\chi^2 = 16.013$); Lotka's square law fit – $\chi^2 = 31.869$ (critical $\chi^2 = 14.070$).

# of papers	Actual # of institutions	Predicted # of institutions for Yule–Simon model	Actual % of institutions	Predicted # of institutions for Lotka's square law
1	562	506.500	55.479	615.296
2	179	168.867	17.670	153.976
3	100	84.383	9.872	68.378
4	52	50.650	5.133	38.494
5	30	33.733	2.962	24.616
6	21	24.109	2.073	17.120
7	17	18.133	1.678	12.561
8	11	14.081	1.086	9.624
9	0	11.244	0.691	7.598
10	4	9.218	0.395	6.179
11	8	7.699	0.790	5.065
12	3	6.483	0.296	4.255
13	4	5.572	0.395	3.647
14	2	4.862	0.197	3.140
15	3	4.255	0.296	2.735
16	3	3.748	0.296	2.431
17	1	3.343	0.099	2.127
18	2	2.938	0.197	1.925
19	0	2.634	0.000	1.722
20	0	2.431	0.000	1.520
21	0	2.127	0.000	1.400
22	0	2.026	0.000	1.271
23	0	1.823	0.000	1.163
24	0	1.722	0.000	1.068
25	1	1.520	0.099	0.985
26	1	1.418	0.099	0.910
27	0	1.317	0.000	0.844
28	1	1.216	0.099	0.785
29	0	1.114	0.000	0.732
30	0	1.114	0.000	0.684
31	0	1.013	0.000	0.640
32	0	0.912	0.000	0.601
33	0	0.912	0.000	0.565
34	0	0.810	0.000	0.532
35	0	0.810	0.000	0.502
37	0	0.709	0.000	0.449
38	0	0.709	0.000	0.426
39	0	0.608	0.000	0.405
40	0	0.608	0.000	0.385
41	0	0.608	0.000	0.366
42	0	0.608	0.000	0.349
43	0	0.507	0.000	0.333
44	1	0.507	0.099	0.318

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