EDITOR'S COMMENTS

Journal Quality and Citations: Common Metrics and Considerations about Their Use

By: **Detmar Straub**
Editor-in-Chief , *MIS Quarterly*
Georgia State University
dstraub@gsu.edu

Chad Anderson
Associate Managing Editor, *MIS Quarterly*
Georgia State University
canderson32@gsu.edu

In my very first editorial (Straub 2008), I briefly discussed the topic of journal quality and journal impact factors. In this editorial, I would like to expand that discussion with the help of the *MISQ* Associate Managing Editor, Chad Anderson. Our goals with respect to (hopefully) informing the IS community are to argue for the criticality of assessing journal quality, to enumerate key characteristics of commonly used metrics, to suggest how and when these metrics should be used, and to call for a broader field of study within which constructs like journal quality can be positioned.

The Importance of Assessing Journal Quality

The value of journal quality rankings to the academic community is complicated. Individual scholars publish their work to inform and engage with their chosen research community. A journal's perceived quality will typically influence the number of readers of that journal and therefore authors will want to publish in top-quality journals to maximize the potential viewers of their work. Publication is also necessary for promotion and tenure, and at many institutions the quality of the journals in which a researcher's work appears is a make or break factor when the merits for promotion and tenure are considered. Finally, while publication in a top quality journal does not guarantee that an article will be highly influential, articles published in top journals will often gain at least a temporary "halo" effect from the journal's perceived quality. These factors, among others, help explain why authors, editors, institutions, and the research community as a whole have a vested interest in the assessment of journal quality and the relative quality ranking of journals in the field.

Last year Paul Gray organized a special issue of the *Communications of the Association for Information Systems* (*CAIS*) on forced journal self-citation, in which we participated. In our article we defined forced journal self-citation as the practice whereby "an editor either requires or strongly requests that an author cite articles that have appeared in the editor's journal" (Straub and Anderson 2009, p. 58). This practice is particularly controversial when the request is made just before or just after the paper has been accepted for publication. The issue of forced journal self-citation results from the importance placed on journal quality rankings by the academic community and the way in which those rankings are determined. We argued that editors might be tempted to engage in forced journal self-citation because "even a single rank change can be meaningful to journal owners and representatives as well as to authors and other members of the community" (Straub and Anderson 2009, p. 61). This is just one small indication of the importance of these metrics for the field and the stature of the field within the larger academic community.

What Is Journal Quality? Does it Differ from Journal Impact and If So, How?

Given that the topic is important, it would be useful first to ruminate about journal quality as an abstraction. If we put on our researcher hats and ask ourselves what we mean by the *construct* of journal quality, we may discover that we mean an assessment of journal attributes that focuses on the process of reviewing papers, the publication of papers that make significant intellectual contributions to the field, and the subsequent stature of the journal that results from the former two attributes. Some might prefer to separate out the downstream effects of journal quality from the causal agency of quality and proffer a separate outcome construct of journal impact (or influence or reputation). In this way, we would have an authentic nomology that would argue that higher qualities in a journal would lead to greater impact, a theoretical model structurally similar to the DeLone-McLean (1992) systems success model, where higher quality systems, information, and service lead to higher levels of systems usage and satisfaction.

All this being said, the scientometric approach to date has been to assume that there is only one construct and that its measurement can take various forms. These forms include representative opinion surveys,[1] citation analyses, purposeful consensus,[2] author affiliation indices (Ferratt et al. 2007), etc. Whereas it would be helpful for the field to consider entire nomologies such as journal quality predicting journal influence (Straub 2006), we are not there yet. Enterprising scholars should try to break us out of the straitjacket of focusing so much attention on the expression of the single construct of journal quality and move us to considerations of how the entire knowledge transference process takes place via journals and other publication venues, but for the moment we are still struggling with the metrics surrounding journal quality in and of itself. For the remainder of this editorial, therefore, we will assume, perhaps unrealistically, that journal quality and journal impact are not separate constructs.[3]

Measuring Journal Quality Through Citations

Historically, as just noted, journal quality has been assessed through a variety of metrics. For decades, the preferred method of assessment was representative opinion surveys. It is interesting to note that when one asks academics, as one typically does, to rate or rank journals, we are dealing at the highest, molar level.[4] What an individual is thinking when responding to this question is debatable, but it likely includes impressions about general reputation, personal experiences with the journal as either an author or a reviewer, knowledge about the rigor of the reviewing processes, peer viewpoints, and so forth. In short, opinion surveys are likely capturing both causal constructs like journal quality as well as outcome constructs like reputation.

Within the last five years or so, citation-based metrics seem to have come to the forefront as a preferred means of assessing journal quality. These differ from opinion surveys in that they only *indirectly* tap into the opinions of scholars in a given field. There is undoubtedly some complex recursion taking place such that scholars cite higher tier journals more frequently because they believe it will redound to their favor in the reviewing process. Over time, the rigor of the reviewing process and the quality of

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[1]Journal quality ranking studies include Barnes (2005), Cooper et al. (1993), Doke and Luke (1987), Ferratt et al. (2007), Gillenson and Stutz (1991), Hardgrave and Walstrom (1997), Holsapple et al. (1993, 1994), Katerattanakul et al. (2003), Koong and Weistroffer (1989), Lending and Wetherbe (1992), Lowry et al. (2004), Mylonopoulos and Theoharakis (2001), Nord and Nord (1990, 1995), Peffers and Tang (2003), Rainer and Miller (2005), Swanson et al. (1998), Templeton et al. (2007), Van Over and Nelson (1986), Vogel and Wetherbe (1984), Walczak (1999), Walstrom and Hardgrave (2001), Walstrom et al. (1995), and Whitman et al. (1999).

[2]Our contention is that the Senior Scholars basket of six (optionally eight) top IS journals that has been promulgated by the Association for Information Systems came about as a result of a consensus process of first the task force designated to put forward a target list and later reified by the Senior Scholars forum group. See http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=346.

[3]A scientometric study that has examined the validity of measurements of journal quality is Lewis et al. (2007). In this study, the assumption is that opinion surveys and citation analyses were both surrogates of journal quality. Given this assumption, they conclude that the approaches were mutually reinforcing. The high correlations they observed could equally be true of a causal model, where opinion surveys best measured journal quality and citation analyses best measured journal impact. This reservation alone shows why it is so crucial that more studies of the science of the journal "phenomenon" be undertaken.

[4]Some might refer to this level as a "global" or "omnibus" level. In the case of the "trust" construct frequently studied in information systems, this level would be a straightforward question asking respondents if they trusted a vendor (or website or IT). There may be variants in terminology (such as "Is the vendor trustworthy?"), but the approach is molar in that it does not break trust down in meso-level components such as vendor ability, beneficience, predictability, etc.

articles appearing in certain journals then reinforces the citation of higher tier journals, and in this way the cycle is complete. But, as noted above, this must remain speculative until such time as an investigation of the knowledge transference process results in theories that can be tested and refined.[5]

In brief, citation-based methods for assessing journal quality are timely, and of interest because of the practicality of understanding them and using them for the advancement of the discipline. It is going too far to say that they are a "better" way to assess journal quality, however.

What are the most common metrics in use today?

Journal Impact Factors: Two-Year Scores

Journal impact factor (JIF) scores are one citation-based metric used to assess journal quality. Thomson Reuters calculates annual JIF scores for its basket of journals and publishes those scores through its Journal Citation Reports. These scores are based on citations in a given year in Thomson Reuter's basket of journals. One issue with this particular quality metric is that some journals are not included in Thomson Reuter's journal basket and therefore cannot be included in rankings which use this metric. A second issue with JIF scores is the time period on which they are based. Traditionally, Thomson Reuters calculated and published two-year JIF scores. Two-year JIF scores are calculated by dividing the number of all citations to a journal's articles published in the previous two years by the number of "citable items" published in that same two year period.[6] Figure 1 provides an example formula for a two-year JIF for *MIS Quarterly* (*MISQ*).

Journal Impact Factors: Five-Year Plus Scores

Starting in 2007, Thomson Reuters began calculating and publishing a five-year JIF score in addition to the two-year JIF. This five-year score uses the same formula structure as the two-year JIF, but instead of a two year window it extends the range to five years. Table 1 includes both two-year and five-year JIF scores for the basket of 30 top business journals listed in Straub and Anderson (2009) and Table 2 displays the rankings for each metric. A two-year JIF (5.183) places *MISQ* third in the rankings while a five-year JIF (11.586) puts *MISQ* in first place.

While on the surface it may sound self-serving, we would like to argue that the five-year JIF is a more appropriate metric for several reasons. First, the influence of a particular article will normally extend beyond a two-year window and therefore a five-year JIF will more accurately reflect the aggregate influence of a journal's articles. Second, the length of the typical publication cycle will tend to push the normal citation of articles beyond that two-year window. It might even be argued that a seven-year or even a 10-year window would be more appropriate for fields in which articles remain highly influential over a long period of time, which seems to be true for the field of information systems.

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[5]Thus, we would speculate that citation-based metrics are possibly no more objective than opinion surveys because of the underlying psychology of why people cite. Moreover, even if they were deemed to be somehow more objective, this does not in any way translate into them being superior to opinion-based measures. One point that is frequently missed when measurement issues arise is that construct validity can only examine whether two or more measures of a construct correlate (convergent validity) and/or differ from measures of other constructs (discriminant validity). If a measurement approach fails these tests, one cannot assume that it is inferior. In short, validation works in both directions and is "symmetrical and egalitarian" (Campbell 1960, p. 548). One validates a measurement approach by comparing it to other approaches, but we have no way of knowing if an approach fails to correlate with other approaches whether it is because it is inferior to the others or superior to them. Modern day positivists do not generally believe that it is possible to "know" reality and to find a deterministic process that explains it (Cook and Campbell 1979). Therefore, we use statistical models to get insights into the underlying reality, including how we can measure the constructs and construct relationships that describe it. These statistical models are only probabilistic, but they are good enough to give us a sense of the "causal realism" (Cook and Campbell 1979, p. 29) of the phenomena we study.

[6]"Citable items" in the denominator of the JIF equation include original, refereed research and review articles and exclude editorials, letters to the editors, news items, meeting notes, etc.

$$\text{2008 } MISQ \text{ JIF} = \frac{\text{Citations from all 2008 articles in Thompson's journal basket to MISQ articles published in 2006 and 2007}}{\text{Number of citable items published in MISQ in 2006 and 2007}}$$

Figure 1. Two-Year Journal Impact Factor Calculation

Table 1. Citation-Based Metric Scores for 2008 (Sorted by Five-Year JIF)

	5-Year JIF	2-Year JIF	Eigen	AI	*h* index
MIS Quarterly	**11.586**	**5.183**	**0.0114**	**3.540**	**29**
Academy of Management Review	8.211	6.125	0.0195	4.302	29
Academy of Management Journal	7.670	6.079	0.0250	3.871	36
Journal of Marketing	7.092	3.598	0.0134	2.929	30
Strategic Management Journal	6.708	3.344	0.0220	2.898	30
Administrative Science Quarterly	6.313	2.853	0.0068	3.680	19
Journal of Finance	5.863	4.018	0.0585	6.005	32
Information Systems Research	**5.644**	**2.261**	**0.0055**	**2.362**	**19**
Organization Science	5.453	2.575	0.0154	2.853	28
Journal of Financial Economics	5.203	3.542	0.0469	5.237	30
Journal of Management	4.532	3.080	0.0099	2.179	22
Journal of Accounting & Economics	4.405	2.851	0.0118	3.364	20
Management Science	4.065	2.354	0.0332	2.317	31
Research Policy	4.043	2.655	0.0126	1.174	28
Marketing Science	3.868	3.309	0.0101	2.226	26
Journal of Business Venturing	3.857	2.143	0.0052	1.235	15
Journal of Management Information Systems	**3.760**	**2.358**	**0.0044**	**1.027**	**17**
Journal of Accounting Research	3.733	2.350	0.0090	3.000	17
Journal of Marketing Research	3.558	2.574	0.0115	2.162	21
Leadership Quarterly	3.503	2.205	0.0050	1.266	18
Accounting Review	3.498	1.920	0.0105	2.146	20
Review of Financial Studies	3.474	2.640	0.0205	4.300	21
Journal of Consumer Research	3.444	1.592	0.0110	1.643	20
Journal of Information Technology	**3.097**	**1.966**	**0.0021**	**0.772**	**8**
Information Systems Journal	**2.940**	**2.375**	**0.0013**	**0.711**	**13**
Journal of Environmental Economics and Management	2.574	1.730	0.0083	1.392	17
Journal of Risk and Uncertainty	2.151	1.020	0.0043	1.526	11
Journal of Strategic Information Systems	**2.012**	**1.484**	**0.0008**	**0.398**	**10**
European Journal of Information Systems	**1.482**	**1.202**	**0.0013**	**0.284**	**11**
Human Resource Management	1.378	0.729	0.0014	0.429	10

Table 2. Citation-Based Metric Ranks for 2008 (sorted by Five-Year JIF)

	5-Year JIF	2-Year JIF	Eigen	AI	*h* index
MIS Quarterly	**1**	**3**	**13**	**7**	**7**
Academy of Management Review	2	1	7	3	7
Academy of Management Journal	3	2	4	5	1
Journal of Marketing	4	5	9	10	4
Strategic Management Journal	5	7	5	11	4
Administrative Science Quarterly	6	10	20	6	18
Journal of Finance	7	4	1	1	2
Information Systems Research	**8**	**20**	**21**	**13**	**18**
Organization Science	9	14	8	12	9
Journal of Financial Economics	10	6	2	2	4
Journal of Management	11	9	17	16	12
Journal of Accounting & Economics	12	11	11	8	15
Management Science	13	18	3	14	3
Research Policy	14	12	10	24	9
Marketing Science	15	8	16	15	11
Journal of Business Venturing	16	22	22	23	24
Journal of Management Information Systems	**17**	**17**	**24**	**25**	**21**
Journal of Accounting Research	18	19	18	9	21
Journal of Marketing Research	19	15	12	17	13
Leadership Quarterly	20	21	23	22	20
Accounting Review	21	24	15	18	15
Review of Financial Studies	22	13	6	4	13
Journal of Consumer Research	23	26	14	19	15
Journal of Information Technology	**24**	**23**	**26**	**26**	**30**
Information Systems Journal	**25**	**16**	**28**	**27**	**25**
Journal of Environmental Economics and Management	26	25	19	21	21
Journal of Risk and Uncertainty	27	29	25	20	26
Journal of Strategic Information Systems	**28**	**27**	**30**	**29**	**28**
European Journal of Information Systems	**29**	**28**	**29**	**30**	**26**
Human Resource Management	30	30	27	28	28

Note: This table is based on data published by Thomson Reuters. It is used with permission. IS journals are in bold face type.

One drawback, however, to a broader JIF window is that it favors older journals. For example, if a 10-year window were used, then JIF scores for journals that have been in existence for less than 10 years could not be calculated and they would therefore be excluded from rankings which use that metric. The arguments for or against the use of a particular window of time in the calculation of JIF scores are important considerations. However, it must be noted that the creation of JIF scores is not a trivial activity and therefore the availability of various time-based scores is largely in the hands of decision makers at organizations like Thomson Reuters who have the necessary resources to calculate these metrics. That being said, as a community we should be using the most appropriate metrics available for assessing journal quality and therefore when JIF scores are adopted for this purpose we suggest that the five-year JIF score be used.

The Effect of Self-Citation on JIFs

Our analysis of journal self-citations for the *CAIS* special issue also demonstrates that other factors can impact JIF scores in addition to the time period window used. Specifically, we assessed the effect self-citation has on JIF-based journal rankings and found that the ranking of two thirds of our basket of 30 top business journals changed when self-citations were removed. Therefore, "we suggest that the use of JIF values without self-citations would be a useful deterrent to the practice of forced self-citation when the motive is to boost impact factors" (Straub and Anderson 2009, p. 61). Unfortunately, Thomson Reuters currently only provides JIF scores without self-citations for their two-year JIF so there is currently a trade-off between the value of a five-year window and a JIF score without self-citations.

Eigenfactor and Article Influence Scores

In addition to JIF scores, other citation-based quality metrics are now available. One set of alternative metrics to JIF scores are EigenFactor™ and Article Influence™ scores. These metrics were developed through the Eigenfactor Project™, a non-commercial academic research project sponsored by the Bergstrom lab in the Department of Biology at the University of Washington. Bergstrom (2009) describes the Eigenfactor score as an estimate, based on journal citations, of the amount of time researchers spend with a journal. The Thomson Reuters Journal Citation Reports (JCR) dataset is used as the citation source, although other sources could be used, with citations from more prestigious journals given greater weight than citations from less prestigious journals. The method for determining prestige is similar to the method used by the Google PageRank algorithm to rank web pages and citation values are divided by the total number of citations appearing in the citing journal to correct for differences in citation patterns across disciplines. A five-year window of citations is used and journal self-citations are removed from the calculation. The sum of all Eigenfactor scores for a given year will sum to 100 so this is a zero-sum metric with an increase in one journal's score resulting in a decrease in the score of one or more other journals.

The Eigenfactor score is only concerned with total journal influence so it doesn't take into consideration the number of articles published by each journal. The article influence (AI) score was developed for this purpose. It is derived from the Eigenfactor score and represents the average influence of each of a journal's articles, making it comparable to the journal impact factor. Article influence scores are normalized so that the mean article score is 1.00. Therefore, if a journal has an AI > 1.00, the aggregate influence of its articles is higher than average compared to all other journals in the Thomson Reuters JCR dataset. *MISQ*'s AI score of 3.540 means that its articles are more than three times as influential as the average journal in the JCR dataset.

Eigenfactor and article influence scores from the period 1995–2007 are available at (www.eigenfactor.org) for free. Scores for 2008 are only available through Thomson Reuters Journal Citation Reports. Tables 1 and 2 provide the 2008 Eigenfactor (Eigen) and article influence (AI) scores and rankings respectively for a basket of 30 top business journals. Here you can begin to see how the choice of metric can produce more pronounced shifts in the rankings. For example, *MISQ* falls to thirteenth based on Eigenfactor score and seventh based on article influence score. Business journals with a focus on finance rank highly on these metrics.

Like all citations-based metrics, Eigenfactor and article influence scores make assumptions about citations. The idea that an Eigenfactor score represents the amount of time researchers spend with a journal assumes that all citations from a given journal represent equal influence. In reality, researchers will spend more time with certain articles they cite and be more highly influenced by those articles than by others. There is not a practical way to capture that kind of information, but it is a limitation for this particular metric.

The h-Index Family

Another set of citation-based quality measures is the *h*-index family of metrics. The original *h*-index was developed by J. E. Hirsch, who defined it in the following way: "A scientist has index *h* if *h* of his or her N_p papers have at least *h* citations each and the other (N_p - *h*) papers have $\leq$ *h* citations each" (Hirsch 2005, p. 16569). In other words, a researcher's published papers

are ranked by the number of citations they have received and the *h*-index is the highest rank where the citation count for that paper is still equal to or less than the paper's rank. The *h*-index can be calculated for either an individual or a journal and Thomson Reuters publishes an *h*-index for its basket of journals through its Journal Citation Reports (JCR). Tables 1 and 2 provide the 2008 JCR *h*-index scores and ranks respectively for the basket of the top 30 business journals. Ties are common with this metric and *MISQ* shares seventh place with the *Academy of Management Review*.

Adjusted *h*-index scores have also been developed to compensate for limitations in the original *h*-index. One limitation of the original *h*-index is based on time in print. This problem exists because, all else being equal, authors whose papers have been in print longer will typically have a higher *h*-index than comparable authors simply because their papers have had more time to accumulate citations. The contemporary *h*-index or *hc*-index was developed to compensate for this issue of time. It adjusts the citation counts for papers by their date of publication by increasing the weight of more recently published papers and decreasing the weight of older papers. A second limitation of the original *h*-index is related to the impact of highly cited papers. The original *h*-index cannot distinguish between a paper with 20 citations and one with 2,000, even though the paper with 2,000 citations is clearly more influential than the one with 20. The *g*-index was developed to give weight to highly cited articles. It does this by using a cumulative citation count and a squared rank to properly weight the influence of highly cited articles. Truex et al. (2009) describe these adjusted *h*-index scores in more detail.

Google Scholar Citation Analyses via Harzing's Publish or Perish

In their research, Truex et al. (2009) use an interesting tool called Harzing's Publish or Perish to collect their citation data. Harzing's Publish or Perish is a free citation analysis tool (available at http://www.harzing.com/pop.htm) that uses Google Scholar as its source of citations (Harzing 2010). The two primary benefits of using Google Scholar over commercial databases like Thompson Reuters Web of Science are that Google Scholar is freely available without a subscription and in addition to journals it includes conferences, books, and other publications (including working papers, syllabi, etc.), casting a wider net for potential citations. The downside to using Google Scholar is that the output typically requires cleansing, especially with older citations. For example, a simple lookup for the journal title "MIS Quarterly" for 2008 returned a total of 59 papers, even though there were only 40 articles published in 2008, including editorials. One reason for this is that articles are often listed multiple times because of variants in the title or list of authors. In the case of *MIS Quarterly*, a simple lookup also captures some *MIS Quarterly Executive* articles. Results from Google Scholar will also include non-refereed papers, like editorials, which are not included in Thompson Reuters JCR statistics.

Publish or Perish offers both author impact analysis and journal impact analysis options. Both analysis options provide a number of metrics including cites per paper (comparable to the journal impact factor) as well as the *h*-index with several of its variants. For example, after cleaning to limit the analysis to the 36 refereed articles published in 2008, the journal analysis results for *MIS Quarterly* showed 358 total citations for an average cites per paper of 9.94. The journal's *h*-index for 2008 is 12 while the *g*-index is 17.

How Shall We Use Such Metrics?

Once numbers become available to a researcher, it is ever so tempting to just use them,[7] sometimes without thinking about the long-term ramifications of such use. As we argue at the beginning of this editorial, careers hinge on the judgments made about journals and an unwary, cavalier use of these metrics could induce long-term pain not only for journals themselves but also for individual scholars.

What do we mean by this? Metrics are very sensitive to context, even though there is a tendency for researchers to ignore context and focus instead on whether a scale has been previously validated (Boudreau et al. 2001). Using previously validated scales without considering the new application domain is like walking into a party without knowing the dress code. Mistakenly wearing

[7]Or dispute them.

casual clothes to a black tie event, for example, will not invalidate your physical presence on the scene, to be sure, but it may undermine everything else that you hoped to accomplish by attending the party.

The "dress code" equivalent for scientometrics is "purposed" applicability. What is the problem being addressed? What are the key factors in bringing forth a working solution? Knowing some answers to these issues will then govern the choice of measures.

At the risk of being too specific and thereby losing the high level argument, but at the same time being less metaphorical to instantiate the concept, let us suggest that a concept like journal quality lies almost completely in the minds of scholars because quality itself is highly abstract, as is the concept of a journal.[8] Without clearly mapped physical markers, we can come up with a set of metrics that will approximate this construct, but never tap into it without a large dose of humility (Straub et al. 2004). It is not even remotely similar to the construct of something physical like ball bearing quality, where we can measure with small degrees of precision the variances of machine tools in creating the balls, their housings, and the processes that assemble these.

Journal quality, on the other hand, can be assessed at fairly primitive levels, such as the number of printing, spelling, or grammatical errors, but this form of measurement would not fit well with the outcome variables that evaluators are linking it with. The goal of publishing in the highest possible quality journal is to be read. So citations may be appropriate for practical uses such as documenting research records. As we argue above, though, journal quality as a research construct may be more ephemeral and require a rigorous scientific process before one feels comfortable with a set of metrics. Knowing the nomology within which journal quality figures is key to choosing the best fitting metrics.

So the main issue is fit, a concept that applies equally well in practice (such as the use of journal quality metrics in P&T decisions) and in scholarly work. Burton-Jones and Straub (2006) argued in an *Information Systems Research* article not that long ago that theoretical constructs in a nomology needed to be fitted for their purpose. In other words, the measures of each construct should be mapped and matched to those of its antecedents and outcomes. The domain was systems usage and the basic argument leads us to posit that if the DV or outcome variable is a performance variable, like higher sales in a particular division, then measures of the IV would need to be "fitted" for this kind of outcome. Lean measures like frequency of use would probably stand little chance in predicting higher sales. Rich measures of systems usage that would capture something like sophisticated use of a customer relationship management (CRM) system would be better matched and therefore should lead to a higher explained variance for the model.

The same logic can be applied to the concept and construct of journal quality—and to its nomological network.

Concluding Thoughts

What is refreshing about citation-based metrics is that they provide a viable and different way of measuring and, thus, thinking about journal quality. Opinion surveys will likely always have a place, especially if researchers can find ways to sample that are not simply repeats of the traditional forms and formats (Lewis et al. 2007). But a completely new approach to metrics might involve even larger departures from the past. Perhaps journal quality can be conceived to be formative, with some elements based on variants of the metrics we discuss in this editorial. Or it could be modeled as a MIMIC construct with both formative and reflective measures. Only time will tell us if scientometrics in information systems continues to be bounded by a focus on a single/double construct like journal quality/impact or diverges into unexplored territories and innovative models exploring the nature of scientific inquiry.

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[8]Or possibly so highly phenomenological as in Persig's *Zen and the Art of Motorcycle Maintenance*.

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