EDITORIAL

Assessing the impact of *JIBS* as an interdisciplinary journal: A network approach

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Abstract

In this editorial, we assess the cross-disciplinary connections of *JIBS* by examining its citation network, which spreads across no less than 36 disciplines or fields. Using a citation network of 166 citing and 645 cited journals, we investigate *JIBS*' interdisciplinarity using the *intermediation* and *integration* approaches of network analysis. Our analyses of citation patterns for a 12-year time period (2001–2012) suggests that *JIBS* is helping bridge disciplines that do not often otherwise talk to each other – a task of critical importance for new knowledge creation. We also find that *JIBS* is enabling integration of knowledge from a *diverse* set of disciplines in comparison to other prominent leading management journals.

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INTRODUCTION

Most international business (IB) scholars agree that a key purpose of interdisciplinary research is to seek answers to complex questions – questions that cannot be fully answered by merely drawing upon singular disciplinary traditions in isolation. In recent decades, dramatic technological advancements made possible by the integration of knowledge from fields that were formerly distinct and often unrelated has led to a number of academic studies (Leydesdorff & Rafols, 2009; Rafols & Meyer, 2010; Rinia, van Leeuwen, van Vuren, & van Raan, 2001) that have examined the notion of interdisciplinarity both in the natural sciences as well as in the social sciences. An increased focus on interdisciplinarity among some policy makers (National Academies, 2004) and academics (Cheng, Henisz, Roth, & Anand, 2009; Dunning, 1989; Laudel & Origgi, 2006; Morillo, Bordons, & Gómez, 2003) as a means of addressing complex issues such as globalization and its effects has led some researchers to examine the implications of interdisciplinary studies for the organization and evaluation of academic research (Langfeldt, 2006; Rafols, Leydesdorff, O'Hare, Nightingale, & Stirling, 2012; Rinia et al., 2001). In this editorial, we seek an answer to the following question – What are the implications for the positioning of *JIBS* as a highly interdisciplinary journal? To this end, we use network analysis methods to examine the cross-disciplinary citation patterns of *JIBS* relative to its comparator

management journals. We aim to improve our understanding of *JIBS*' contribution as a communication medium and as a knowledge integrator in the network of business and management-related journals.

While the relative importance of journals is often assessed primarily on the basis of citations, journals that are interdisciplinary are likely to be relatively disadvantaged with respect to their citation counts and patterns in comparison with unidisciplinary journals. This is because more interdisciplinary journals tend to build up independent poles of citations in each of the "specialty" disciplines, which are covered by their own field of study, and each of these contributing disciplines has its own largely separate social community and accepted research paradigm(s). In contrast, unidisciplinary journals have the benefit of building up knowledge interactively over time with other close neighbor journals within their discipline and that generates an increasing rate of cross-citations of key articles that lay the foundation for the relevant area. This advantage for the localized visibility of journals with a strong disciplinary focus, and especially general journals at the heart of a discipline, is reflected in their impact factors (defined as the average number of times articles published in a journal in the past 2 years have been cited in the year for which an impact factor is being calculated). Thus, the impact factors of the leading general journals in a discipline – and particularly in a large, more populous discipline – tend to be higher in comparison to the impact factors of interdisciplinary journals (Rafols et al., 2012).

Impact factor-based bias against interdisciplinary research is often further reinforced by the strong disciplinary focus of academic departments, which tend to reward authors with publications in high-impact *single discipline* journals, thereby reducing the incentive for researchers with cross-disciplinary interests to publish their work in *interdisciplinary* journals (Leahey, 2007; van Rijnsoever & Hessels, 2011). Furthermore, interdisciplinary researchers who publish in single discipline journals often do not get the recognition (and hence citations) they deserve for their efforts to integrate knowledge from two or more disciplines because their audience is often concerned primarily with issues within the boundaries of the discipline in question (National Academies, 2004: 139). However, despite these constraints on journals that operate in a multidisciplinary domain such as the field of IB studies, *JIBS* has consistently been ranked among the top 10 business journals since 2007, which is when Thomson Reuters' Journal Citation Reports (JCR) began publishing

the 5-year journal impact factors (see Tables A.1 and A.2 in the online appendix). The purpose of this editorial is to go beyond the usual analysis of journal impact factor comparisons and perform an in-depth analysis of the pattern of article citations for *JIBS* relative to other journals in order to assess the academic *impact* of interdisciplinarity.

In the 25 years since Dunning's call to scholars and researchers for a more interdisciplinary approach to research in IB (Dunning, 1989), scholars have examined increasingly complex phenomena, many of which could not be satisfactorily addressed by taking a unidisciplinary approach; this, in turn, has encouraged scholarship in our area to draw on theories and methodologies from *across* disciplines. Scholars in the field of IB are continuing to focus on improving our understanding of complex questions that include, but are not limited to, the strategies, investment motives, organization, behaviors and capabilities of firms that operate across borders, irrespective of whether they are born-globals or large long established multinationals or merely exporting firms, which cross different institutional environments and one or more political boundaries. More recently, several efforts have been made to increase the awareness, especially among younger IB scholars, of the interdisciplinary nature of the IB field (Cantwell & Brannen, 2011; Cheng et al., 2009), so that the goal of producing "insightful, innovative and impactful research on IB" (Cantwell & Brannen, 2011: 7) can be achieved.

In this editorial, we assess the position of *JIBS*, the primary publication outlet for IB scholars, as a communication medium and knowledge integrator in the citation network of (166 citing and 645 cited) journals that spread over no less than 35 disciplines or fields. We examine the position of *JIBS* relative to other leading management journals over a 12-year period (2001–2012). Following Rafols et al. (2012), we investigate interdisciplinarity from two perspectives – *intermediation* (Leydesdorff, 2007) and *integration* (Porter, Roessner, Cohen, & Perreault, 2006). Intermediation builds on the notion of network *centrality* and is measured in terms of (1) incoming and outgoing information flows or knowledge-based connections (aka citations) from each actor (aka journal) in a network, and (2) the position of each actor on the shortest path between other actors in the network formed by these citation connections between articles in different journals (Freeman, 1977; Leydesdorff, 2007). Integration, on the other hand, is viewed as the "synthesis of ideas and methods" across different disciplines (National

Academies, 2004: 27) and is measured by examining the *diversity* of subject categories referenced by articles of a focal journal (Porter et al., 2006). While the intermediation approach helps us to view the role of *JIBS* as a facilitator of communication among journals across distinct disciplines, the integration approach shows the position of *JIBS* relative to other journals in enabling intermingling of theoretical concepts, methodologies or models from a variety of different fields (Porter et al., 2006). Our results suggest that *JIBS* is facilitating communication among disciplines that often do not otherwise talk to each other – a task that is hard to achieve, yet may be of critical importance. In addition, we find that *JIBS* is enabling knowledge integration from a diverse set of fields in comparison to other journals. Lastly, we find that *JIBS*' scores along the two dimensions of interdisciplinary – intermediation (aka betweenness) and integration – are higher or similar to the other highest-ranking business journals (based on 5-year impact factors).

This editorial is organized as follows. In the next section, we present details of how we construct our journal citation network. Then we show how intermediation and integration approaches to measuring interdisciplinarity are used in the context of *JIBS*. Lastly we present our results, and conclude with a discussion of our findings.

WHO IS *JIBS* TALKING TO?

To understand the nature of the interdisciplinary outreach of *JIBS*, we began by examining the structure of the cross-disciplinary connections of *JIBS*. To this end, we turned to the extant bibliometrics literature, in particular the citation analysis literature, which relies on social network methods to measure different dimensions of interdisciplinarity. Following other studies, especially in the sciences, that have examined the interdisciplinarity of subject areas as well as journals, we use two different approaches to look at interdisciplinarity of *JIBS*. The first approach (called intermediation) is focused on measuring the degree of influence of *JIBS* over communication among other journals, while the second approach (called integration) is focused on the diversity of knowledge sources integrated by *JIBS*. We begin by defining the journal citation network, which forms the basis for this study.

Journal Citation Network Construction

Our citation network consisted of 166 journals, where each journal represented a node in the network. These 166 journals represent the top 50

journals (based on their 5-year impact factor rankings for 2008) each in the subject categories of management, business, business and finance, and economics in the Thomson Reuters' JCR. As we are interested in comparing *JIBS* with other leading journals in the fields of Business and Management, we are *primarily* concerned with examining the spread of a *few* key journals in the citation map of journals. To reduce the selection bias issue (which would have been exacerbated if we constructed the citation network by including *only* the journals being compared), we used the four subject categories, mentioned above, as the starting point for our citation network construction. Table A.3 in the online appendix shows the list of 166 journals in our network. As several journals appear in the top 50 categories for more than one of these four overlapping subject categories, our citation network consists of 166 journals (*Forbes* was excluded from this sample), as opposed to 200 journals. To construct the network, we downloaded citation data for all journals in the sample for the years 2001–2012 from Thomson Scientific's Web of Science (WoS). An examination of WoS citation data revealed that journals often have more than one abbreviation, which needed to be mapped to the corresponding journal name. Over a million citations in our sample were subject to this difficulty. To ensure that citation counts between journals are captured correctly, we created a thesaurus for mapping ambiguous journal abbreviations to their respective journal names.

Our sample of 166 journals generated 4,216,630 citations for the observation period of 12 years; many of these citations related to journals other than the journals in our sample of 166, and they either cited articles in journals in our sample of 166 journals or were cited by them. Of these, 43,028 citations lacked the assignment of a proper abbreviation, and so we dropped these from our sample resulting in a total of 4,173,602 citations. Of these citations, 1,414,979 referred to journals with less than 200 citations over the 12-year period, that is, an average of less than 20 citations per year, a very low number in comparison to an average of 40,000 citations per year for the most cited journals. Consequently, we dropped these from our sample too. Our final sample consisted of 2,758,623 citations connected to the 166 journals for the 2001–2012 observation period. As the JCR organizes journals into rather broad subject categories, we assigned each of 166 journals to a more specific discipline or field (Table A.3 in the online appendix shows the assigned disciplines or fields for our initial set of

166 journals); this process involved checking the website of each journal to determine its primary purpose and then assigning it to a particular discipline or field. As our sample consisted of 645 *cited* journals, we also assigned each of these journals to a specific field or discipline; and as a result the journals in our citation map spread over 36 disciplines or fields, which are shown in Table 1. Note that three journals could not be mapped to any specific discipline so we placed them under an “Other” category. It should also be noted that the downloaded citations refer to a variety of publication types, which includes academic journals, books, book chapters, handbooks, newspapers, reports or working papers. However, 1,955,723 citations, that is, approximately 71% of all references, consisted of citations associated with journals within our sample of 166.

JIBS as a Communication Facilitator

Drawing on Freeman’s (1977) pioneering work on centrality, and following Leydesdorff’s (2007) application of the concept, we analyzed the citation network data to examine centrality in terms of in-degree, out-degree and betweenness. In this study, in-degree refers to the number of other journals that are cited by a focal journal; out-degree refers to the number of other journals that cite a focal journal and betweenness refers to the extent to which a focal journal is on the shortest path between pairs of other journals, where a path is basically a walk through the network along its links. A path from journal *A* to journal *B* to journal *C* (i.e., a path from *A* to *C* that passes through *B*) is defined as occurring when in the

relevant period any article in *A* cites any other article in *B*, and in turn any article in *B* cites any other article in *C* (or vice versa). It need not necessarily be the same article in *B* that is cited by an article in *A* and itself cites an article in *C*. When there are multiple such paths of the same length between a given pair of journals (e.g., a path from *A* to *B* to *C*, and one from *A* to *M* to *C*), then in defining the shortest path between that pair of journals priority is given to the path that has the highest volume of citations along it.

Betweenness, as noted by Leydesdorff (2007: 1304) “measures the degree to which the node under study can function as a point of control in the communication.” In other words, the greater the betweenness score of a journal, the greater is its role in enabling communication between other journals in the network. We first consider the betweenness centrality for binary networks (the positioning of a journal on the shortest citation path between pairs of other journals) and then take into account the strength of the citation ties that link such journal pairs.

Following Leydesdorff (2007), we use the following formula for defining the betweenness centrality of node *k*:

$$\sum_i \sum_j \frac{g_{ikj}}{g_{ij}}, i \neq j \neq k$$

where, g_{ij} is defined as the number of geodesic paths between *i* and *j*, and g_{ikj} is the number of geodesics that pass through the node *k*.

Table 1 The 36 disciplines or fields of the cited journals

Accounting	Industrial Relations & Labor
Anthropology	International Business
Applied Psychology	Law
Biology	Management
Business	Marketing
Business Ethics	Medicine
Communication	Multidisciplinary Sciences
Computer Science, Information Systems	Operations Research & Management Science
Demography	Organizational Behavior
Economics	Other
Energy & Fuels	Physics
Entrepreneurship	Planning and Development
Environmental Sciences	Political Science
Environmental Studies	Psychology
Finance	Social Sciences Mathematical Methods
Geography	Sociology
Hospitality, Leisure, Sport & Tourism	Statistics & Probability
Human Resource Management	Urban Studies

The betweenness centrality as defined above ignores the strength of citation ties. However, if we consider citation ties as pipes that convey knowledge, a thicker tie representing many articles of the citing journal that refer to articles in the cited journal stands for more influence by the cited journal than a tie based only on one article. The ease of influence by stronger ties is reflected in the geodesic path for weighted networks (Brandes, 2001),

$$g_{ij}^w = \min \left(\frac{1}{w_{ia}} + \dots + \frac{1}{w_{zj}} \right)$$

where $(1)/(w_{ia})$, for instance, stands for the ease to convey knowledge or influence across the citation tie between journal i and journal a . As a consequence the shortest path on a weighted network between A and B may go via C in a case of strong ties between A and C as well as between B and C, despite there being only a weak (direct) tie between A and B (Piepenbrink & Gaur, 2013).

All calculations, including the network analysis, were performed using the statistical software R (R Core Development Team, 2014). We used the package *igraph* (Csardi & Nepusz, 2006) to create the networks and calculate the network parameters.

Results

In-degree, out-degree and betweenness ranks for *JIBS* are shown in Table 2. The in-degree rank column of Table 2 shows that *JIBS* is ranked among the top 10 for 6 years of the observation period. This means that *JIBS* articles cite a rather large number of other journals. Table 2 also shows that *JIBS* ranks among the top 30 with regard to the out-degree. Out-degree shows that in 2001, 21 journals cited *JIBS*, while in 2012, 37 journals cited *JIBS*. In terms of ranking,

Table 2 also shows in 2001, *JIBS* was ranked 24th, while in 2012, *JIBS* was ranked 29th in our sample of 166 journals. The betweenness rank measure, which shows the extent to which a focal journal, in this case *JIBS*, is on the shortest path between pairs of other journals, has been consistently high in the last 5 years. *JIBS* has a betweenness rank of 8th for 2008, 7th for 2009, 4th for 2010, 8th for 2011 and 9th for 2012, when ties are weighted. When weights of the ties are not taken into account, then *JIBS* has a betweenness rank of 6th for 2008, 2009 and 2010, and 11th for 2011 and 2012, as shown in Table 2.

To improve our understanding of how *JIBS* differs from other comparator journals like the *Academy of Management Journal* (*AMJ*) and the *Strategic Management Journal* (*SMJ*), we ran betweenness centrality analysis for these journals. The results for these analyses are shown in Tables 3 and 4.

Table 3 shows that the in-degree rank of *AMJ* for 2001 was 1st, while it was 37th for 2012. This means that *AMJ* articles cited fewer other journals in 2012 than they did in 2001. The out-degree rank of *AMJ* has been consistently among the top 10, meaning that *AMJ* articles are cited by many other journals. Table 3 also shows the betweenness centrality for *AMJ*. *AMJ* was ranked 18th in 2001 but fell to 72nd in 2012 in terms of its betweenness (weighted) centrality. The binary betweenness rank for *AMJ* was 8th for 2001 and 22nd for 2012. Table 4 shows the equivalent ranks for the *SMJ*. The *SMJ* ranked among the top 10 in terms of its in-degree for 9 years of the observation period. It also ranked among the top 10 in terms of out-degree for 10 out of 12 years of the observation period.

As betweenness centrality is a measure of how many shortest paths between two journals a specific

Table 2 In-degree, out-degree and betweenness centrality ranks for *JIBS*

Year	In-degree	Out-degree	Betweenness	Betweenness (binary)	In-degree rank	Out-degree rank	Betweenness rank	Betweenness (binary) rank
2001	15	21	684	383.7	33	24	17	21
2002	19	21	896	549.8	18	25	13	19
2003	22	23	434.2	279.8	20	26	36	33
2004	17	22	439.2	578.2	37	26	30	17
2005	27	19	474.8	283.3	10	35	35	35
2006	27	26	1846.9	1247.8	17	29	4	6
2007	36	28	303.9	717.6	7	25	53	16
2008	43	31	997.9	975.2	4	26	8	6
2009	46	26	1576.8	1429.3	5	37	7	6
2010	52	32	1922.1	1478.4	4	26	4	6
2011	45	35	1212.4	881.3	7	27	8	11
2012	37	37	1089.2	853.1	16	29	9	11

Table 3 In-degree, out-degree and betweenness centrality ranks for *AMJ*

Year	In-degree	Out-degree	Betweenness	Betweenness (binary)	In-degree rank	Out-degree rank	Betweenness rank	Betweenness (binary) rank
2001	29	40	673.6	959.7	1	10	18	8
2002	25	41	778	1045.1	7	10	15	6
2003	24	49	416.2	745.4	10	10	38	14
2004	21	51	470.3	730.5	19	8	28	11
2005	25	53	752.3	1083.5	11	8	19	11
2006	29	58	581.5	706.7	14	8	25	17
2007	30	57	399.1	818.3	14	10	46	12
2008	35	60	446.3	830.8	11	10	42	13
2009	34	60	737.5	1020.9	14	8	18	9
2010	30	63	556.8	726	20	9	27	17
2011	31	61	336.7	621.5	25	9	50	18
2012	28	61	185.7	468.7	37	10	72	22

Table 4 In-degree, out-degree and betweenness centrality ranks for the *SMJ*

Year	In-degree	Out-degree	Betweenness	Betweenness (binary)	In-degree rank	Out-degree rank	Betweenness rank	Betweenness (binary) rank
2001	29	42	757.2	1827.8	3	9	14	4
2002	31	46	632.3	1420.2	3	7	24	5
2003	31	54	601.8	1414.2	5	7	24	7
2004	32	53	580.8	1339.6	5	7	22	5
2005	33	56	1913.2	1993.9	5	7	4	4
2006	35	57	705.8	1896.1	7	9	20	4
2007	32	58	593	1254.7	11	9	28	7
2008	32	62	166	763.8	13	9	75	15
2009	39	56	780.8	879.2	8	10	15	15
2010	39	62	1274.7	1500.2	11	11	9	5
2011	48	61	1857.8	1488.5	5	10	3	5
2012	47	60	905.9	965.8	6	11	11	10

journal lies on, we delved a little deeper to see the number of shortest paths on which *JIBS* lies, between the 166 journals in our sample for the year 2010. We examined each possible pairwise combination of journals in the study, so each journal had a possible 165 connections with others. For the year 2010, however, our sample consisted of 160 journals since not all 166 journals were cited every year. As we have a directed network, the shortest paths can go in both directions – outward from a focal journal and inward to a focal journal shown in Tables 5 and 6, respectively, each in descending order. Note that Tables 5 and 6 display a subset of the entire list of journals. Table 5 shows that it is possible to reach all 159 other journals from *JIBS*. Similarly, the journal *Corporate Governance* had 115 paths to other journals on which *JIBS* played a part. Thus, *JIBS*

seems to play an important role for this journal as a channel through which it can reach other journals. This also means that *Corporate Governance* connects to 44 (i.e., 159–115) other journals, but *JIBS* does not lie on any of those 44 shortest paths. Note here that we take into account the weight of ties, that is, we prioritize paths that consist of a larger number of citations, which create a path between any two journals.

Along similar lines, Table 6 shows that it is possible for 156 other journals to reach *JIBS* through successive article citations. For instance the shortest path between *JIBS* and *Real Estate Economics* follows a chain *JIBS* – *Journal of Development Economics* – *Review of Financial Studies* – *Review of Economic Statistics* – *Real Estate Economics*, while the shortest path between *AMJ* and *Journal of Development Economics*

Table 5 The shortest paths (outward) on which *JIBS* is located for the year 2010

<i>Journal of International Business Studies</i>	159	<i>World Development</i>	27
<i>Corporate Governance</i>	115	<i>Financial Management</i>	26
<i>Industrial Marketing Management</i>	113	<i>Leadership Quarterly</i>	26
<i>Small Business Economics</i>	95	<i>Supply Chain Management</i>	25
<i>Organizational Research Methods</i>	92	<i>Contemporary Accounting Research</i>	22
<i>Journal of the Academy of Marketing Science</i>	77	<i>International Journal of Service Industry Management</i>	20
<i>Human Relations</i>	57	<i>Journal of Corporate Finance</i>	19
<i>International Marketing Review</i>	56	<i>Information Systems Research</i>	18
<i>Long Range Planning</i>	54	<i>Journal of Marketing Research</i>	17
<i>Journal of Accounting and Economics</i>	52	<i>Omega International Journal of Management Science</i>	17
<i>Psychology and Marketing</i>	52	<i>Entrepreneurship Theory and Practice</i>	16
<i>IEEE Transactions on Engineering Management</i>	46	<i>Journal of Financial and Quantitative Analysis</i>	16
<i>California Management Review</i>	45	<i>Accounting Review</i>	15
<i>Organization Science</i>	36	<i>Marketing Letters</i>	15
<i>Journal of World Business</i>	35	<i>European Financial Management</i>	14
<i>Accounting Organizations and Society</i>	34	<i>International Journal of Operations & Production Management</i>	14
<i>Journal of Interactive Marketing</i>	33	<i>International Small Business Journal</i>	14
<i>Work, Employment & Society</i>	31	<i>Journal of Banking and Finance</i>	14
<i>Information & Management</i>	28	<i>Journal of Futures Markets</i>	14
<i>Journal of Organizational Behavior</i>	28	<i>Quantitative Finance</i>	14
<i>Journal of Accounting Research</i>	27	<i>British Journal of Management</i>	13

Table 6 The shortest paths (inward) on which *JIBS* is located for the year 2010

<i>Journal of International Business Studies</i>	156	<i>Journal of Retailing</i>	25
<i>Journal of Development Economics</i>	88	<i>International Journal of Forecasting</i>	24
<i>Journal of Economic Growth</i>	87	<i>Journal of International Money and Finance</i>	24
<i>World Economics</i>	83	<i>Review of Financial Studies</i>	23
<i>World Bank Research Observer</i>	78	<i>Journal of Health Economics</i>	22
<i>European Economic Review</i>	74	<i>Journal of Portfolio Management</i>	22
<i>Business Ethics Quarterly</i>	71	<i>Journal of Urban Economics</i>	22
<i>Journal of Public Economics</i>	70	<i>Small Business Economics</i>	22
<i>American Economic Review</i>	56	<i>Brookings Papers on Economic Activity</i>	21
<i>IMF Staff Papers</i>	53	<i>Entrepreneurship & Regional Development</i>	20
<i>Journal of International Economics</i>	52	<i>Resource and Energy Economics</i>	20
<i>Long Range Planning</i>	47	<i>Review of Economics and Statistics</i>	20
<i>World Bank Economic Review</i>	47	<i>Review of Economic Studies</i>	20
<i>Journal of Money, Credit and Banking</i>	41	<i>Journal of Law and Economics</i>	18
<i>Group & Organization Management</i>	38	<i>Journal of Monetary Economics</i>	18
<i>International Journal of Management Review</i>	38	<i>Real Estate Economics</i>	18
<i>Journal of Economic Literature</i>	35	<i>World Development</i>	18
<i>Journal of Econometrics</i>	34	<i>Journal of Academy of Marketing Science</i>	17
<i>Journal of Financial Markets</i>	32	<i>Journal of Human Resources</i>	17
<i>IEEE Transactions on Engineering Management</i>	26	<i>Fiscal Studies</i>	17
<i>Journal of Labor Economics</i>	25	<i>Journal of Product Innovation Management</i>	16

goes via *JIBS*, in the form *AMJ* – *California Management Review* – *JIBS* – *Journal of Development Economics*.

The network graphs in Figures 1 and 2 display single journals as nodes, where the size of the node indicates the degree of that node, that is the number of journals to which a given journal is connected.

Links represent the citations between journals based on a cutoff of at least 10 citations. Though the networks are directed, we do not display the arrows for the purpose of legibility.

The journal citation network for 2001 (see Figure 1) shows two distinct clusters, where the top cluster

Figure 1 The journal citation network for 2001 with a cutoff of 10 citations.

consists only of economics and accounting journals, while the bottom cluster hosts a mix of all the other disciplines or fields considered. *Research Policy* is one of the journals that bridges these two clusters. *AMJ* is rather central in the mixed cluster, whereas *Journal of International Business Studies* is well integrated into this cluster, but shows some affinity to the top cluster.

The journal citation network for 2012 (see Figure 2a) still shows two clusters; however, they are much more closely connected, in comparison to the network for 2001, with links between many more journals. In addition to that, there are several journals located in the bridging area in 2012 in comparison to 2001 network. *JIBS* appears to be closer to the center of the mixed cluster in 2012. However, if we increase the threshold to ties of at least 20, a structure (see Figure 2b) similar to that of 2001 emerges: two distinct clusters, *Research Policy* acting as a bridge between them and *JIBS* well integrated in the mixed cluster, but drawn to the economics/accounting cluster.

JIBS as a Knowledge Integrator

Next, we investigate the implications of *JIBS* as an interdisciplinary journal from the viewpoint of the diversity of knowledge sources upon which it draws. Diversity in bibliometric studies is typically reflected by the *number* of disciplines to which references

Figure 2 (a) The journal citation network for 2012 with a cutoff of 10 citations; (b) The journal citation network for 2012 with a cutoff of 20 citations.

cited by a focal journal are classified (Porter & Rafols, 2009). This method for measuring interdisciplinarity, referred to as the integration method, is based on a *knowledge diversity* measure (Porter & Rafols, 2009; Rafols & Meyer, 2010; Rafols et al., 2012), which seeks to assess how diverse is the knowledge network of a focal journal. The integration score “captures not only the number of disciplines cited by a paper or their degree of concentration (as Herfindahl or Shannon indices

[would] do), but also how disparate (i.e., how different) these disciplines are" (Porter & Rafols, 2009: 721). This is a more robust measure of interdisciplinarity because it takes into account the similarity of disciplines in which the cited articles fall; for example, if an article cites three articles that belong to three disciplines that are extremely similar, the integration score is likely to have a score close to zero, as opposed to the Shannon and Herfindahl measures, which would have a score of zero *only* if all the three cited articles belonged to the same discipline (Porter et al., 2006).

Following along the lines of the earlier analysis, our sample consisted of 166 citing and 645 cited journals. We kept all journals beyond 240 citations independent of their discipline and ranking. As each journal in the JCR is assigned to one or more rather general subject categories, as mentioned earlier, we had to assign each journal to a single individual discipline or field (shown in Table 1), before we could run the integration analysis. While this categorization helps us to see how similar or dissimilar is the field of IB, in relation to the other 35 categories, it should be noted that the proximity of an individual field or discipline to others does not bias our results. This is due to the fact that the integration measure takes into account the similarity of fields (Porter & Rafols, 2009).

Following Porter and Rafols (2009: 723), we use the following formula for the Integration index:

$$I = 1 - \sum_{i,j} s_{ij} p_i p_j$$

where s_{ij} is the cosine measure of similarity between disciplines i and j . To create the s_{ij} matrix we follow the procedure described in Porter and Rafols (2009: 724). In our case, the matrix is based on the co-citation sample of 2,716,442 articles downloaded from the WoS database. p_i represents the proportion of references citing the discipline i in a given article.

The similarity matrix, s_{ij} , was constructed using the cosine similarity of journals based on their citation patterns to the 36 categories. Having determined the similarity scores for disciplines, integration scores for journals were calculated. We calculated an integration score for each article for the journals in our sample, and then calculated the mean integration score for each journal on an annual basis. As mentioned in the previous section, all calculations for integration were performed with the statistical software R (R Core Development Team, 2014).

Results

Table 7 shows the cosine similarity of fields or disciplines for the year 2010 for the Accounting, Business, Business Ethics, Economics, Entrepreneurship, Finance, Human Resource Management, IB, Management and Marketing disciplines or fields of study. Greyed cells in Table 7 represent the three highest cosine similarity values for the discipline or field given in the column in conjunction with the disciplines or fields shown in the rows. For example, Accounting had the highest similarity with Finance, Law and Business in descending order; on the other hand, Accounting had a very low similarity with the IB field, with a score of 0.008019. Management had highest similarity with Sociology (0.389174), IB (0.326774) and Business (0.322304). Similarly, in this sample of journals belonging to 36 disciplines or fields, Law had the highest similarity to Finance (as shown by a score of 0.127238), and Psychology had the highest similarity to Organizational Behavior (as shown in Table A.4 of the online appendix). The Marketing discipline was most similar to Business and Psychology, with scores of 0.416728 and 0.208353, respectively.

Our results show that the following five fields (or disciplines) had the greatest similarity to the field of IB for our observation period of 2001–2012: Management, Marketing, Business, Human Resource Management and Entrepreneurship (as shown in Table A.5 of the online appendix).

Table 8 shows journals with the highest integration scores for the year 2010. *Contemporary Accounting Research* ranked the highest with an integration score of 0.9471, while the *Journal of Economic Geography* and *Economic Geography* ranked second and third with scores of 0.9450 and 0.9404, respectively.

Table 9 shows the integration scores for *JIBS* over time. *JIBS* has consistently improved in its rank in the last 5 years. The journal ranked 45th in 2008, 37th in 2009, 27th in 2010 and 2011, and 18th in 2012.

CONCLUSIONS AND DISCUSSION

To assess the academic impact of the interdisciplinary outreach of *JIBS*, we used network analysis to measure (1) the degree of influence of *JIBS* over communication among other journals (i.e., intermediation), and (2) the diversity of knowledge sources integrated by *JIBS* (i.e., integration), in a citation network of 166 journals, which cover 645 cited journals spread across 36 disciplines or fields. Our results suggest that *JIBS* is increasingly acting as an intermediary for other journals in the related social

Table 7 The similarity of a few key fields based on citations for the year 2010

	Accounting	Business	Business Ethics	Economics	Entrepreneurship	Finance	Human resource management	International business	Management	Marketing
Accounting	1.000000	0.065831	0.024834	0.062423	0.004628	0.196972	0.009815	0.008019	0.034733	0.007962
Anthropology	0.013050	0.018135	0.015143	0.010852	0.009822	0.005468	0.019765	0.009553	0.055162	0.041498
Applied psychology	0.001714	0.033021	0.032914	0.008103	0.075471	0.004298	0.228638	0.027035	0.188144	0.007901
Biology	0.000000	0.003793	0.000000	0.073981	0.002739	0.001573	0.001034	0.000615	0.006352	0.003489
Business	0.065830	1.000000	0.145821	0.128763	0.122250	0.208620	0.058715	0.140428	0.322304	0.416728
Business ethics	0.024830	0.145821	1.000000	0.020470	0.024222	0.012424	0.080224	0.048408	0.132213	0.071405
Communication	0.004661	0.058646	0.018115	0.009586	0.008712	0.001263	0.038350	0.013035	0.077106	0.126766
Computer science, information systems	0.007492	0.152457	0.029264	0.032129	0.008139	0.003184	0.029408	0.022760	0.169342	0.122148
Demography	0.000035	0.003980	0.001296	0.128346	0.007665	0.002973	0.057440	0.001673	0.002611	0.000517
Economics	0.062420	0.128763	0.020471	1.000000	0.072646	0.286845	0.084078	0.072620	0.148107	0.049124
Energy & fuels	0.001042	0.006998	0.000849	0.090861	0.002788	0.011642	0.000329	0.000000	0.003401	0.002219
Entrepreneurship	0.004628	0.122250	0.024222	0.072646	1.000000	0.047093	0.045255	0.108302	0.284713	0.028609
Environmental sciences	0.000598	0.023089	0.018243	0.109755	0.007204	0.002971	0.003288	0.004303	0.021058	0.004563
Environmental studies	0.000891	0.027683	0.013502	0.197297	0.004917	0.011366	0.007206	0.002645	0.017264	0.010534
Finance	0.197000	0.208620	0.012424	0.286845	0.047093	1.000000	0.007571	0.028630	0.076006	0.008235
Geography	0.000564	0.046196	0.007801	0.140603	0.093440	0.012131	0.027388	0.031196	0.135090	0.012621
Hospitality, leisure, sport & tourism	0.000031	0.023597	0.001700	0.012803	0.003911	0.000340	0.000878	0.004702	0.039640	0.053647
Human resource management	0.009815	0.058715	0.080224	0.084078	0.045255	0.007571	1.000000	0.153644	0.281699	0.038066
Industrial relations & labor	0.009852	0.024811	0.032212	0.087142	0.011918	0.012246	0.286538	0.023426	0.100386	0.008947
International business	0.008019	0.140428	0.048408	0.072620	0.108302	0.028630	0.153644	1.000000	0.326774	0.154550
Law	0.068730	0.034712	0.052987	0.100308	0.012667	0.127238	0.015847	0.017281	0.060042	0.012331
Management	0.034730	0.322304	0.132213	0.148107	0.284713	0.076006	0.281699	0.326774	1.000000	0.193574
Marketing	0.007962	0.416728	0.071405	0.049124	0.028609	0.008235	0.038066	0.154550	0.193574	1.000000
Medicine	0.005549	0.017704	0.017167	0.138725	0.006283	0.014664	0.127351	0.005464	0.047784	0.032147
Multidisciplinary sciences	0.005439	0.042469	0.013645	0.145794	0.016322	0.017248	0.038023	0.007691	0.071428	0.043591
Operations research & management science	0.008251	0.158506	0.013201	0.041310	0.014832	0.019344	0.040385	0.043815	0.181988	0.122405
Organizational behavior	0.013550	0.065712	0.062483	0.021861	0.054958	0.008299	0.268412	0.042208	0.266140	0.049582
Other	0.006322	0.064632	0.014980	0.121492	0.010217	0.025570	0.097250	0.089376	0.099316	0.083999
Physics	0.000071	0.016496	0.000000	0.036027	0.001064	0.017041	0.001204	0.001910	0.015258	0.013094
Planning and development	0.000744	0.021710	0.007724	0.070289	0.025943	0.006624	0.009859	0.023457	0.043494	0.009451
Political science	0.007773	0.043054	0.031596	0.177045	0.023780	0.019233	0.039846	0.047776	0.085336	0.029626
Psychology	0.020140	0.105943	0.082707	0.039837	0.055841	0.016384	0.348117	0.049518	0.268090	0.208353
Social sciences mathematical methods	0.016980	0.111735	0.023968	0.150922	0.024294	0.066526	0.050228	0.040337	0.114803	0.090076
Sociology	0.022140	0.096520	0.047604	0.100373	0.145626	0.026918	0.184311	0.099945	0.389174	0.090035
Statistics & probability	0.015500	0.057635	0.003402	0.229817	0.011590	0.109390	0.028681	0.020273	0.037768	0.050822
Urban studies	0.000513	0.009625	0.003760	0.178759	0.027288	0.028315	0.010199	0.015888	0.025143	0.005074

Table 8 Top 15 journals by integration scores in descending order for 2010

Top 15 journals by integration scores		
Rank	Journal name	Integration score
1	<i>Contemporary Accounting Research</i>	0.9471
2	<i>Journal of Economic Geography</i>	0.9450
3	<i>Economic Geography</i>	0.9404
4	<i>MIS Quarterly</i>	0.9367
5	<i>Energy Journal</i>	0.9360
6	<i>Accounting Organizations and Society</i>	0.9344
7	<i>Journal of Management Information Systems</i>	0.9338
8	<i>Journal of International Marketing</i>	0.9328
9	<i>Resource and Energy Economics</i>	0.9281
10	<i>Entrepreneurship and Regional Development</i>	0.9257
11	<i>Corporate Governance: an International Review</i>	0.9255
12	<i>International Marketing Review</i>	0.9239
13	<i>British Journal of Management</i>	0.9236
14	<i>Information Systems Research</i>	0.9234
15	<i>Journal of Health Economics</i>	0.9221

Table 9 The ranking of *JIBS* over time based on its integration score

<i>JIBS</i> ranking based on integration scores 2001–2012			
Year	Rank	Year	Rank
2001	13	2007	24
2002	10	2008	45
2003	14	2009	37
2004	70	2010	27
2005	14	2011	27
2006	25	2012	18

and behavioral sciences, and that there has been an improvement in its position as a communication facilitator. In the last 5 years, *JIBS* is among the top 10 journals in terms of its betweenness centrality, which shows the importance of a journal acting as a conduit of knowledge flows. As an illustrative point of comparison, we find that *AMJ* has consistently fallen with regard to its betweenness rank in the last 4 years, indicating that there are fewer journals in its citation network and that it is enabling communication flows among a smaller set of journals. Figure 3 suggests that *JIBS* ranks well relative to *Administrative Science Quarterly* (ASQ), *AMR*, *AMJ* and *Organization Science* (Org. Sci.) in terms of its ability to facilitate

communication in the social network of journals. In 2010 and 2012, *JIBS* has the highest (weighted) betweenness score in comparison to other five journals. When the weights of the ties are not taken into account, then it ranks second for all 3 years.

With regard to *JIBS*' in-degree and out-degree ranks (shown in Table 2), our results suggest that *JIBS* is acting both as an integrator as well as a source of knowledge in its network of journals; this finding is consistent with the findings of Sullivan, Nerur, and Balijepally (2011), who report that *JIBS* ranks high on both the "storer," as they call it, and the "source" dimensions (2011: 451–452), relative to other IB journals for the 2001–2007 observation period in their sample of 39 journals. It is true that as Sullivan et al. (2011) also observe, *JIBS* ranks still more highly as a knowledge recipient (in-degree) than as a knowledge source (out-degree), which reflects to some extent the disadvantage of a multidisciplinary position in journal impact factor assessments based on citations by others to articles in a journal, as we discussed at the start. However, we do not see the especially prominent knowledge recipient role of *JIBS* simply as the journal functioning as a passive store of knowledge; rather, we contend that IB scholars combine diverse knowledge in novel ways to build and extend IB theory. Using a more robust measure of interdisciplinarity – the integration measure, which takes the similarity of fields into account when calculating the number of diverse disciplines that an article draws upon (Porter & Rafols, 2009), we find that *JIBS* has consistently improved, in the last 5 years, in its rank based on integration of knowledge from *diverse* disciplines. This finding suggests that IB scholars are combining knowledge from *dissimilar* disciplines in novel ways to contribute to IB theory. Our finding also corroborates the viewpoint of former Editor-in-Chief, Lorraine Eden, who notes "IB scholars are enthusiastic about boundary spanning" (Eden, 2008: 3). In addition to that, our finding reinforces the position of *JIBS* as a row journal, drawing here on the matrix analogy of Lorraine Eden (2008: 2) who argues that if we think in terms of a matrix in which the columns are disciplines and the rows are fields of study or topic areas that cross disciplines, "successful submissions to *JIBS* are not based in a single cell," instead they tend to "spill over into other 'cells' by incorporating insights from other disciplines into their research."

While Sullivan et al. (2011) provide a comparison of *JIBS* with other IB journals, we are more concerned, in this editorial, with *JIBS* as the primary representative journal of the IB field in comparison

Figure 3 Weighted and binary betweenness score comparison for 2010–2012.

with other leading comparator journals in related fields or disciplines, and therefore we compare *JIBS* primarily with the leading management journals. To this end, we find that in the last 3 years, *JIBS* has had a higher integration score than *AMJ*, *ASQ* and *Organization Science*, and it has been neck and neck with the *SMJ* on this front, as shown in Figure 4. In sum, *JIBS* ranks higher than many of its major comparator journals in its interdisciplinarity.

LIMITATIONS AND FUTURE DIRECTIONS

Although we use a rather large database of journals in comparison to most bibliometric studies, we nevertheless imposed a cutoff for determining which journals constitute our sample. Therefore, one limitation of this study is that we selected journals only from the Business, Management, Business and Finance, and Economics subject categories of JCR, and not from, for instance, Sociology and Psychology. We made this choice based on the predominantly business school affiliations of most scholars and the normal identification of the IB field with business-related subjects. However, the effect of this limitation is mitigated by the fact journals are often assigned to multiple subject categories in JCR, therefore our

Figure 4 Integration score comparison for 2010–2012.

sample does contain some journals that also belong to the wider social science and behavioral science categories such as Psychology. Furthermore, for the integration score calculation, we included both the 166 citing and the 645 cited journals, and this increased the spread of our journals to 36 disciplines, provided that they met the cutoff condition. It follows from the account just given that another limitation of this study is that we chose a cutoff point for considering citations; as a result, we exclude journals that receive lower levels of citations. While a larger database may change the results somewhat, we believe that the overall pattern would be quite stable and consistent with our findings.

As noted before, the JCR sometimes assigns a journal to two (or more) disciplines or fields, but for the purposes of our analysis, we assigned each journal to just one discipline or field; this could be

viewed as a limitation as well. However, to ensure that this subjective assignment does not bias our results, we used the robust integration score measure that considers the similarity of fields into account as explained earlier. Lastly, we used the pre-assignment of each journal to a certain discipline as an input into our data. An alternative approach to employ in future research would be to use the *community detection* algorithms for networks to find clusters of journals based on their citation network and to reveal the different roles that journals take in the emerging structure. As *JIBS* is dedicated to the internationalization of business activities, an interesting question for future research would be to examine how international is the research community that dedicates its efforts to this field, and how has the geographic distribution of scholarship evolved with the growing interest in emerging markets.

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