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IS Research Perspective

A Scientometric Investigation into the Validity of IS Journal Quality Measures*

Bruce R. Lewis
Wayne Calloway School of Business and Accountancy
Wake Forest University
lewisb@wfu.edu

Gary F. Templeton
Department of Management and Information Systems
Mississippi State University
GTempleton@cobilan.msstate.edu

Xin Luo
Department of Computer Information Systems
Virginia State University
xluo@vsu.edu

Abstract:

In this study we investigated the measurement validity of the findings in the IS journal quality stream over the past ten years. Our evaluation applied a series of validation tests to the metrics presented in these studies using data from multiple sources. The results of our tests for content, convergent, and discriminant validity, as well as those for parallel-form, test-retest, and item-to-total reliability, were highly supportive. From these findings, we conclude that recent studies in the IS journal quality stream are credible. As such, these IS journal quality measures provide appropriate indicators of relative journal quality. This conclusion is important for both academic administrators and scientometric researchers, the latter of whom depend on journal quality measures in the evaluation of published IS research.

Keywords: *IS journal quality measurement, scientometric research, validity, reliability*

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1. Introduction

The identity of a discipline is largely established by journals that publish in the field (Lowry, Romans and Curtis, 2004). Individuals, academic institutions, and scholarly communities alike are heavily invested in peer-reviewed publications. For researchers, published research is the end-product of intense study experiences, serving as the vehicle for presentation of work to the public. Institutions use publication records to determine researcher productivity and evaluate faculty performance. Scholarly communities see publications as official demonstrations of accepted knowledge upon which research traditions are founded. The importance of journals, therefore, lies in their influence on the visibility and prestige afforded all stakeholders in a discipline.

Rainer and Miller (2005) assert that "the importance of journals in a discipline naturally leads to the question of relative journal quality" (p. 92). Chua, Cao, Cousins and Straub (2002) note that "a high quality publication is clearly more valuable to the IS research discipline than a low quality one" (p. 189). In response to this issue, studies examining the quality of IS journals have been published every two to three years since the 1980s. According to Straub (2006), this research is "eminently practical in providing empirical evidence for journal tier classification" (p. 243). These studies, which make up the IS journal quality stream, thus serve as a data-based mechanism for evaluating the relative quality of journals in the field.

Studies assessing journal quality are one type of research known broadly as scientometrics, which is defined as "the quantitative study of scientific communication" (Leydesdorff, 2001, p. 1). Scientometric studies form a vital line of inquiry to facilitate the ongoing evaluation and improvement of an academic discipline. In particular, Straub (2006) notes that scientometric research is concerned with "the legitimacy in a field and how it is established" (p. 242) and lauded the inherent value of these self-studies to the development and progress of the IS field.

As the IS discipline has matured, scientometric studies have been conducted on a broad range of topics. These include articles on theoretical issues such as IS as a reference discipline (e.g., Grover, Ayyagari, Gokhale, Lim and Coffey, 2006; Katerattanakul, Han and Rea, 2006; Wade, Biehl and Kim, 2006) and the epistemological structure of the IS field (e.g., Benbasat and Zmud, 2003; Culnan, 1987). In addition, articles dealing with promotion and tenure standards (e.g., Dennis, Valacich, Fuller and Schneider, 2006; Kozar, Larsen and Straub, 2006) and researcher and institutional productivity (e.g., Chua et al, 2002; Huang and Hsu, 2005; Lowry, Karuga and Richardson, 2007) are examples of scientometric research in IS. Many of these studies, in particular those that are concerned with promotion/tenure standards and research productivity, rely on measures of relative journal quality as a key element in their research methodology. Further, journal quality may be used as an independent and/or dependent variable in research testing scientific inquiry nomologies and studies examining the causality of researcher reputation.

Lowry et al. (2004) posited several other ways in which IS journal quality measures provide benefits to academicians and practitioners. They serve: 1) to assist in finding and publishing the best disciplinary research, 2) to encourage assessment and improvement by journal editors, 3) to aid libraries in allocating budgets, and 4) to evaluate faculty research output. Scientometric assessments of journal quality in IS are typically based on two types of data (Katerattanakul, Razi, Han and Kam, 2005): opinion surveys (e.g., Doke and Luke, 1987; Lowry et al., 2004; Whitman, Henderson and Townsend, 1999) and citation indices (e.g., Holsapple, Johnson, Manakyan and Tanner, 1993; Katerattanakul, Han and Hong, 2003; Vogel and Wetherbe, 1984), and produce quality scores from which relative journal standing is determined.

Because results somewhat differ among studies in the IS journal quality stream, some may question this source of journal quality metrics. To address this concern, many studies have compared their findings to those from previous studies and have found them to be relatively consistent. These analyses have addressed, in a fashion, the nomological validity of the IS journal quality measurement stream. However, with the exception of Katerattanakul et al. (2005), these *ad-hoc* comparisons primarily used descriptive statistics and/or subjective judgements and were not conducted rigorously or systematically across the stream. Thus far, no investigation has assessed the technical validity (whether a measure represents what it purports to represent) of the stream. As such, at this point in time, no researcher or administrator can conclude with a high degree of certainty that the measures in the IS journal quality stream are valid.

As a result of the importance of journal quality and the consequent widespread use of journal quality measures for a variety of purposes, it is imperative to ascertain whether these metrics appropriately capture the underlying concept of journal quality. This means that the validity of these measures must be established, as Straub, Boudreau and Geffen (2004) encourage for all IS research streams. The purpose of the present study is to address this deficiency by applying the rigors of psychometric methods (i.e., Campbell, 1960) in examining the validity of journal quality metrics from studies in the IS journal quality stream. Such an in-depth analysis of the validity of the stream is warranted due to the preponderance of existing IS journal quality studies, the variety of the ways in which they are used, and the central question of whether the metrics selected are appropriate.

We next articulate and justify our methods for assessing the validity of the IS journal quality stream. We report the findings of our investigations into multiple aspects of validity, including content, construct, and reliability. We close with a discussion of our findings, the limitations of this study, and recommendations for future research in this area.

2. Methods and Findings

In order to optimize the currency of our findings, we focused on nine recent studies aimed at assessing IS journal quality. These studies, listed in Table 1, reported journal quality data from either opinion surveys or citation indices. Our analyses employed the perception and citation ratings from these studies, as shown in the right-hand column of Table 1. With two exceptions, these studies were independent of one another. In one exception, the Walstrom and Hardgrave (2001) study was a replication of the Hardgrave and Walstrom (1997) study. In the other, the Rainer and Miller (2005) study utilized an aggregation of rankings from nine studies between 1991 and 2003 (these included seven that based their measures on opinion surveys and two that derived rankings from citation scores). Four of the studies used by Rainer and Miller (2005) were included in our project, as indicated in Table 1. Due to the dependencies in the data with the Rainer and Miller (2005) study and the four others in our project, we used the Rainer and Miller (2005) results only in our assessment of item-to-total reliability, as described later. Consequently, all of our analyses for validity employed data from the first eight studies listed in Table 1.

Table 1. Studies in the IS Journal Quality Measurement Stream Included in this Study

Study	Journal	Method	Data Used in this Study
Hardgrave & Walstrom (1997) *	*CACM*	Opinion survey (perception of journal appropriateness as a publishing outlet); reported metrics for 53 pure IS, affiliated field and practitioner journals	Mean perception ratings from their Table 2
Whitman et al. (1999) *	*ISR*	Opinion survey (perception of journal quality); reported metrics for 80 pure IS, affiliated field and practitioner journals	Mean perception ratings from their Table 6
Mylonopoulos & Theoharkis (2001) *	*CACM*	Opinion survey (perception of journal contribution to the field); included 87 journals and reported metrics for the 50 top-ranked pure IS, affiliated field and practitioner journals	World popularity perception ratings from their Table 2
Walstrom & Hardgrave (2001)	*I&M*	Opinion survey (perception of journal appropriateness as a publishing outlet); reported metrics for 51 pure IS, affiliated field and practitioner journals	Mean perception ratings from their Table 4
Peffers & Tang (2003) *	*JITTA*	Opinion survey (perception of journal value as a publishing source); included 326 journals and reported metrics for the 50 top-ranked pure IS journals	Total weighted perception ratings from their Table 3
Katerattanakul et al. (2003)	*CACM*	Citation indices (average of seven citation scores); reported metrics for 27 pure IS, affiliated field and practitioner journals	Average citation ratings from their Table 2
Lowry et al. (2004)	*JAIS*	Opinion survey (perception of journal quality); included 131 journals and reported metrics for the 25 top-ranked pure IS and affiliated field journals	World perception weight ratings from their Table 2
Barnes (2005)	*CACM*	Citation indices (impact scores); included 50 journals and reported metrics for the 23 top-ranked pure IS and affiliated field journals	Citation impact ratings from their Table 2
Rainer & Miller (2005)	*CACM*	Aggregation (average ranking across nine studies from 1991-2003: seven based on opinion surveys and two based on citation indices); included 50 journals and reported metrics for the 29 top-ranked pure IS journals	Average across-studies scores from their Table 2

* Included in the Rainer & Miller (2005) aggregate analysis

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In a study of IS researcher productivity, Chua et al. (2002) note that many journals publishing IS research are not specific to the field and conclude that IS scientometric studies will provide the discipline more value if they concentrate on IS-focused publishing outlets. Reinforcing this position, Katetattanakul et al. (2005) provide "empirical evidence in support of the proposal that IS journal ranking should include only IS journals" (p. 2). Likewise, Peffers and Tang (2003) make a convincing case that 'pure' IS journals should be separated from those in allied fields for quality measurement purposes. Based on these arguments, we examined only pure IS journals in our study.

Peffers and Tang (2003) specifically address the question of which "outlets for IS research are seen by researchers as IS journals" (p. 68) by asking their respondents to classify the journals as either pure IS research journals, affiliated field journals or professional journals. Given that the journal basket in the Peffers and Tang (2003) study was the largest in the IS journal quality stream (326 journals) and that their final journal classifications were based on empirical data, we believe that Peffers and Tang (2003) produced the most comprehensive list thus far of IS-centric journals. Accordingly, the journals utilized in our analyses included only the 50 journals enumerated in Table 3 (IS Research Journals) of Peffers and Tang (2003, p.72), with a slight adjustment. We replaced their number 50 ranked journal, *Journal of Management*, with *Communications of the ACM (CACM)*. Although included in their study, *CACM* was not listed in Peffers and Tang's Table 3, since they categorized it as a professional journal. However, due to the fact that almost 40% of their respondents categorized *CACM* as a research journal, and it received the highest overall quality score in their ratings, we felt it was advisable to include it in our journal basket.

In addition to the ratings data from the studies reported in Table 1, we employed acceptance rates from *Cabell's Directory of Publishing Opportunities* (1997, 2001, 2004). Our third source of data was target journal lists that are formally categorized and employed at research universities with IS doctoral programs, a source which has rarely appeared in IS journal quality research (Kozar et al., 2006). Utilizing all of these sources, we gathered data on the 50 IS-centric journals described above.

In order to collect data on how journal quality is applied in practice, we solicited copies of target journal lists from institutions contained on the *ISWorld* listing of 'Doctoral Programs in Information Sciences' (Crowston, 2005). Such lists typically categorize journals based on quality as perceived by the institution (Van Fleet, McWilliams and Segal, 2000). We sought only target lists used for evaluating faculty research. Of the 157 institutions on the *ISWorld* list, 81 (52%) responded, and 35 of these provided their formal target journal lists. The other respondents either did not have internally-generated lists (39), used external lists (5), or could not release their list for policy reasons (2). The usable responses were an international sample, although respondents were predominantly U.S.-based. Using the sample of 35 lists, we computed three scores of relative journal quality: 1) the number of times the journal was listed in the top category across schools, 2) the number of times the journal was listed in the top two categories across schools, and 3) the number of times the journal was listed in any category across schools. These use-in-practice scores derived from university lists are presented in the Appendix; they reflect how journals are actually judged and employed in academic practice.

Validity is concerned with how appropriately a measure represents the concept of interest (Cronbach and Meehl, 1955). In our study, the concept of interest is IS journal quality, as measured by studies in the stream. Straub et al. (2004) suggest that in the assessment of validity, the analysis of construct validity and reliability is mandatory, and the evaluation of content validity is highly recommended. Therefore, we examined these psychometric traits across the recent studies in the stream.

The reader should take note, however, that ours was not a typical psychometric evaluation focusing on a single measurement instrument. This investigation was, instead, a macro study examining the overall validity of a set of multiple measures, with data collected from separate techniques, across several studies. The present study is not, strictly speaking, a meta-analysis, although its goal of generalizing across the research stream is similar to that of meta-analysis. As such, traditional analytical methods, such as structural equation modelling and Cronbach's α, were not applicable. We approached the idea of validity from a higher-level, more generic perspective. Our intent was essentially to determine whether, overall, the studies in the IS journal quality stream were consistent with one another not only in content, but in similarities and differences in composition.

Why, beyond the reasons just cited, is this a significant issue? If we have some assurance that the construct of journal quality is valid, it can be readily incorporated into relevant nomological networks in future studies (Straub, 2006). Theories that permit disciplines to better understand what impacts or influences quality in their journals can be extremely useful in creating and disseminating scientific knowledge.

2.1. Content Validity

Content validity is concerned with the extent to which items in a measure represent the domain that is the target of generalizations from that measure (Straub et al., 2004). In the IS journal quality stream, we considered the measurement items to be evaluations of the journals that made up the baskets of the studies in the stream. Therefore, to address content validity, we examined the journals that were evaluated in the studies in the stream to determine if they appropriately capture the domain of IS journals.

Our assessment of content validity deals with content in a different sense than in other psychometric tests. In most studies, items should be drawn randomly from the universe of all possible items to establish content validity (Cronbach, 1971; Straub et al., 2004). In such cases, there are no inherent values associated with each item of interest. Moreover, the ordering of such items in the instrumentation has no special meaning. In the case of the construct of journal quality, however, the nature of the construct is such that both of these are important aspects of the appropriate content. Specifically, as researchers, we are interested in the exact makeup of journals that rank highest in each category, especially the highest ranked category. To see how this differs from the standard approach to content validity, consider measures of a construct of IS journal quality that were drawn randomly from the journals in the discipline and, because of chance, did not include either *MISQ* or *ISR* among the journals in the instrument. "Content" in this case involves choices having to do with sampling, but the sampling is purposive, not random. This variant on content validity means that we should not draw randomly from all journals in that we are not seeking diverse samples for purposes of UTOS and wider generalizability (Shadish et al., 2002).

Friedenberg (1995) notes that "elements of greater importance will receive more emphasis" (p. 248) in the evaluation of content validity of the measurement of a concept. Thus, one indication of content validity is the occurrence of the most prominent IS journals in the baskets of the studies in the stream. Based on the top ten journals determined in the Lowry et al. (2004) study, derived by allowing respondents to specify journals in a free-form fashion, we designated the following IS-centric journals to be the most prominent: *MIS Quarterly* (*MISQ*), *Information Systems Research* (*ISR*), *Journal of Management Information Systems* (*JMIS*), *Communications of the ACM* (*CACM*), *Decision Support Systems* (*DSS*), *Information and Management* (*I&M*), *ACM Transactions on Information Systems* (*ACMTIS*), *European Journal of Information Systems* (*EJIS*), *Journal of the AIS* (*JAIS*), and *Information Systems Journal* (*ISJ*). Table 2 reports the occurrences of these journals in the eight studies we examined from the IS journal quality stream. Five of these ten prominent journals are present

Table 2. Content Validity Analysis - Occurrence of Prominent Journals in the IS Journal Quality Measurement Stream

Journal	Year Started	Included in These Study's Journal Baskets								Inclusion Percent
		Hardgrave & Walstrom (1997)	Whitman et al. (1999)	Mylonopoulos & Theoharkis (2001)	Walstrom & Hardgrave (2001)	Peffers & Tang (2003)	Katerattanakul et al. (2003)	Lowry et al. (2004)	Barnes (2005)	
MISQ	1977	✔	✔	✔	✔	✔	✔	✔	✔	100%
ISR	1990	✔	✔	✔	✔	✔	✔	✔	✔	100%
JMIS	1984	✔	✔	✔	✔	✔		✔	✔	87.5%
CACM	1957	✔	✔	✔	✔	✔	✔	✔	✔	100%
DSS	1991	✔	✔	✔	✔	✔	✔	✔	✔	100%
I&M	1977	✔	✔	✔	✔	✔	✔	✔	✔	100%
ACMTIS	1983	✔		✔	✔	✔		✔	✔	75%
EJIS	1992			✔	✔	✔	✔	✔	✔	75%
JAIS	2000			✔		✔		✔		50%*
ISJ	1991		✔	✔		✔	✔	✔	✔	75%

***** Percent calculated based on only 6 eligible studies, since JAIS was not published at the time of the Hardgrave & Walstrom (1997) and the Whitman et al. (1999) studies

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in all eight of the target studies in the stream since 1997. The other five are present in at least half of the studies, with occurrence rates ranging from 50% to 87.5%. Even *JAIS*, which is the youngest of this set, was present in 50% of the studies that were conducted since it started publication. From these findings, we conclude that the most prominent IS journals are well represented in the published journal quality studies, thus providing one indication of the content validity of the stream.

Friedenberg (1995) also suggests that another way of assessing content validity is to investigate the association between different measures of the same concept. With the exception of the two Hardgrave/Walstrom efforts, the first eight studies listed in Table 1 were all conducted by different researchers and employed different opinion-based surveys and/or citation scores. Consequently, the second way we examined content validity was by correlating the ratings from these studies with each other in pairs. Due to the relatively small number of journals in common between the studies, we employed the nonparametric Spearman Rank Correlation Coefficient (ρ). These correlations are reported in Table 3. All but one of these 27 correlations is statistically significant at the .05 level, with 15 of these significant at the .001 level. The magnitudes of the 26 significant correlations range from .430 to .976, with only one being less than .500. As recommended by Baroudi and Orlikowski (1989), evidence of the strength of these correlations is provided by the coefficient of determination, calculated by squaring the correlation coefficient, which indicates the percent of variance explained in the relationship (Lind, Mason and Marchal, 2000). In a clear majority of these pairings, at least 50% of the variance is being explained, and in some cases it is greater than 80%. These results confirm a pronounced association among the measures from the published studies in the IS journal quality stream, indicating the presence of content validity. Based on these two approaches—the occurrence of prominent journals in the studies in the stream and the correlation among the different measures from the studies in the stream—we conclude that the studies in the IS journal quality stream exhibit acceptable content validity.

Table 3. Content Validity Analysis - Correlations Between the Quality Ratings of Studies in the IS Journal Quality Measurement Stream

Study	Spearman Correlation Coefficient (Number of Journals) *Alpha Probability*						
	Hardgrave & Walstrom (1997)	Whitman et al. (1999)	Mylonopoulos & Theoharkis (2001)	Walstrom & Hardgrave (2001)	Peffers & Tang (2003)	Katerattanakul et al. (2003)	Lowry et al. (2004)
Whitman et al. (1999)	.881 (17) *.001*						
Mylonopoulos & Theoharkis (2001)	.733 (16) *.001*	.754 (18) *.001*					
Walstrom & Hardgrave (2001)		.932 (16) *.001*	.871 (17) *.001*				
Peffers & Tang (2003)	.614 (18) *.003*	.764 (21) *.001*	.736 (28) *.001*	.538 (21) *.006*			
Katerattanakul et al. (2003)	.806 (10) *.002*	.863 (10) *.001*	.459 (12) *.067*	.776 (11) *.002*	.537 (14) *.024*		
Lowry et al. (2004)	.976 (8) *.001*	.906 (10) *.001*	.951 (12) *.001*	.964 (11) *.001*	.810 (15) *.001*	.851 (10) *.001*	
Barnes (2005)	.621 (13) *.012*	.526 (14) *.027*	.430 (18) *.037*	.641 (14) *.007*	.543 (18) *.010*	.816 (12) *.001*	.588 (10) *.037*

2.2. Construct Validity

Construct validity relates to how well a measure gauges the actual meaning of the concept it is supposed to represent (Straub et al., 2004). It is essentially an issue of operationalization, therefore. In order to exhibit construct validity, a measure must be associated with other assessments measuring the same concept, while simultaneously not relating to measures of differing concepts (Campbell and Fiske, 1959).

Convergent validity, one of the primary components of construct validity, is the tendency for a given measure to exhibit a strong relationship with other metrics of the same concept (Friedenberg, 1995). Evidence of convergent validity can be provided via correlations with measures derived from different methods (Aiken, 1997). We examined the convergent validity of the IS journal quality stream by correlating the ratings from the first eight studies in the stream listed in Table 1 with the metrics of journal use in academic practice derived from the data we collected from school journal lists. Our use-in-practice

metrics included the number of schools listing the journal in their top category, the number of schools listing the journal in their top two categories, and the number of schools listing the journal in any of their categories (as shown in the appendix). These measures depict how journals are actually considered and used at universities. Given that journals are generally categorized at individual schools by their perceived value (Van Fleet et al., 2000), these metrics appropriately serve as another set of measures of journal quality with which to gauge the convergent validity of the studies in the stream. The Spearman correlations between the published journal ratings and the measures of journal use in academic practice are reported in Table 4. All of these correlations are statistically significant at the .05 level, with 75% of them significant at .001. All but two of the 24 correlation coefficients (greater than 90%) are at least .500, with fifty percent at or above .800. In the majority of these pairings, at least 50% of the variance is explained. Hence, there is a manifest relationship between the scores from the studies in the IS journal quality stream and measures of journal use in academic practice. This finding provides persuasive support that the stream's metrics exhibit convergent validity.

Table 4. Convergent Validity Analysis - Correlations Between Study Quality Ratings and Measures of Journal Use in Academic Practice

	Spearman Correlation Coefficient (Number of Journals) *Alpha Probability*		
Study	Listed in Top Category	Listed in Top Two Categories	Listed in Any Category
Hardgrave & Walstrom (1997)	.840 (18) *.001*	.817 (18) *.001*	.636 (18) *.001*
Whitman et al. (1999)	.845 (21) *.001*	.817 (21) *.001*	.666 (21) *.001*
Mylonopoulos & Theoharkis (2001)	.771 (28) *.001*	.839 (28) *.001*	.854 (28) *.001*
Walstrom & Hardgrave (2001)	.911 (21) *.001*	.923 (21) *.001*	.873 (21) *.001*
Peffers & Tang (2003)	.467 (50) *.001*	.642 (50) *.001*	.643 (50) *.001*
Katerattanakul et al. (2003)	.685 (14) *.003*	.549 (14) *.021*	.509 (14) *.031*
Lowry et al. (2004)	.808 (15) *.001*	.940 (15) *.001*	.918 (15) *.001*
Barnes (2005)	.652 (18) *.002*	.540 (18) *.010*	.496 (18) *.018*

Discriminant validity, the other element of construct validity, is the propensity of a measure to *not* correlate with measures of unrelated concepts (Friedenberg, 1995). If this is the case, as is ideal, the measure is said to discriminate between constructs (Straub et al., 2004). Although journal acceptance rates are sometimes used as an indicator of journal quality, Van Fleet et al. (2000) noted that acceptance rates are inappropriate surrogates of journal quality for at least three reasons: 1) acceptance rates are not stable over time, 2) acceptance rates are not necessarily accurate because they are self-reported and non-verified, and 3) the exact definition of acceptance rate may differ among journals. Further, basing their conclusions on empirical evidence, several studies of practices in the business academy have determined that acceptance rates are not a good proxy for journal quality (Coe and Weinstock, 1984; Lewis, Templeton and Luo, 2007; Van Fleet et al., 2000). Finally, the editors of *Cabell's Directory of Publishing Opportunities,* the most common source for acceptance rate data, specifically caution against inappropriate use of their acceptance rate data. For these reasons, we conclude that acceptance rates measure a concept that is unrelated to journal quality, and hence are a reasonable counter-construct to evaluate the discriminant validity of the results in the IS journal quality stream.

The Spearman correlations between the journal quality scores from the first eight studies in the stream listed in Table 1 and Cabell's acceptance rates from the same time periods are shown in Table 5. None of these correlations are significant at the .05 level, and the coefficient magnitudes are small. In fact, the coefficients from the two citation-based studies (Barnes, 2005; Katerattanakul et al., 2003) depict inverse relationships between their journal quality scores and acceptance rates. These results provide a patent indication of the discriminant validity of the metrics in the stream. Based on these assessments of convergent and discriminant validity, we conclude that the measures in the IS journal quality stream exhibit acceptable construct validity.

Table 5. Discriminant Validity Analysis - Correlations between Study Quality Ratings and Cabell's Acceptance Rates

	Spearman Correlation Coefficient (Number of Journals) *Alpha Probability*		
Study	1997-98 Acceptance Rates	2001-02 Acceptance Rates	2004-05 Acceptance Rates
Hardgrave & Walstrom (1997)	.187 (12) *.280*		
Whitman et al. (1999)	.301 (14) *.148*		
Mylonopoulos & Theoharkis (2001)		.117 (13) *.351*	
Walstrom & Hardgrave (2001)		.081 (12) *.402*	
Peffers & Tang (2003)		.388 (18) *.068*	
Katerattanakul et al. (2003)		-.123 (8) *.386*	
Lowry et al. (2004)			.178 (10) *.311*
Barnes (2005)			-.160 (10) *.330*

2.3. Reliability

Reliability is concerned with the dependability of a measure over successive trials and in different contexts (Cronbach, 1951). Aiken (1997) points out that a measure cannot be deemed valid unless it is found to be reliable. Straub et al. (2004) recommend that evaluating "one form or another of reliability is mandatory for scientific veracity" (p. 400) and, furthermore, encourage the use of multiple methods for establishing reliability. In our study, we examined the reliability of the results in the IS journal quality stream using parallel-form, test-retest, and item-to-total techniques. In all of our reliability analyses, we employed the ratings from selected studies in the stream shown in Table 1.

Parallel-form reliability involves the comparison of two similar, but not exactly the same, versions of measurement from data collected after no more than a brief period has elapsed between the two administrations (Aiken, 1997). The IS journal quality measures by Mylonopoulos and Theoharakis (2001) and Walstrom and Hardgrave (2001) were based on data from opinion surveys collected within a short time of each other, although they used different instruments. In addition, both of these studies employed ISWorld lists for their sampling frames. Thus, we considered these two studies to be approximate parallel forms, and we computed the correlation between them to assess reliability from this perspective. The Spearman correlation reported in Table 6 between these two parallel-form studies is .875, which is significant at the .001 level. Better than 76% of the variance in this relationship is explained. This result suggests strong parallel-form reliability.

Test-retest reliability assesses the consistency of a measure over time (Aiken, 1997). It is conducted by administering the same measurement instrument twice in succession, with the expectation that the elapsed time will not produce widely differing results if the measure is reliable (Straub et al., 2004). Since the opinion surveys that were the bases for the Hardgrave and Walstrom (1997) and the Walstrom and Hardgrave (2001) studies employed nearly identical data collection instruments from the same general population (Walstrom and Hardgrave, 2001), we utilized them to evaluate test-retest reliability. As shown in Table 6, the Spearman correlation between these two opinion-based studies conducted four years apart is .971, which is significant at the .001 level. In this case, nearly 95% of the variance is explained. This very strong correlation provides authoritative evidence that the IS journal quality stream exhibits reliability from the test-retest perspective.

It is unfortunate that we do not have more studies in this stream that essentially replicate their own work over a space of one or more years. This would provide more evidence of test-retest reliability. What we can say is that our evidence here is equally as strong as the Hendrickson, Massey and Cronan (1993) test-retest of TAM scales.

Item-to-total reliability focuses on internal consistency by appraising the ability of components of the measure to predict the overall results (Friedenberg, 1995). If the components measure the same thing, and thus are internally reliable, then they should correlate individually with the overall score (Friedenberg, 1995). In this test, we took the studies to be analogous to individual components and the Rainer and Miller (2005) study (in which the results were based on an average of multiple studies) to be a proxy for the overall stream assessment of IS journal quality. As such, we calculated the Spearman correlations between the Rainer and Miller (2005) results and those from the four studies in our project that were also used in the computation of the Rainer and Miller (2005) scores. As shown in Table 6, all four of these correlations are statistically significant at the .001 level, with magnitudes in excess of .800, meaning that 64% or more of the variance is explained. In one case, the Hardgrave and Walstrom (1997) study, nearly 88% of the variance is explained. These very high levels of association between the individual studies from 1997 to 2003 and the aggregation measure offer strong substantiation of the internal reliability of the IS journal quality stream. From these evaluations of parallel-form, test-retest, and item-to-total reliability, we conclude that the metrics in the stream are reliable.

Table 6. Reliability Analyses - Correlations Between Study Quality Ratings

Parallel-form: Spearman Correlation Coefficient (Number of Journals) *Alpha Probability*	
Mylonopoulos & Theoharkis (2001) vs. Walstrom & Hardgrave (2001): .875 (17) *.001*	
Test-retest: Spearman Correlation Coefficient (Number of Journals) *Alpha Probability*	
Hardgrave & Walstrom (1997) vs. Walstrom & Hardgrave (2001): .971 (16) *.001*	
Item-to-total: Spearman Correlation Coefficient (Number of Journals) *Alpha Probability*	
Studies Included in the Rainer & Miller Aggregate:	Rainer & Miller (2005)
Hardgrave & Walstrom (1997)	.938 (13) *.001*
Whitman et al. (1999)	.821 (14) *.001*
Mylonopoulos & Theoharkis (2001)	.863 (15) *.001*
Peffers & Tang (2003)	.815 (16) *.001*

The results of these assessments of psychometric properties provide substantive indication that the IS journal quality stream exhibits acceptable levels of content and construct validity, as well as reliability. Therefore, we conclude that the results from the studies in the stream are appropriate measures of journal quality. Since two of the three tests of reliability employed data from multiple-year time spans, we also conclude that the measures in the stream are relatively consistent.

3. Discussion

Journal quality is an important issue in any discipline due to the far reaching influence journals have on academic fields. We viewed the metrics published in the IS journal quality stream as one alternative, albeit the most prevalent, for assessing journal quality in IS. Of course, the use of these journal quality measures presupposes that they are valid, and hitherto this has not been empirically established. Accordingly, the purpose of this study was to empirically examine the validity of these measures.

It is critical that constructs of interest to scientometric researchers be validated wherever possible. This advances the rigor of this line of work (Chua et al., 2002), and it argues implicitly for the extension of these scientific measures into more fruitful avenues, such as the creation of nomologies to explore how scientific disciplines value inquiry and discovery, how they mature, how they interact among themselves for the dissemination of knowledge, and how their journal processes succeed or not (Straub, 2006).

Our methodology employed empirical analyses to assess various aspects of the psychometric validity (i.e., Campbell, 1960) of these IS journal quality measures. We employed a variety of data sources; a summary of our methods and findings is reported in Table 7. These results indicate that, although journal quality measures differ from study to study, the instrumentation of the stream as a whole is capturing the construct of journal quality. We consider establishing the validity of journal quality measures to be essential in a maturing discipline. As such, our findings should provide comfort for all who deal with the issue of IS journal quality, whether it be in administrative or scholarly endeavours.

There are also practical ramifications of this work. The concept of journal quality is routinely relied upon in numerous academic decisions, such as faculty hiring, compensation, promotion, tenure, and awards. In the field of IS, an article in *MISQ* or *ISR* will certainly score points toward these decisions, as these two journals are universally recognized as best in class (Dennis et al., 2006). But what about other, lesser known journals? How can their quality be established so that authors who publish in those venues can be appropriately recognized? Our results dealing with the IS journal quality stream provide valuable input in addressing this question. The stream exhibits both validity and reliability, as we report, and may thus be useful in assessing the quality of these journals.

However, at the same time, we caution that journal quality measures should not provide all of the information needed to effectively make such life-impacting decisions. We trust that the findings of this research do not encourage a short-sighted mindset that focuses narrowly on only publishing in a highly limited set of journals.

In addition to the administrative uses of journal quality measures, these metrics can also serve as factors in various types of scientometric studies. For example, in a study of IS researcher productivity, Huang and Hsu (2005) determined the journal basket for their methodology from the quality metrics of Mylonopoulos and Theoharakis (2001), another scientometric study in the IS journal quality stream. In a study investigating researcher reputation, the methodology might call for a journal quality metric to be used as the moderator of a measure of publication quantity. The idea here would be that a researcher's journal hits (quantity) multiplied by the quality score of each of these journals would predict his or her reputation. In these cases, journal quality would serve as an antecedent. In other situations, journal quality might be cast as an outcome variable, such as investigating journal characteristics that determine quality level.

As in any research endeavor, the measurement validity of journal quality metrics should be continually re-established. The lack of just such measurement validation in IS research has been recognized as a problem (Straub et al., 2004). For scientometrics in general, Bookstein (2001) notes: "The essence of scientometrics is precise measurement. Yet the measurement made in scientometric research is steeped in ambiguity" (p. 74). It is our hope that the results of this study will serve to mitigate the uncertainties related to the measurement of IS journal quality, and thus foster scientific activity that contributes to useful knowledge.

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Table 7. Summary of Methods and Findings				
Measurement Property	**Definition**	**Analysis**	**Statistical Test**	**Finding**
Content Validity	The extent to which the items in the measure are representative of the domain that will be the target of generalizations from the measure (Straub et al., 2004)	Occurrence of Prominent Journals in Baskets of the Studies in the Stream	Percentages	The most prominent IS journals are well represented in the journal baskets in the stream / Provides evidence of content validity in the IS journal quality stream
		Association Among Ratings from All Studies in the Stream	Spearman Rank Correlation Coefficient	All but one correlation significant at the .05 level or better, and the vast majority show strong associations / Provides substantiation of the content validity in the IS journal quality stream
Construct Validity				
Convergent	The tendency for a measure to exhibit a high degree of association with other measures of the same concept (Aiken, 1997)	Study Ratings vs. Use in Practice Metrics	Spearman Rank Correlation Coefficient	All correlations significant at the .05 level or better, and the vast majority depict moderate to strong associations / Provides support for the convergent validity of the ratings in the IS journal quality stream
Discriminant	The propensity of a measure *not* to correlate with measures of unrelated concepts (Friedenberg, 1995)	Study Ratings vs. Cabell's Acceptance Rates	Spearman Rank Correlation Coefficient	No correlations significant at the .05 level / Provides confirmation of the discriminant validity of the ratings in the IS journal quality stream
Reliability				
Parallel-Form	A comparison of two similar (but not the same) versions of the measure from data collected at approximately the same time (Aiken, 1997)	Two Studies in the Same Year (2001): Mylonopoulos & Theoharkis vs. Walstrom & Hardgrave	Spearman Rank Correlation Coefficient	Correlation significant at the .001 level and depicts high association / Indicates parallel-form reliability of the ratings in the IS journal quality stream
Test-Retest	The consistency of a measure over time in repeated administrations (Aiken, 1997)	Replicated Studies at Different Times: Walstrom & Hardgrave	Spearman Rank Correlation Coefficient	Correlation significant at the .001 level and shows very strong association / Provides support that the IS journal quality stream ratings exhibit test-retest reliability
Item-to-Total	The ability of components of the measure to predict overall results (Friedenberg, 1995)	Results from the Studies Included in Rainer & Miller vs. Rainer & Miller Results	Spearman Rank Correlation Coefficient	All correlations significant at the .001 level or better, and represent strong relationships / Offers evidence of the internal reliability of the ratings in the IS journal quality stream

3.1. Limitations

Two caveats are worthy of mention when interpreting the results of this study. First, inclusion in our study was dependent upon whether the journal appeared in the list of top 50 IS research journals as reported by Peffers and Tang (2003). We used this source so that we could focus on only IS-centric journals and thus provide standardization across the studies in the stream. However, it is clear to us that many quality IS journals were, per force, absent from our journal set. Second, the sample frame from which school lists were collected included only institutions that offered IS doctoral programs. Obviously, the inclusion of target journal lists from non-doctoral-granting institutions would have broadened the scope of the data. This limitation may be offset somewhat by the fact that doctoral-granting institutions are generally more research active (Milne and Vent, 1987), and should be more cognizant of the relative merits of IS journals.

3.2. Recommendations

Based on our experiences in this study, we offer several recommendations regarding future research directions and issues. Our first suggestion concerns new avenues for determining relative journal quality. Traditional approaches of arriving at

journal quality assessments include perception (opinion) surveys of researchers and citation scores. In this study, we introduced a third source, school target journal lists, which has only rarely been employed in IS, and we feel that this is a relevant new basis for journal quality assessment. However, there are other ways that have not been used to measure journal quality that might be as good or better. We encourage efforts aimed at creating new perspectives on appraising the quality of journals in the IS field. One approach would be to assess the quality of editorial boards and/or reviewers. Another would be to assess the perceptions of the journal review processes itself. Such perspectives could be instrumental in the development of surrogate measures of journal quality. These approaches might be especially useful in the evaluation of new journals.

In our examination of the articles published in the IS journal quality stream, we did not find precise definitions of journal quality. The concept of journal quality is an idea that should be explored from a more scholarly perspective than conducted to date. Consequently, we recommend that a comprehensive construct development study on IS journal quality should be undertaken. Guidelines for the methodology in such a study can be found in Lewis, Templeton and Byrd (2005) and Straub et al. (2004).

In conducting this study, we found that it was difficult to compare IS journal measures from one study to the next, due mainly to the makeup of the journal basket being studied. We offer two recommendations concerning the composition of journal baskets. First, researchers should continue to segregate IS journals from journals in other disciplines that only occasionally publish IS research; the practice of this and other recent studies such as Peffers and Tang (2003) and Rainer and Miller (2005) should be seen as exemplars in this regard. Although previous authors have made this same recommendation (e.g., Chua et al., 2002; Katerattanakul et al., 2005), we stress it here because of the profound impact this practice will have on increasing the number of journals in common between studies and maximizing consistency of results. Second, in order to fully realize the benefits of journal segregation, we strongly advocate that the criteria for determining what is classified as an IS journal be clearly articulated. We believe that, at this point in time, the list of 'pure' IS journals from the Peffers and Tang (2003) article embodies the most comprehensive research-based list of this kind, and will serve well until an updated and empirically verified list is produced.

On a related point, researchers should be wary of the effect of basket size in journal quality studies. Chua et al. (2002) explained the practical limits of using baskets: "Both opinion surveys and citation/content analysis use sampling baskets since the entire population of journals cannot be known or, at the very least, cannot be studied. It may be possible someday to study all of the published journals in the world, but for the time being, this remains an intractable research problem" (p. 151). However, we infer from the Chua et al. (2002) findings that the larger the journal basket, the more stable the nomological validity. This emphasizes the importance of using large journal baskets in future journal quality studies. We recommend that research be undertaken to extend the work of Chua et al. (2002) by determining the optimal basket size and the journals that should be included in such a basket so that scientometric findings involving journals will be more robust.

Each of the 500+ journals in the IS field is subject to appraisal by any member of the research community at any time. As a result, journal quality studies will undoubtedly continue to contribute value to the IS discipline as it matures, as noted by Rainer and Miller (2005). Periodically demonstrating the validity of IS journal quality measures is, therefore, imperative in order to maintain the bona fides of these sources. As such, the validity of new quality measures should be systematically assessed as we move forward. At the very least, each new study should report correlations between its results and recent quality measures for purposes of commenting on their consistency. Periodically a complete validity analysis should be undertaken to assess IS journal quality measures over multiple years. The methodology employed in our study can serve as a model for these future validity assessments. The approach of recurrently investigating the psychometric properties of journal quality measurement will prove invaluable in strengthening scientometric research in numerous areas, as well as in advancing the scientific integrity of the IS field.

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Appendix: Use-in-Practice Scores from Institutional Journal Lists			
Journal	Number of Schools Classifying the Journal in:		
	The Top Category	The Top Two Categories	Any Category
ACM Special Interest Group Pubs	0	1	6
ACM Transactions on IS	7	12	13
Australian Journal of IS	0	0	6
Behavior & IT	0	2	9
Communications of the ACM	24	31	31
Communications of the AIS	0	5	12
Computer Supported Cooperative Work	1	1	2
Data Base	2	13	21
Decision Support Systems	4	25	27
E Commerce Research & Applications	0	2	3
e Service Journal	0	0	2
European Journal of IS	3	21	25
Electronic Markets	1	2	7
Information & Management	5	22	29
Information and Organization	6	14	15
Information Processing and Mgt	1	2	6
Information Research	0	0	1
Information Systems	5	8	13
Info Systems Frontiers	0	3	10
Information Technology and Mgt	0	4	7
Information Technology and People	2	7	12
Informing Science	0	0	1
International J of Human Comp Studies	1	7	13
International Journal of E Commerce	2	9	15
International Journal of Info Mgt	0	2	8
Information Resource Management J	0	4	11
Information Systems Journal	2	15	18
Information Systems Management	1	4	8
Information Systems Research	34	34	34
Journal of the ACM	3	7	8
Journal of the AIS	3	18	18
Journal of Computer Info Systems	0	5	9
Journal of Database Management	1	5	9
Journal of Organizational and EUC	0	3	12
Journal of Global Information Mgt	0	3	8
Journal of Global Info Technology Mgt	0	3	6
Journal of Info Systems Management	0	0	3
Journal of Information Technology	2	8	14
Journal of IS Education	0	0	6
Journal of IT Cases & Applications	0	1	5
Journal of IT Education	0	0	3
Journal of Info Tech Theory & App	0	0	3
Journal of MIS	27	33	34
Journal of Strategic Information Systems	2	16	22
MIS Quarterly	35	35	35
MISQ Discovery	0	0	1
Organizational Computing & Ecommerce	1	5	13
Scandavian Journal of IS	0	1	6
The Information Society	2	9	13
Wirtschaftsinformatik	0	0	1

About the Authors

Bruce R. Lewis is Associate Professor and Cooper Fellow in Information Systems in the Calloway School of Business at Wake Forest University. He spent 25 years as a practicing IT professional, manager and consultant. He holds a B.S. in Mathematics, an M.S. in Statistics and a Ph.D. in MIS. He has published in the *Journal of Management Information Systems*, the *European Journal of Information Systems*, *Information and Management*, *Communications of the AIS*, *The DATA BASE for Advances in Information Systems*, and *Expert Systems with Applications*.

Gary F. Templeton is an Assistant Professor of MIS in the College of Business and Industry at Mississippi State University. His research interests include organizational learning, strategic IT outcomes, and IS meta-research. He received his Ph.D., Masters in MIS and M.B.A. from Auburn University. He has published in the *Journal of Management Information Systems*, the *European Journal of Information Systems*, *Communications of the ACM, Communications of the AIS*, *Information Technology and Management,* and *Information Systems Frontiers*.

Xin Luo is an Assistant Professor of Computer Information Systems in the School of Business at Virginia State University. He holds a B.A. in International Business, an M.B.A., an M.S. and a Ph.D. in MIS from Mississippi State University. His research interests include information assurance, cross-cultural IS adoption, and e/m-commerce. He has published in *Communications of the ACM*, *Communications of the AIS,* the *Journal of Organizational and End User Computing*, *Information Systems Security*, the *International Journal of Information Security and Privacy*, and the *Journal of Internet Banking and Commerce*.

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