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Are we on the right track? an update to Lyytinen et al.'s commentary on why the old world cannot publish

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ABSTRACT

In a thought-provoking paper published in EJIS more than a decade ago, Lyytinen and colleagues asked the question, why does the "old world" perform poorly in high academic impact publishing? This triggered a lively debate on the epistemological and methodological traditions, preferences, and research practices of Europeans versus North Americans that has lasted until today. Is it still true, we asked ourselves, that European scholars generate less academic impact than their North American colleagues? Is the European research context indeed disadvantageous for developing high academic impact research? In this paper, we set out to explore these questions by analysing the Google Scholar profiles of 1713 IS researchers from all over the world. Our findings show that Northern and Western European scholars no longer seem to differ significantly from their North American peers, even though the different research contexts still exercise a certain level of influence. However, is this a development the "old world" desires? We provide an assessment and some suggestions for the future of European IS research.

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1. Introduction

Much has been written about the fragmented identity of the Information Systems (IS) field (Burgess et al., 2016; W. W. Chen & Hirschheim, 2004; Vessey et al., 2002) and the differences in the epistemological and methodological traditions of the "old vs. the new world" (Avgerou et al., 1999; Dwivedi & Kuljis, 2008; Stein et al., 2016). A particularly lively debate has emerged throughout Europe because of Lyytinen et al.'s (2007) thought-provoking paper that asked why the old world performs poorly in "high-impact"[1] publishing. In this paper, we revisit what was written more than a decade ago and explore whether it is still true that European scholars generate less academic impact than their North American (or other international) colleagues. However, as we will discuss later, our understanding of creating or having a high impact in the scientific community is different from that in Lyytinen et al.'s (2007) original article, which equated "high impact" with the number of publications in the senior scholars' basket of journals (Association for Information Systems, 2021b). Beyond that, we re-examine whether the institutional factors and research contexts that Lyytinen et al. (2007) found to impede the European IS community from developing high academic impact research are indeed disadvantageous.

We perform this comparison by analysing 1713 Google Scholar profiles of IS researchers. Our results show a different picture from that in 2007; that is, the European IS community has significantly caught up to and even superseded the average North American colleague in terms of academic impact. We argue that a possible explanation for this change can be found in the different research contexts, particularly in terms of the financial endowments of universities and research units as well as the level of digitalisation and information and communication technology (ICT) investment in practice, which have seen some improvements in Europe and other parts of the world while worsening in the US. Before these analyses, we disentangle key terms, such as research productivity, quality, and academic impact, and explain why we did not follow the pattern of counting basket journal articles and instead relied on the *h-index* to conceptualise the academic impact of a researcher. We then outline how the differences in research contexts influence the academic impact score. We conclude the paper by discussing the implications of our work and offer some ideas regarding why focusing only on academic publishing might not necessarily be positive for the European IS research context in particular.

2. A scientometric view of academic impact

Academic recognition rests mainly on the recognition received for one's scholarly work, which can take multiple forms in the IS discipline (e.g., software, trade press

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articles, consulting, patents, industry standards, methods, guidelines, and public policy) beyond publication in scientific journals or conferences (Hevner et al., 2004; Rosemann & Vessey, 2008). However, we will concentrate on what is of greatest concern to most scholars, that is, *academic publications*, as they are often tied to institutional demands for promotion (e.g., to obtain a degree or tenure) or research funding (e.g., to obtain the necessary means for appointing research staff or purchasing special equipment). More than a decade ago, Huang and Hsu (2005) pointed to the global tendency that universities "consider the number of publications in quality research journals quite seriously in tenure and merit decisions" (p. 555). This has led to an urgency and fierce competition for creating knowledge that is publishable in the top-tier outlets of a discipline (Wiener et al., 2018). It has also favoured the formation of institutional surveys, article counting exercises, and citation network analyses for the purpose of establishing university, journal, or author rankings (Chua et al., 2002; Clarke, 2007; Lewis et al., 2007; Lowry et al., 2007, 2013; Mingers & Harzing, 2007; Venkatesh, 2021).

With the advent of bibliometric databases, such as the AIS eLibrary, Google Scholar, Scopus, or Web of Science, and the possibility of scraping large amounts of web resources in a short period of time, the task of "*score-keeping*", as Clarke (2007) calls it, has become relatively common. Researcher-based rankings frequently centre on *productivity*, which is typically measured by the number of publications produced in a given period of time (e.g., articles that appeared in the past three or five years), and *impact*, which is commonly expressed by citation counts, assuming that the reference of one's work in the subsequent literature is a valid indicator of the work's influence and significance for the rest of the research community (Lowry et al., 2007). However, as Clarke (2007) highlights, "whether the influence of work or author was of the nature of notability or notoriety, remains generally ignored by citation analysis" (p. 3), given that every citation counts equally. In this sense, it remains unclear whether a citation is an expression of paying homage to a rigorous, well-crafted, scholarly piece of work, a substantiation or correction of one's own work (in the case of a self-citation), a critique of extant published work of others (Hansen et al., 2006), or the result of a reviewer's accommodation, a coercive journal practice, or the deliberate manipulation (in the case of excessive self-citation) of one's personal authority (Ioannidis, 2015).

The uncomfortable fact is that there is no consensus thus far on how to reliably measure the *academic impact* of a scholar with one or more bibliometric indicators (Hirsch, 2005). Not wanting to replicate a lengthy debate that has been going on for decades and is mainly animated by scholars in scientometrics (Brusilovsky, 1978), a measure that has been widely considered to be a fair compromise is the so-called *h-index* (Hirsch, 2005). This is a measure for characterising the academic impact of a researcher as an "index h if h of his or her N_p papers have at least h citations each and the other $(N_p - h)$ papers have $\leq h$ citations each" (Hirsch, 2005, pp. 16,569); put more simply, a researcher scores an h-index of 10 if he or she has 10 articles that have received at least 10 citations. It therefore includes both the researcher's potential influence on other scholars (number of citations) and productivity (number of publications) in a single number that is easy to understand.

As mentioned, the h-index has not been totally uncontested (Bornmann & Daniel, 2009). A range of refinements and alternative metrics have been proposed (e.g., Egghe, 2006; Jin et al., 2007; Zhang, 2009) to address the major shortcomings that Hirsch himself noted, such as the distribution of the citation counts, the length of time since each article was published, the number of co-authors per citation, and the age, or rather, the number of years a researcher has been active in the field (Hirsch, 2010). Popular ranking services, such as those found on the websites of Venkatesh (2021) and Harzing (2016b), therefore provide multiple academic impact measures. The h-index achieved by an individual researcher is furthermore highly dependent on the number of scholars and publications in the discipline and of course on the reliability of the data sources used to calculate the h-index (Harzing, 2016c). For instance, Clarke (2007) found considerable variations in the citation counts when comparing the bibliometric data available on Web of Science with those on Google Scholar; in a sample of Australian IS researchers, the citation counts varied from 1.15 to almost 9 times less in Web of Science because it encompasses only a small subset of publication outlets relevant to the IS discipline.

To circumvent this problem and to link research productivity with some sort of quality rating, it has been particularly popular in IS to narrow the view to a selected list of core journals, referred to as the *senior scholars' basket of journals* (Association for Information Systems, 2021b) or simply the "basket". However, multiple issues remain, such as disagreement in the perceived quality of journals (Huang & Hsu, 2005; Lewis et al., 2007; Lowry et al., 2013), the stability of the "basket" over time (Jiang et al., 2017), differences in how co-authored articles are counted (L. Li et al., 2014; Zhai et al., 2014), preferences or over-representation of specific topics or research methods in these journals (Liu & Myers, 2011), and simple errors in reporting. Perhaps the most important shortcoming of such narrow studies is "[. . .] that research production is not equivalent to research impact. In other words, some articles appearing in top journals contribute significantly to the development of the field while other articles are virtually ignored" (Lowry et al., 2007, p. 143). Additionally, in a world that is becoming ever more complex, interconnected, and diverse, such a narrow focus might also hinder us from contributing to something larger, such as developing responses to the *grand challenges* of our time, which undoubtedly require multiple paradigmatic, methodological, and theoretical viewpoints in order to be solved (Becker et al., 2015). Today, much significant work towards promoting the scientific quality and practical relevance of IS research is therefore organised and conducted within transdisciplinary *special interest groups* (SIGs), such as SIG Health, SIG GlobDev, and SIG SI (Association for Information Systems, 2021a). Many topics of interest by researchers active in these SIGs are outside the scope of the top-tier journals and are hence published somewhere else and in a wide range of forms. In addition to a lack of topical fit and that it is strongly encouraged to publish in the basket, there may be some practical or ideological reasons why certain researchers are absent. For example, some scholars favour the publication of their work in non-paywall outlets or are coerced by the publication policy of their institution or funding body (e.g., the Australian Research Council, H2020 programme of the European Commission, Swiss National Science Foundation, UK Research Council, or US National Science Foundation) to disseminate their findings following the gold or green open-access standard.[2] Therefore, we will now describe how institutional and contextual factors may influence academic impact.

3. Contextual factors influencing the academic impact score

As mentioned earlier, studies aiming at capturing and understanding "academic impact" have mostly concentrated on scientometric factors, such as the size and (self-)citation practices of the author team (Straub & Anderson, 2009; Venkatesh, 2021) or the quality of the outlet where the articles are published (Chua et al., 2002; Lowry et al., 2007). For example, it was shown that co-authored papers receive, on average, more citations than single-authored papers (E. Y. Li et al., 2013) and that eminent scientists receive disproportionately more credit for their contributions, while relatively unknown scientists tend to obtain disproportionately little credit for comparable contributions (Merton, 1968). However, little emphasis has thus far been given to nonscientometric and contextual factors, which might explain the distortion of the academic impact score.

An obvious factor is *language*. English is the lingua franca in many scientific disciplines as well as in the IS community (Davison & Díaz Andrade, 2018). High academic impact research requires versatile methodological proficiency, thorough socialisation into the field, and good writing skills (Lyytinen et al., 2007), which is why the mastery of English, at least to some extent, is essential (Meneghini & Packer, 2007). While a common language certainly eases communication between researchers, it also creates a disadvantage for non-English natives given that translating original thoughts into a different semantic, syntactic, and sometimes cultural context is extremely challenging. Everyone who is a non-English native would agree that particularly culture-laden concepts and ideas, such as the Chinese "guanxi" (Chu et al., 2019) and the Persian "baksheesh" (Kemal, 2019), to mention just two well-known examples, often lose expressive power when they are translated and contextually adapted for international readership (Alves & Pozzebon, 2013). Unlike other fields, such as natural sciences and medicine, where the acceptance or rejection of a manuscript relies first and foremost on the quality of experimental results and the underlying data, in IS, there is a much stronger emphasis on judging the logical argumentation and clarity of expression of thoughts. Therefore, it seems likely that creating or having academic impact in our field is more vulnerable to language effects (Van Raan et al., 2011).

A less obvious influencing factor of research impact is *money*. As with any enterprise (Coen & Maritan, 2011), the scientific enterprise may also profit from a superior endowment in the form of better facilities, equipment, PhD students, postdocs, travel, and dissemination budgets. In many disciplines, this has played an important role in reaching the forefront of scientific discovery. A study conducted by Ben Sowter, director of research at the QS World University Rankings, concluded that the main discriminator between higher education systems that are seeing improvements and those that are not is research funding (O'Malley, 2019). According to him, countries such as China, whose research impact trajectory is diametrically opposed to that of the US, have considerably expanded government expenditure in higher education, while on the other end, the Trump administration introduced cuts to the Education Department budget. Translated to the IS context, a better endowment may allow researchers to perform labour-intensive investigations, which may require, for instance, many staff to collect and transcribe qualitative data or implement software components in more design science research-oriented studies. It may be used for remunerating scientific programmers or respondents on crowd platforms, such as Mechanical Turk, to increase the sample of quantitative studies or experiments (Lowry et al., 2016). At universities where academics are primarily hired for teaching positions, it may be used as compensation for obtaining more research time and for stabilising employment contracts. It may serve to pay article processing charges for paywall journals (e.g., the basket) in order to grant free access to one's latest work and increase the likelihood of being cited (Holmberg et al., 2020). It may be used for services that may considerably improve the quality and quantity of dissemination, such as language editing and ghostwriters. Accordingly, we will not focus on language effects in our later analyses.

If we expand our perspective from the financial endowment of a university or research unit to the broader economic situation of a country, we may find additional indirect effects on the academic impact score. As Nobel Laureate Randy Schekman (2013) noted, it has become a common pattern in science that the largest rewards often follow the flashiest work, not the best. Although academic discourse should be driven less by short-term bubbles, the craving for media attention and scholarly recognition has encouraged many researchers to fall for overhyped topics, which in our discipline are frequently tied to new technologies (and the adoption thereof by private and public organisations). Translated to the IS context, scholars in comparatively wealthy countries may have more opportunities to study emerging research topics, such as algorithmic decision-making, artificial intelligence, robotics, the Internet of Things, distributed ledger technologies, and edge computing, than scholars in the Global South. As we move towards more data-intensive forms of knowledge creation (P. C. L. Chen & Zhang, 2014), a vibrant and financially sound environment may not only grant researchers access to expensive computing infrastructure but also allow them to empirically observe how new technologies are used in practice given their superior budget for investing in ICT. This could be one of the reasons why, according to Davison and Díaz Andrade (2018), scholars in less economically developed countries have made very few contributions to the development of theory in IS, while researchers from wealthy countries have been able to consolidate their work with the accepted "universal knowledge".

4. Data collection and sample

To obtain the data for analysing a sufficiently large and diverse set of academics in the IS field, we applied and extended a Web scraping algorithm based on Node.js that collects all information available on public Google Scholar profiles. This includes a researcher's name, university affiliation, verified email address (for determining the country of origin), year of first citation, citation count, h-index, and the keywords that the researcher defined to best describe his or her area of work. We chose Google Scholar over alternative bibliometric databases, such as Web of Science and Scopus, because it offers greater coverage of IS-relevant journals (Clarke, 2007) and because it better reflects the efforts and variety of practice-based research (Rosemann & Vessey, 2008), given that it also includes citations from publications in conferences, books, magazines, software, and patents. However, most importantly, Web of Science and Scopus are predominantly in English, while Google Scholar is not (Harzing, 2016a). In this sense, the academic impact of non-English language publications is also captured. Certainly, no solution is perfect. It remains a challenge to generate an accurate count due to data-encoding problems (e.g., authors using Cyrillic, Japanese, Korean or Chinese characters for their profiles) and name variants (e.g., the handling of middle names and initials or changes in a family name after marriage). Furthermore, data accuracy critically depends on the quality of the data indexed by Google Scholar and the researchers' efforts to keep their personal profiles accurate and up-to-date, which can be variable (Delgado López-Cózar et al., 2014).

As a baseline for generating the sample, we used the AIS Faculty Directory and extracted the names and affiliations of researchers with an academic membership only; hence, students and professionals are not represented in the sample. As of the end of November 2018, this yielded a list of 2758 researchers, out of which we could match 1713 (62.11%) with a public Google Scholar profile by manual search. The web scraping process began in December 2018; minor data transformation, cleansing, and validation procedures followed. Visual and statistical analyses were performed using different scientific computing packages available for the Python programming language.

4.1. Sample demographics

Out of the 1713 researcher profiles that we scraped from Google Scholar, the largest proportion originates from North America (47.46%). As shown in Table 1, European IS scholars account for 21.48% of the

Table 1. Descriptive statistics of scraped Google Scholar profiles per geographic area.

			CITATIONS			H-INDEX		
	n	in %	M	Mdn	SD	M	Mdn	SD
North America	813	47.5%	3051.1	772.0	7515.5	15.6	11.0	14.1
Latin America	33	1.9%	986.1	280.0	1586.1	11.2	8.0	8.5
East Asia	98	5.7%	2103.1	598.5	3723.2	14.4	9.5	12.7
South Asia	31	1.8%	458.8	149.0	933.2	7.3	6.0	6.2
Southeast Asia	131	7.7%	1076.6	121.0	3050.4	9.2	5.0	11.1
Oceania	128	7.5%	1946.5	688.0	3501.1	15.0	12.0	11.0
Africa	44	2.6%	343.3	156.0	485.9	7.3	6.0	5.2
Middle East	67	3.9%	1047.7	416.0	2054.3	10.7	8.0	8.2
Eastern Europe	17	1.0%	303.1	137.0	383.4	7.0	6.0	4.2
Northern Europe	86	5.0%	1598.7	652.5	2014.7	15.2	13.0	10.0
Western Europe	265	15.5%	2421.9	1015.0	3650.2	17.8	15.0	12.9

sample; that is, there are 86 researchers from Northern Europe, 17 from Eastern Europe, and, excluding the other two European groups, 265 from Western Europe. Other large groups are researchers from Oceania (7.47%) and Southeast Asia (7.65%). Although Africa, Latin America, and South Asia constitute approximately 50% of the world population, they make up only 6.31% of our sample.

Academics from the United States represent by far the largest country-specific group (43.49%). While considerably smaller, Australia (5.78%), Germany (4.38%), Canada (3.79%), the United Kingdom (3.62%), Malaysia (3.21%), and Indonesia (2.57%) constitute considerable national research communities as well. All other countries account for 2% of the sample or less each. However, small can also be beautiful! In our sample, several smaller, highly industrialised, developed countries (in terms of population) perform, on average, better than, for instance, the United States. If we look at the number of IS scholars per million capita or the number of citations per million capita, it is evident that Australia, Denmark, Finland, Hong Kong, Liechtenstein, New Zealand, Singapore and Switzerland all seem to employ more IS researchers and, interestingly, generate more citations per million inhabitants.[3] As shown in Figure 1, it is also important to note that many countries are not represented in the sample, either because IS as a discipline may not yet be established in these countries, the scholars are not active in the AIS community, or they simply lack a public Google Scholar account. Particularly striking is the absence of many African and Latin American countries and researchers from countries that are supposedly at the forefront of digitalisation, such as Estonia.

The share of researchers with less than 10 years of experience ranges from 3 to 16% of scholars in a specific geographical area. The proportion of young academics is particularly high in South Asia (16.1%), Africa (13.6%), and Southeast Asia (9.2%), which either indicates an increasing interest in dedicating a research career to the investigation of sociotechnical phenomena or indicates that IS as a discipline has only recently been established in certain countries. This is in contrast to Europe, the Middle East, and North America, where the proportion of young academics lies between 4 and 6%; Latin America (3.0%) and Oceania (3.1%) have fewer academics entering the IS discipline, in other words, a higher proportion of experienced researchers.

5. Revisiting claim i: European is scholars have a low academic impact

Let us first revisit the claim that European IS scholars perform poorly in generating academic impact compared to Northern American (and other international) colleagues. To test this hypothesis, we performed an analysis of variance (ANOVA) on the h-index and citation counts. Given that the test of homoscedasticity indicated unequal variances among groups ($W = 3.51$, $p = 0.00$), we used Welch ANOVA to identify statistical variations among the geographical areas because it is more robust against this kind of scenario. The results we obtained show that there are indeed some significant differences among IS scholars in different parts of the world ($F = 22.94$, $p = 0.00$). Next, to examine whether the academic impact of European academics differs significantly from that

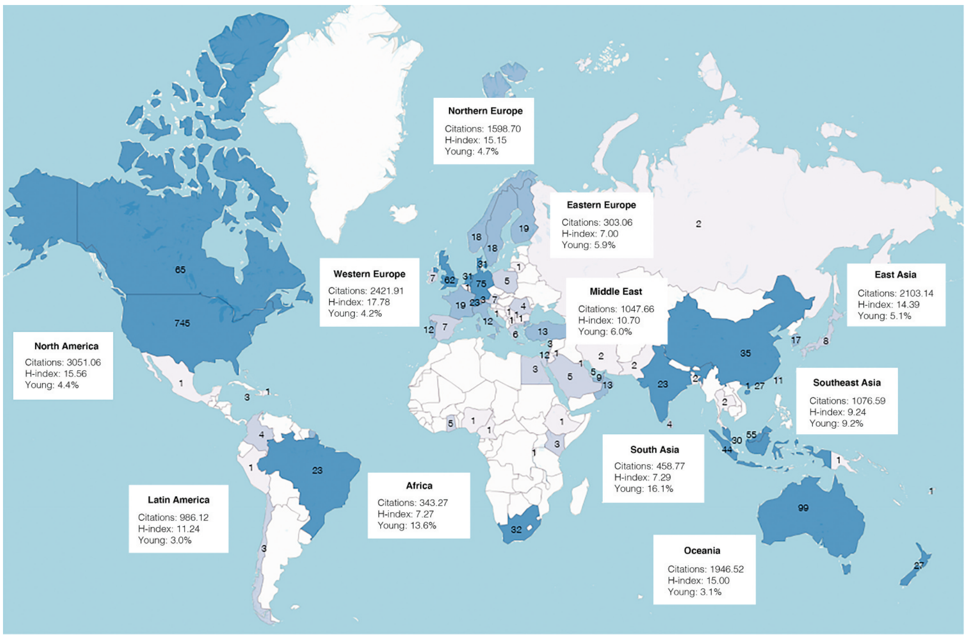

Figure 1. Geographic overview of the scraped Google Scholar profiles.

Table 2. Contrast between the adjusted predictions of citation counts and h-index; the baseline represents the citation counts or h-index of North American IS scholars.

CONTRAST	CITATIONS						H-INDEX					
North America vs.	DIFF	SE	T	DF	P	G	DIFF	SE	T	DF	P	G
Latin America***	2064.9	381.7	5.4	113.2	0.001	0.960	4.3	1.6	2.8	39.5	0.187	0.492
East Asia	947.9	459.3	2.1	209.6	0.500	0.221	1.2	1.4	0.9	127.7	0.900	0.092
South Asia***	2592.3	312.4	8.3	295.2	0.001	1.517	8.3	1.2	6.8	42.9	0.001	1.243
Southeast Asia***	1974.5	374.8	5.3	441.1	0.001	0.496	6.3	1.1	5.8	203.8	0.001	0.546
Oceania	1104.5	406.5	2.7	349.4	0.653	0.258	0.6	1.1	0.5	198.5	0.900	0.049
Africa***	2707.8	273.6	9.9	846.9	0.001	1.531	8.3	0.9	8.9	83.0	0.001	1.381
Middle East***	2003.4	364.0	5.5	265.6	0.001	0.699	4.9	1.1	4.4	101.9	0.001	0.555
Eastern Europe***	2748.0	279.5	9.8	574.9	0.001	2.407	8.6	1.1	7.6	24.5	0.001	1.858
Northern Europe	1452.4	341.6	4.3	423.4	0.657	0.482	0.4	1.2	0.3	123.7	0.900	0.039
Western Europe	629.2	346.1	1.8	924.0	0.500	0.129	−2.2	0.9	−2.4	486.0	0.387	−0.168

Note: DIFF = mean difference; SE = standard error; T = T-value; DF = adjusted degrees of freedom; P = significance at *p < .05, **p < .01, ***p < .001; G = Hedge's g corrected effect size

of their North American colleagues, we checked the contrast between the adjusted predictions of citation counts and the h-index, which are illustrated in Table 2.

We observe that Northern and Western European IS scholars (such as academics from East Asia and Oceania) are not significantly dissimilar from North American colleagues, suggesting that a convergence or adaptation of working styles, training, or publication intensity has taken place over the years (this does not seem to be true for Eastern European IS scholars, who present a statistically significant deviation from North American colleagues). Despite this rapprochement, Northern and Western European researchers still exhibit a lower average citation rate than North Americans, that is, approximately 1452 fewer citations in the case of Northern European scholars and 629 in the case of Western European scholars. Interestingly, however, Western European scholars seem to have, on average, a higher h-index score than North Americans, outperforming them by approximately 2 impact points. Because they have a similar share of young scholars, that is, 4.4% of researchers in North America and 4.7% in Western Europe, a possible explanation for this unexpected result could be that different tenure requirements or regulations imposed by funding bodies have encouraged academics from the old world to diversify knowledge dissemination (e.g., by writing conference papers, book chapters, magazine articles, and working papers) and that North American colleagues have neglected or been discouraged from doing so. This diversification allows for more timely and frequent publication and broader outreach of results, given that publishing an article in a top-tier journal typically targets a very specific, mostly scientific readership and takes considerably more time, effort, and risk.

This different publication behaviour could also explain why the probability density of the h-index of European academics, as illustrated in Figure 2, has a less pyramidal shape than that of North America. There are different possible explanations for this variation.

The fact that the North American violin has a far longer neck (indicating researchers with very high h-indices) while the European violins are more full-bodied (indicating more researchers with a more homogenous level of h-indices) may be partially attributed to different orientations in PhD education. In North America, PhD programmes are a continuation of undergraduate studies, with high tuition charges and fees paid by students. They prepare students to excel in research and in writing top-quality publications. As such, they primarily attract students whose main motivation is to kick-start an academic career. Pursuing a PhD in Europe is often based on several reasons beyond the desire to become an academic, such as improving the probability of getting a job after graduation, obtaining better career opportunities in industry, or simply out of curiosity. Furthermore, PhD studies in Europe are often

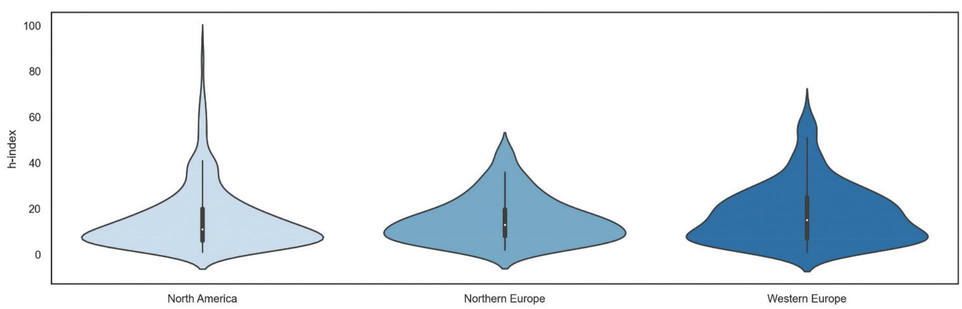

Figure 2. Violin plot of the h-index for IS scholars in North America, Northern Europe, and Western Europe.

salaried work, either full-time or part-time, in collaboration with industry partners that partially finance and set the direction of the student's research project. Leaving academia after having successfully defended the thesis, for example, to work for a company with which the student previously collaborated, is not unusual. Accordingly, publishing early, broadly, and in a diversified manner – instead of exclusively targeting the basket, which entails a lengthy review cycle – could be a reason why the median h-index score of European academics is slightly higher (i.e., 13 impact points for Northern Europeans and 15 for Western Europeans) than the median of 11 impact points of academics from North America.

The violin plots also show that the highest h-index in Europe (i.e., 45 for Northern Europe and 64 for Western Europe) is much lower than in North America, where a few top scholars obtain extraordinarily high impact scores (the highest h-index at the time of data extraction was 93 impact points). A possible reason for this disparity is that North American colleagues are more successful in establishing schools of thought or intellectual traditions, where foundational articles are frequently cited by subsequent generations of researchers. European scholars, on the other hand, are confronted with the constant loss of their doctoral students to industry. Consequently, they are frequently left with few successors citing their work. Another explanation could be the fact that top North American universities, to compete in global rankings, apply a more entrepreneurial and more global approach to filling professorship positions. Paying higher salaries and offering better work conditions (Gill & Bhattacherjee, 2009) have also resulted in many prominent IS researchers from Europe, as well as other parts of the world, considering a relocation of their workplace to a North American university. European universities, the majority of which are public, often do not have any possibility of acting in a similar way. Furthermore, teaching in the national language is often mandatory (particularly in undergraduate programs), which has traditionally reduced the search space to national boundaries or discouraged applications from "superstar" professors who are not fluent in a specific language.

To conclude our examination regarding the first claim, we therefore give a nuanced response to Lyytinen et al.'s (2007) criticism that the "*old world performs poorly*". Our data show that Northern and Western European IS scholars are no longer significantly dissimilar to North American scholars. This is especially the case when we shift the view towards academic impact and away from productivity and quality, as in prior studies (e.g., Chua et al., 2002; Lewis et al., 2007; Lowry et al., 2013). Then, it is evident that North America may indeed have a higher absolute number of "high academic impact scholars" or "superstars", but Europe has a higher overall academic impact per individual researcher.

6. Revisiting claim II: the European research context is disadvantageous for generating academic impact

Let us now revisit the second claim, that is, that the institutional research context and, in particular, the more industry-focused type of research and funding regime of European IS scholars, is disadvantageous for them in generating academic impact. To test this hypothesis, we analyse how government expenditure in higher education per student (as a percentage of GDP) and private sector ICT investment (as a percentage of GDP) influence the h-index score of researchers. As mentioned earlier, we postulate that better endowments of universities and research units may allow IS scholars to conduct studies that are more remarkable in terms of scale and complexity (and thus attract more attention). Similarly, since the IS discipline is constantly influenced by new technological artefacts that call for new empirical research (Te'eni et al., 2015), we argue that IS scholars in countries where the private sector largely invests in ICT may have more favourable conditions for developing high academic impact research (by having a "first-mover" advantage in studying certain phenomena) than scholars in countries where investments are held back. Since our previous analysis showed some outliers, we performed a robust linear regression to improve the stability of the results (Yu & Yao, 2017).

Table 3 shows that government expenditure in higher education, private sector ICT investment, and the years a researcher is active in the field significantly influence the h-index of a researcher. In addition, we see that government spending in higher education has less influence on the improvement of the academic

Table 3. Robust regression results.

	COEF	SE	Z	P>|Z|	[0.025	0.975]
Intercept ***	−3.13	0.58	−5.39	0.00	−4.27	−1.99
Government higher ed expenditure (as a percentage of GDP)[a], ***	0.05	0.01	3.52	0.01	0.02	0.07
Private sector ICT investment (as a percentage of GDP)[b], ***	3.39	0.98	3.46	0.00	1.47	5.30
Number of years active in academia ***	0.79	0.02	40.37	0.00	0.75	0.83

Note: based on a) World Bank education statistics and b) OECD key ICT indicators. Significance at *p < .05, **p < .01, ***p < .001

impact score, while doing research in an environment where the economy actively seeks to innovate or become more competitive through increased digitalisation has more influence. A possible explanation for this finding is that performing high academic impact research in IS is not necessarily resource intensive because it can be performed by small teams and without any expensive equipment or technical staff to run and maintain it (in contrast to natural or medical science projects). Design-oriented IS research (Hevner et al., 2004; Peffers et al., 2007) might be an exception here. Our results also corroborate the fact that empirical research is dominating the mainstream IS research agenda (Cheon et al., 1993) since having access to "good empirical data" and working in an innovative research context might be helpful for generating academic impact. However, this could also indirectly show that our field might be susceptible to a *novelty bias* (Wang et al., 2017), as we might give preference to observing new, short-term phenomena in practice and be less enthusiastic regarding long-term theorising.

Again, if we contrast the results of this analysis, in Figure 3, we see that North American IS scholars, although greatly affected by budget cuts (at least at many public universities), are compensating for the less favourable financial conditions with the effects of a more technophilic environment. Conversely, the private sector in Northern and Western Europe seems to invest less in ICT, yet the governments provide a more research-friendly environment in higher education institutions. In this sense, our nuanced response to Lyytinen et al.'s (2007) claim that the institutional context is disadvantageous for European IS scholars is: "it depends". There are two economic factors in play that indirectly influence the academic impact scores of researchers. While projects funded by the European Community (EU) or national funding agencies might indeed "sap time and energy from publication and decrease Europeans' motivation to publish" (Lyytinen et al., 2007, p. 324), they offer a resourceful working environment that could be used for developing more labour-intensive kinds of studies. In particular, since we have begun to embrace more data-intensive forms of knowledge creation (P. C. L. Chen & Zhang, 2014), this could be a competitive edge that will be key in the future. On the other hand, we see that North American IS scholars operate in a more innovative external environment, which gives them the advantage of acting upon new phenomena and collecting empirical data for thoughtful theoretical research before their European colleagues.

7. Conclusion and recommendations

We wrote this article to revisit whether the claims of Lyytinen et al. (2007) that European academics are subject to a disadvantageous research environment and therefore perform relatively poorly in high academic impact publishing still hold today. Unlike previous studies, which explain possible differences between the "old world" and the "new world" with the conjecture of epistemological and methodological choices and preferences (Burgess et al., 2016; Sidorova et al., 2008), we do not make any previous assumptions in this regard and ground our work merely on a scientometric analysis of the h-indices of 1713 IS researchers and a statistical analysis contrasting the influence of government expenditure and private sector investments on their academic impact.

7.1. *What could we learn from this?*

Our findings show that European IS scholars do not seem to significantly differ (anymore) from their North American counterparts – "superstar" professors aside – in terms of academic impact measures such as

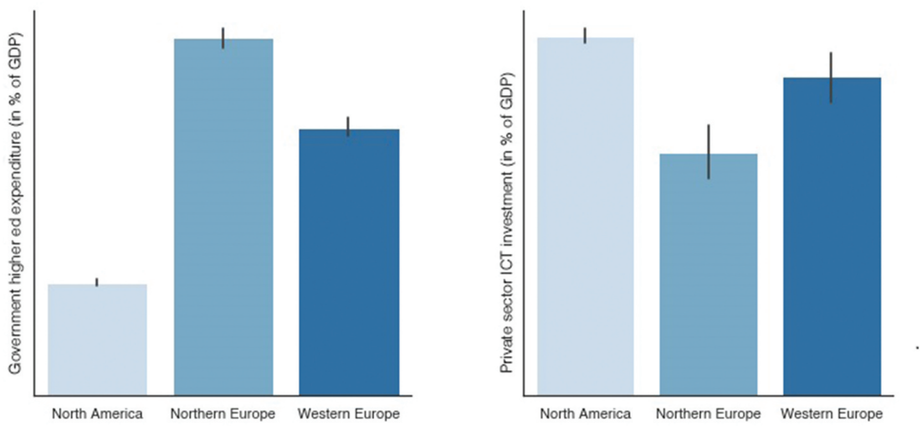

Figure 3. Differences in government expenditure in higher education and private sector ICT investments in North America, Northern Europe, and Western Europe.

the h-index. Although academic trajectories and traditions are still dissimilar, and even though the share of government expenditure in higher education and private sector ICT investment has been developing in different directions, we can observe that rapprochement has taken place. Hence, one can say that today, the idea that the distinction between the "old world" and "new world" refers to different academic publishing regimes probably makes little to no sense. As Galletta et al. (2019, p. 40) put it, "We have doubtlessly become 'more academic', and we now more resemble fields such as economics and management science".

Before we discuss what this may imply for European IS scholars and the discipline as a whole, let us clarify the limitations of this study. It is important to note that our sample was restricted to researchers in the AIS Faculty Directory who possess a public Google Scholar account. This reduced the potential sample population, but we assume that the absence of academics was the same for European and North American scholars; however, this is certainly different for the profiles of researchers who do not have Western names, do not use Western typography (e.g., those who use Cyrillic, Korean or Chinese typography), or do not have access to services offered by Google. Additionally, checking the data was time-consuming and relied on fallible human beings. It would therefore be foolish to claim absolute data reliability and completeness. Since we mainly concentrated on comparing North American with Northern and Western European IS scholars, we do not believe that this had a major effect on our findings. We would also like to highlight that we did not filter any obvious (or not so obvious) ways that academics may have boosted their citation counts and h-indices, for example, by excessive use of self-citations, multiple publication biases, closed cocitation networks, the capitalisation of connections with editorial board members, topic selection, or profile merging (Delgado López-Cózar et al., 2014; Ioannidis, 2015; E. Y. Li et al., 2013). As mentioned earlier, the h-index is particularly prone to temporal effects, such as the time since an article was published or the number of years a researcher has been active in the field. Given that the share of young scholars in our sample is similar in North America and Europe, we again assume that there is no significant difference in this regard. That said, let us now turn to a reflection on the possible consequences of this rapprochement.

7.2. What does this imply for the future of European IS research?

Much has changed since Lyytinen et al.'s (2007) controversial and thought-provoking publication on the state of European IS research. On the one hand, as we demonstrate in this paper, European scholars have shown that they are capable of adapting and *playing the publishing game* in a similar way to their North American colleagues, but with an idiosyncratic touch. On the other hand, the world around academia has fundamentally changed. While some of us spend ever more time writing brilliant scholarly contributions (some might say at the expense of real-world grounding) to obtain scientific acclaim for the next promotion or for tenure (Galletta et al., 2019), society is facing existential issues, such as the climate crisis, pandemics, poverty, the ageing of the population, unemployment, and the seemingly unstoppable rise of populist and intolerant tendencies, to mention just a few of the challenges ahead. A publication deluge is hardly a resolution of these issues (Pan et al., 2018). Hence, if we follow the path of our neighbouring disciplines and continue to focus on thought experiments and scholarly niche problems instead of actively participating in problem solving and policymaking, the IS field not only risks sliding into academic oblivion but also losing private and public funding. As always in a crisis, the unnecessary elements are stripped away first. According to Davison and Bjørn-Andersen (2019, p. 989), "[. . .] research funding agencies will no longer be satisfied with claims that our research has impact merely because we use it in the training of our students, because it is well-cited by other academics, or because it is published in reputable journals". This would be particularly detrimental for European IS scholars because, as we have shown, they rely more substantially on government expenditure and collaborative arrangements with industry partners than on tuition charges and fees paid by students. Accordingly, this drain of funding would not only affect personal equipment or research time (for those who must compensate their teaching load financially) but ultimately also reduce attractiveness and opportunities for PhD students, who represent the next generation of European IS scholars. Shrinking IS departments with very few professors and even fewer PhD students would be the norm. This, in turn, would cause us to lose our connection to practice even further, especially since we could no longer place our PhD students in companies or public agencies, which would again hamper our chances to obtain private or public funding. The question therefore arises of how to prevent this vicious circle from happening.

7.3. Recommendations for moving forward and making a difference

It would be wrong and presumptuous to claim to have a definite answer to this complex question. Whether we like it or not, in our current academic system, publications are still of major importance, particularly in deciding the fate of promotion or tenure. In this sense, the first point of attack would be to rethink on what grounds tenure and promotion decisions are made and whether we want to (or have to) participate in publication competitions and university ranking boosting exercises, which are primarily used by non-academic staff to justify administrative bloat and increase student fees (Chan et al., 2018), but which often restrict our freedom of research and prevent us from doing meaningful, value-adding research for society.[4]

In the short term, active or passive denial of the publish-or-perish mantra might only be possible for some of us (i.e., those who no longer have to worry about promotion or tenure). Therefore, department chairs and tenured faculty members have a crucial role in exemplifying modes of scholarly work that benefit individuals, businesses, governments, and the broader society – locally and globally – and that include the perspectives of different stakeholders without compromising the integrity, independence, and curiosity of research. We should continue (or start) to collaborate with the subjects, beneficiaries, and supporters of our research. We should actively seek to create free spaces and set aside time to engage in policy advocacy and problem solving. While Boyer (1996) claims that it is pointless to remind researchers of their obligation to develop solutions to pressing civic, social, economic, and moral problems, we believe that it is important to recall that we should be role models who show the next generation of European IS scholars how to do things differently to achieve not only academic but also societal impact.

As mentors, colleagues, and reviewers, we could embark on a more reflective, culturally sensitive approach in providing feedback to young scholars. Instead of seeking and acclaiming only "universal knowledge" and "theoretical contributions", we could start recognising (and embracing) diversity in research themes, types of inquiry, methods, tools, and forms of scholarship (Avison et al., 2018) and start valuing (and accepting) both theoretical and applied contributions that address pressing and current issues (Davison & Bjørn-Andersen, 2019). There are many new opportunities, such as citizen science (Levy & Germonprez, 2017; Lukyanenko et al., 2019) and other forms of engaged research, that are found rather rarely in IS research. Journal editors and conference organisers could equally promote the prevalence of such research by, for example, establishing new genres and formats, such as policy briefs and software reviews (Pan & Pee, 2020), that facilitate expanding the societal impact of IS research. This would particularly help more problem-driven and engaged scholars to obtain recognition for their work under the current citation-based promotion and tenure system.

We are confident that we can overcome the "publish or perish" trap without being stigmatised as "low performers" or as having a "weak publishing culture" (Lyytinen et al., 2007). Our study shows that European IS scholars have largely adapted to new circumstances and requirements. Therefore, why should this not be the case now, especially since we can demonstrate to a world confronted with many crises that IS research matters and that it can make a difference?

Notes

1. Please note that when we use the concept "impact", we mean "academic impact", typically in the form of citations in academic journals. Accordingly, impact in this article does not imply "societal impact" in the form of contributions to, for example, the United Nations Sustainability Goals (United Nations, 2021), or to societal goals such as economic growth, health, public policy, culture and/or quality of life as defined by the UK Research Excellence Framework (UK Research and Innovation, 2021).
2. Note that, at the time of writing this paper, none of the eight basket journals follows the gold open-access standard. However, half of them allow the dissemination of research results in accordance with the green open-access standard.
3. For more details, see Table A1 in the appendix.
4. By meaningful and value-adding research we do not simply mean expanding our presence on social media or popular discussion sites, but dealing with genuine problems for society. However, disseminating the fruits of our research in diverse forms to collectively advance basic knowledge and practice could be one piece of the puzzle (Davison & Bjørn-Andersen, 2019).

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References

Alves, M. A., & Pozzebon, M. (2013). How to resist linguistic domination and promote knowledge diversity? *Revista De Administração De Empresas*, *53*(5), 629–633. https://doi.org/10.1590/S0034-759020130610

Association for Information Systems. (2021a). *AIS Special Interest Groups*. Atlanta: Association for Information Systems. Retrieved May 17, 2021 from https://aisnet.org/page/AISSIGs

Association for Information Systems. (2021b). *Senior scholars' basket of journals*. Association for Information Systems. Retrieved May 17, 2021 from https://aisnet.org/page/SeniorScholarBasket

Avgerou, C., Siemer, J., & Bjorn-Andersen, N. (1999). The academic field of information systems in Europe. *European Journal of Information Systems*, *8*(2), 136–153. https://doi.org/10.1057/palgrave.ejis.3000319

Avison, D. E., Davison, R. M., & Malaurent, J. (2018). Information systems action research: Debunking myths and overcoming barriers. *Information & Management*, *55*(2), 177–187. https://doi.org/10.1016/j.im.2017.05.004

Becker, J., vom Brocke, J., Heddier, M., & Seidel, S. (2015). In search of information systems (grand) challenges. *Business & Information Systems Engineering*, *57*(6), 377–390. https://doi.org/10.1007/s12599-015-0394-0

Bornmann, L., & Daniel, H. D. (2009). The state of h index research: Is the h index the ideal way to measure research performance? *EMBO Reports*, *10*(1), 2–6. https://doi.org/10.1038/embor.2008.233

Boyer, E. L. (1996). The scholarship of engagement. *Journal of Public Service & Outreach*, *20*(1), 11–20. https://openjournals.libs.uga.edu/jheoe/article/view/1246

Brusilovsky, B. Y. (1978). Partial and system forecasts in scientometrics. *Technological Forecasting and Social Change*, *12*(2–3), 193–200. https://doi.org/10.1016/0040-1625(78)90055-0

Burgess, T. F., Grimshaw, P., & Shaw, N. E. (2016). Research commentary—diversity of the information systems research field: A journal governance perspective. *Information Systems Research*, *28*(1), 5–21. https://doi.org/10.1287/isre.2016.0657

Chan, J., Johns, F., & Moses, L. B. (2018). Academic metrics and positioning strategies. In B. Ajana (Ed.), *Metric Culture* (pp. 177–195). Emerald Publishing Limited.

Chen, P. C. L., & Zhang, C.-Y. (2014). Data-intensive applications, challenges, techniques and technologies: A survey on big data. *Information Sciences*, *275*, 314–347. https://doi.org/10.1016/j.ins.2014.01.015

Chen, W., & Hirschheim, R. (2004). A paradigmatic and methodological examination of information systems research from 1991 to 2001. *Information Systems Journal*, *14*(3), 197–235. https://doi.org/10.1111/j.1365-2575.2004.00173.x

Cheon, M. J., Groven, V., & Sabherwal, R. (1993). The evolution of empirical research in IS: A study in IS maturity. *Information & Management*, *24*(3), 107–119. https://doi.org/10.1016/0378-7206(93)90060-7

Chu, X., Luo, X., & Chen, Y. (2019). A systematic review on cross-cultural information systems research: Evidence from the last decade. *Information & Management*, *56*(3), 403–417. https://doi.org/10.1016/j.im.2018.08.001

Chua, C., Cao, L., Cousins, K., & Straub, D. (2002). Measuring researcher-production in Information Systems. *Journal of the Association for Information Systems*, *3*(1), 145–215. https://doi.org/10.17705/1jais.00026

Clarke, R. (2007). An exploratory study of information systems researcher impact. *Communications of the Association for Information Systems*, *22*(1), 1–32. https://doi.org/10.17705/1CAIS.02201

Coen, C. A., & Maritan, C. A. (2011). Investing in capabilities: The dynamics of resource allocation. *Organization Science*, *22*(1), 99–117. https://doi.org/10.1287/orsc.1090.0524

Davison, R. M., & Bjørn-Andersen, N. (2019). Do we care about the societal impact of our research? *Information Systems Journal*, *29*(5), 989–993. https://doi.org/10.1111/isj.12259

Davison, R. M., & Díaz Andrade, A. (2018). Promoting indigenous theory. *Information Systems Journal*, *28*(5), 759–764. https://doi.org/10.1111/isj.12203

Delgado López-Cózar, E., Robinson-García, N., & Torres-Salinas, D. (2014). The google scholar experiment: How to index false papers and manipulate bibliometric indicators. *Journal of the Association for Information Science Technology*, *65*(3), 446–454. https://doi.org/10.1002/asi.23056

Dwivedi, Y. K., & Kuljis, J. (2008). Profile of IS research published in the European journal of information systems. *European Journal of Information Systems*, *17*(6), 678–693. https://doi.org/10.1057/ejis.2008.57

Egghe, L. (2006). Theory and practise of the g-index. *Scientometrics*, *69*(1), 131–152. https://doi.org/10.1007/s11192-006-0144-7

Galletta, D. F., Bjørn-Andersen, N., Leidner, D. E., Markus, M. L., McLean, E. R., Straub, D., & Wetherbe, J. (2019). If practice makes perfect, where do we stand? *Communications of the Association for Information Systems*, *45*((1)), 39–64. https://doi.org/10.17705/1CAIS.04503

Gill, G., & Bhattacherjee, A. (2009). Whom are we informing? Issues and recommendations for MIS research from an informing sciences perspective. *MIS Quarterly*, *33*(2), 217–235. https://doi.org/10.2307/20650290

Hansen, S., Lyytinen, K., & Markus, M. L. (2006). *The legacy of "power and politics" in disciplinary discourse: A citation analysis. Proceedings of the 26th international conference on information systems*, Milwaukee, USA.

Harzing, A.-W. (2016a). *Do google scholar, scopus and the web of science speak your language?* Retrieved May 17, 2021 from https://harzing.com/publications/white-papers/do-google-scholar-scopus-and-the-web-of-science-speak-your-language

Harzing, A.-W. (2016b). *Publish or perish*. Retrieved May 17, 2021 from https://harzing.com/resources/publish-or-perish

Harzing, A.-W. (2016c). *Reflections on the h-index*. Retrieved May 17, 2021 from https://harzing.com/publications/white-papers/reflections-on-the-h-index

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly*, *28*(1), 75–105. https://doi.org/10.2307/25148625

Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences*, *102*(46), 16569–16572. https://doi.org/10.1073/pnas.0507655102

Hirsch, J. E. (2010). An index to quantify an individual's scientific research output that takes into account the effect of multiple coauthorship. *Scientometrics*, *85*(3), 741–754. https://doi.org/10.1007/s11192-010-0193-9

Holmberg, K., Hedman, J., Bowman, T. D., Didegah, F., & Laakso, M. (2020). Do articles in open access journals have more frequent altmetric activity than articles in subscription-based journals? An investigation of the research output of Finnish universities. *Scientometrics*, *122*(1), 645–659. https://doi.org/10.1007/s11192-019-03301-x

Huang, -H.-H., & Hsu, J. S.-C. (2005). An evaluation of publication productivity in information systems: 1999 to 2003. *Communications of the Association for Information Systems*, *15*(1), 555–564. https://doi.org/10.17705/1CAIS.01531

Ioannidis, J. P. A. (2015). A generalized view of self-citation: Direct, co-author, collaborative, and coercive induced self-citation. *Journal of Psychosomatic Research*, *78*(1), 7–11. https://doi.org/10.1016/j.jpsychores.2014.11.008

Jiang, L., Jiang, D., & Grover, V. (2017). The sphere of influence of information systems journals: A longitudinal study. *Communications of the Association* *for Information Systems*, *41*(1), 150–178. https://doi.org/10.17705/1CAIS.04107

Jin, B., Liang, L., Rousseau, R., & Egghe, L. (2007). The R-and AR-indices: Complementing the h-index. *Chinese Science Bulletin*, *52*(6), 855–863. https://doi.org/10.1007/s11434-007-0145-9

Kemal, A. A. (2019). Mobile banking in the government-to-person payment sector for financial inclusion in Pakistan. *Information Technology for Development*, *25*(3), 475–502. https://doi.org/10.1080/02681102.2017.1422105

Levy, M., & Germonprez, M. (2017). The potential for citizen science in information systems research. *Communications of the Association for Information Systems*, *40*(1), 22–39. https://doi.org/10.17705/1CAIS.04002

Lewis, B. R., Templeton, G. F., & Luo, X. (2007). A scientometric investigation into the validity of IS journal quality measures. *Journal of the Association for Information Systems*, *8*(12), 619–633. https://doi.org/10.17705/1jais.00145

Li, E. Y., Liao, C. H., & Yen, H. R. (2013). Co-authorship networks and research impact: A social capital perspective. *Research Policy*, *42*(9), 1515–1530. https://doi.org/10.1016/j.respol.2013.06.012

Li, L., Gao, P., & Mao, J.-Y. (2014). Research on IT in China: A call for greater contextualization. *Journal of Information Technology*, *29*(3), 208–222. https://doi.org/10.1057/jit.2014.15

Liu, F., & Myers, M. D. (2011). An analysis of the AIS basket of top journals. *Journal of Systems and Information Technology*, *13*(1), 5–24. https://doi.org/10.1108/13287261111118322

Lowry, P. B., D'Arcy, J., Hammer, B., & Moody, G. D. (2016). "Cargo Cult" science in traditional organization and information systems survey research: A case for using nontraditional methods of data collection, including mechanical turk and online panels. *The Journal of Strategic Information Systems*, *25*(3), 232–240. https://doi.org/10.1016/j.jsis.2016.06.002

Lowry, P. B., Karuga, G. G., & Richardson, V. J. (2007). Assessing leading institutions, faculty, and articles in premier information systems research journals. *Communications of the Association for Information Systems*, *20*(1), 142–203. https://doi.org/10.17705/1CAIS.02016

Lowry, P. B., Moody, G. D., Gaskin, J., Galletta, D. F., Humpherys, S. L., Barlow, J. B., & Wilson, D. W. (2013). Evaluating journal quality and the Association for information systems senior scholars' journal basket via bibliometric measures: Do expert journal assessments add value? *MIS Quarterly*, *37*(4), 993–1012. https://doi.org/10.25300/MISQ/2013/37.4.01

Lukyanenko, R., Wiggins, A., & Rosser, H. K. (2019). Citizen science: An information quality research frontier. *Information Systems Frontiers*, *22*(4), 961–983. https://doi.org/10.1007/s10796-019-09915-z

Lyytinen, K., Baskerville, R., Iivari, J., & Te'eni, D. (2007). Why the old world cannot publish? Overcoming challenges in publishing high-impact IS research. *European Journal of Information Systems*, *16*(4), 317–326. https://doi.org/10.1057/palgrave.ejis.3000695

Meneghini, R., & Packer, A. L. (2007). Is there science beyond English? *EMBO Reports*, *8*(2), 112–116. https://doi.org/10.1038/sj.embor.7400906

Merton, R. K. (1968). The Matthew effect in science. *Science*, *159*(3810), 56–63. https://doi.org/10.1126/science.159.3810.56

Mingers, J., & Harzing, A.-W. (2007). Ranking journals in business and management: A statistical analysis of the harzing data set. *European Journal of Information Systems*, *16*(4), 303–316. https://doi.org/10.1057/palgrave.ejis.3000696

O'Malley, B. (2019). *US suffers worst global ranking performance in 16 years*. University World News. Retrieved May 17, 2021 from https://www.universityworldnews.com/post.php?story=20190621130009586

Pan, R. K., Petersen, A. M., Pammolli, F., & Fortunato, S. (2018). The memory of science: Inflation, myopia, and the knowledge network. *Journal of Informetrics*, *12*(3), 656–678. https://doi.org/10.1016/j.joi.2018.06.005

Pan, S. L., & Pee, L. G. (2020). Usable, in-use, and useful research: A 3U framework for demonstrating practice impact. *Information Systems Journal*, *30*(2), 403–426. https://doi.org/10.1111/isj.12274

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, *24*(3), 45–77. https://doi.org/10.2753/MIS0742-1222240302

Rosemann, M., & Vessey, I. (2008). Toward improving the relevance of Information Systems research to practice: The role of applicability checks. *MIS Quarterly*, *32*(1), 1–22. https://doi.org/10.2307/25148826

Schekman, R. (2013). *How journals like nature, cell and science are damaging science*. The Guardian. Retrieved May 17, 2021 from https://www.theguardian.com/commentisfree/2013/dec/09/how-journals-nature-science-cell-damage-science

Sidorova, A., Evangelopoulos, N., Valacich, J. S., & Ramakrishnan, T. (2008). Uncovering the intellectual core of the information systems discipline. *MIS Quarterly*, *32*(3), 467–482. https://doi.org/10.2307/25148852

Stein, M.-K., Galliers, R. D., & Whitley, E. A. (2016). Twenty years of the European information systems academy at ECIS: Emergent trends and research topics. *European Journal of Information Systems*, *25*(1), 1–15. https://doi.org/10.1057/ejis.2014.25

Straub, D., & Anderson, C. (2009). Journal self-citation VI: Forced journal self-citation–common, appropriate, ethical? *Communications of the Association for Information Systems*, *25*(1), 57–66. https://doi.org/10.17705/1CAIS.02506

Te'eni, D., Rowe, F., Ågerfalk, P. J., & Lee, J. S. (2015). Publishing and getting published in EJIS: Marshaling contributions for a diversity of genres. *European Journal of Information Systems*, *24*(6), 559–568. https://doi.org/10.1057/ejis.2015.20

UK Research and Innovation (2021). *Research excellence framework 2021*. UK Research and Innovation (UKRI). Retrieved May 17, 2021 from https://www.ref.ac.uk

United Nations (2021). *Sustainable development goals*. United Nations. Retrieved February 17, 2020 from https://sdgs.un.org/goals

Van Raan, A. F., Van Leeuwen, T. N., & Visser, M. S. (2011). Severe language effect in university rankings: Particularly Germany and France are wronged in citation-based rankings. *Scientometrics*, *88*(2), 495–498. https://doi.org/10.1007/s11192-011-0382-1

Venkatesh, V. (2021). *AIS research ranking service*. Retrieved May 17, 2021 from https://www.aisresearchrankings.org

Vessey, I., Ramesh, V., & Glass, R. L. (2002). Research in information systems: An empirical study of diversity in the discipline and its journals. *Journal of Management Information Systems*, *19*(2), 129–174. https://doi.org/10.1080/07421222.2002.11045721

Wang, J., Veugelers, R., & Stephan, P. (2017). Bias against novelty in science: A cautionary tale for users of bibliometric indicators. *Research Policy*, *46*(8), 1416–1436. https://doi.org/10.1016/j.respol.2017.06.006

Wiener, M., Saunders, C., Chatterjee, S., Dennis, A. R., Gregor, S., Mähring, M., & Mertens, P. (2018). Information systems research: Making an impact in a publish-or-perish world. *Communications of the Association for Information Systems*, *43*(1), 466–481. https://doi.org/10.17705/1CAIS.04326

Yu, C., & Yao, W. (2017). Robust linear regression: A review and comparison. *Communications in Statistics - Simulation and Computation*, *46*(8), 6261–6282. https://doi.org/10.1080/03610918.2016.1202271

Zhai, L., Li, X., Yan, X., & Fan, W. (2014). Evolutionary analysis of collaboration networks in the field of information systems. *Scientometrics*, *101*(3), 1657–1677. https://doi.org/10.1007/s11192-014-1360-1

Zhang, C.-T. (2009). The e-index, complementing the h-index for excess citations. *PLoS One*, *4*(5), e5429. https://doi.org/10.1371/journal.pone.0005429

APPENDIX

Table A1. Descriptive statistics per country.

			per million inhabitants		citations			h-index		
Country	**N**	**in %**	IS scholars	Citations	Mean	Median	SD	Mean	Median	SD
Australia	99	5.78%	3.93	7899.9	2011.1	777.0	3201.1	15.8	13.0	11.5
Austria	7	0.41%	0.78	1249.6	1598.6	593.0	2248.7	12.9	13.0	10.0
Bangladesh	2	0.12%	0.01	2	163	163	137.2	6.5	6.5	5
Belgium	1	0.06%	0.09	39.5	456	456		13	13	
Brazil	23	1.34%	0.11	145.8	1337.8	593	1795.8	13.7	10	8.9
Bulgaria	1	0.06%	0.14	6.7	47	47		4	4	
Cameroon	1	0.06%	0.04	0.9	22	22		3	3	
Canada	65	3.79%	1.74	5611.6	3229.8	790	7430.1	16.7	11	15.5
Chile	3	0.18%	0.16	20.8	131.7	125	54.3	5.7	6	0.6
China	34	1.98%	0.02	42.7	1750.4	253	4734.6	11.8	8	13.9
Colombia	4	0.23%	0.08	8	100.5	48.5	137	3.8	3	3.1
Croatia	1	0.06%	0.24	3.9	16	16		2	2	
Denmark	31	1.81%	5.37	7793	1451	959	1474.1	15	14	8.3
Dominican Republic	1	0.06%	0.09	33	354	354		5	5	
Egypt	3	0.18%	0.03	35.2	1178.7	1513	984.1	14.3	18	11
Ethiopia	1	0.06%	0.01	0.2	17	17		2	2	
Fiji	1	0.06%	1.12	11.2	10	10		2	2	
Finland	19	1.11%	3.43	7251.6	2111.4	414.0	2762.7	16	13	11.7
France	19	1.11%	0.29	471.5	1616.3	461	2870.2	13	11	9.7
Germany	75	4.38%	0.90	2228.8	2481.9	1170	3948.6	18.3	17	13.1
Ghana	5	0.29%	0.17	66	380.6	169	469.7	8.4	7	5.3
Greece	6	0.35%	0.57	1245.7	2174.5	2453.5	1089.5	23.3	25.5	7.9
Hong Kong	27	1.58%	3.63	13,470.8	3710	1823	4810.6	20.1	15	14.7
India	23	1.34%	0.02	9.6	567.4	169	1058.2	8.2	7	6.7
Indonesia	44	2.57%	0.16	23.8	146.7	30.5	277	4.1	3	3.6
Iran	2	0.12%	0.02	4.1	171.5	171.5	194.5	5	5	1.4
Ireland	7	0.41%	1.43	3297.9	2300.3	800	4244.7	17.4	15	16.5
Israel	12	0.70%	1.41	3356	2382.6	1031.5	3865.5	16.7	14	7.7
Italy	12	0.70%	0.20	248.6	1254.2	338.5	2939.1	12.8	9	12.1
Jamaica	3	0.18%	1.02	285.6	280.7	312	247.5	5.7	6	3.5
Japan	8	0.47%	0.06	51.4	814.5	106.5	1688.5	8.8	5	10.1
Jordan	1	0.06%	0.10	183.3	1852	1852		23	23	
Kenya	3	0.18%	0.06	8.1	142.3	95	98	4	5	2.7
Kuwait	1	0.06%	0.24	27.1	114	114		7	7	
Lebanon	3	0.18%	0.44	1187.3	2713.3	11	4685.8	11.7	2	17.6
Liechtenstein	3	0.18%	78.91	253,557.4	3213.3	961	4679.4	20	13	20.4
Lithuania	1	0.06%	0.36	377.9	1043	1043		15	15	
Macao	1	0.06%	1.56	277.9	178	178		5	5	
Macedonia	1	0.06%	0.48	32.6	68	68		4	4	
Malaysia	55	3.21%	1.72	588	341.6	121	424.1	7.7	6	4.7
Mexico	1	0.06%	0.01	2.7	346	346		13	13	
Montenegro	1	0.06%	1.59	1874.2	1177	1177		13	13	
Netherlands	31	1.81%	1.81	4197.4	2315	1364	3039.7	17.7	17	13.4
New Zealand	27	1.58%	5.64	10,228.2	1811.9	643	4587.5	12.7	10	9.2
Nigeria	1	0.06%	0.00	0.6	115	115		6	6	
Norway	18	1.05%	3.35	5082.3	1518.7	620.5	2145.1	14.9	13	10.7
Oman	13	0.76%	2.61	1814.9	694.5	430	951.6	9.5	8	6.3
Pakistan	2	0.12%	0.01	3.5	378.5	378.5	501.3	7	7	5.7
Papua New Guinea	1	0.06%	0.11	127.6	1120	1120		16	16	
Peru	1	0.06%	0.03	8.5	276	276		5	5	
Poland	5	0.29%	0.13	51.5	390.2	342	360.5	8.2	9	4.5
Portugal	12	0.70%	1.17	2764.9	2356.2	1123	3310.4	16.2	15	9.9
Qatar	5	0.29%	1.77	1572.3	890.6	925	692.3	11.4	11	5.5
Republic of Korea	17	0.99%	0.33	730	2199.8	1365	2380	16.1	14	8.6
Romania	4	0.23%	0.21	23.7	114.8	82.5	123.8	5.8	5.5	3.5
Russian Federation	2	0.12%	0.01	1.8	132	132	45.3	5.5	5.5	0.7
Rwanda	1	0.06%	0.08	4.7	59	59		4	4	
Saudi Arabia	5	0.29%	0.15	153.9	1055	1373	960.6	14.6	16	11.4
Serbia	1	0.06%	0.11	14.5	127	127		6	6	
Singapore	30	1.75%	5.17	19,921.7	3854.4	1322	5556.6	19.9	14	18.1
South Africa	32	1.87%	0.55	214.5	392.5	203.5	529.8	7.8	7	5.5
Spain	7	0.41%	0.15	144.7	966.3	728	1299.7	11.9	12	8.6
Sri Lanka	4	0.23%	0.19	4.1	22	20	6.2	2.5	2	1
Sweden	18	1.05%	1.79	2496.3	1391.9	581.5	1841.5	14.8	13.5	11
Switzerland	23	1.34%	2.68	9110.3	3403	2078	4669.2	21.4	20	12.6
Taiwan	11	0.64%	0.46	1014.1	2191.6	429	4877.1	14.9	9	13.3
Thailand	2	0.12%	0.03	2.4	81.5	81.5	82.7	4	4	2.8
Turkey	13	0.76%	0.16	35.3	226.2	53	293.7	4.9	4	4.5
United Arab Emirates	9	0.53%	0.92	605.8	657.7	268	870.5	9	7	5.7
United Kingdom	62	3.62%	0.92	2597.5	2812.9	1040.5	3963.1	19.3	16.5	14
United States	745	43.49%	2.26	6897.5	3046.6	776	7540.7	15.5	11	14