

Institution: University of Wolverhampton		
Unit of Assessment: 34 Communication, Cultural and Media Studies, Library and Information Management		
Title of case study: Advice and Consultancy on Using Indicators to Help Evaluate Research Impacts		
Period when the underpinning research was undertaken: 2008 - 2019		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Professor Michael Thelwall Dr Kayvan Kousha Pardeep Sud Dr David Wilkinson	Professor of Data Science Postdoctoral Researcher Senior Lecturer Principal Lecturer	1989 - Present 2012 - Present 2005 - Present 1988 - 2014
Period when the claimed impact occurred: 2014 - 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact <p>United Nations (UN) organisations evaluated their achievements and designed more effective future strategies with our reports on the web footprint of their impacts, empowering women and helping organisations and individuals addressing food poverty worldwide. The EU developed more informed research strategies helped by our researcher mobility contributions. The UK higher education sector used indicators appropriately to support research evaluation helped by our advice in multiple advisory groups and reports. The Belgian government made more informed decisions about future research funding with our web impact analyses on the varied contributions of different research groups.</p>		
2. Underpinning research <p>The research underpinning the impacts comprises long-term methods development and evaluations and some study-specific innovations. This section focuses on recent directly underpinning research. The findings are typically that the method is effective in specified contexts. Most impacts have harnessed multiple indicators and methods, with too many underpinning studies to mention individually. Except where mentioned, the underpinning research is from Statistical Cybermetrics Research Group (SCRG) members alone.</p> <p><u>SocialMedia1: A validated method to assess social media strategy success</u></p> <p>Thelwall has developed methods to gather and analyse social media data since 2008. The methodological approach is encapsulated in his social media analysis toolkit, Mozdeh. Mozdeh is backed by numerous studies describing, justifying and analysing the word frequency/sentiment methods. In conjunction with Canadian consultancy AlterSpark, we developed a simple but novel quantitative/qualitative mixed method using Mozdeh to assess the factors associating with success within a social media strategy by harvesting all tweets and identifying themes, differentiating highly retweeted tweets from less retweeted tweets [R1].</p> <p><u>Altmetrics1: Development and evaluation of altmetrics</u></p> <p>Kousha and Thelwall have proposed and/or evaluated many altmetrics. This allows us to knowledgeably select and apply multiple indicators for individual client needs, and provide general advice on research indicator use. A study co-authored with Wellcome staff (unfunded)</p>		

demonstrated that Mendeley reader counts, when appropriately collected and processed, could give early impact evidence for funders [R2]. This enables funders like Wellcome to make earlier evaluations of programme strategy changes.

Altmetrics2: Validated web method to count grey literature citations

Non-academic organisations often publish grey literature as online PDFs. Wilkinson (retired), Sud, and Thelwall introduced and evaluated a method to count and geographically classify web mentions of these online white papers and other grey literature through commercial search engine queries [R3].

Altmetrics3: Validated method to extract commercial search engine results

Ongoing search engine research informs the choice of methods and development of our software (Webometric Analyst) to collect general web indicators and harvest other academic-related information from the web. We introduced and validated alternative search engine-based methods to obtain relatively complete and robust general web citation information [R4] when the search engine results are incomplete.

Altmetrics4: The validated linked citation method to identify academic hyperlinks

Thelwall has developed link analysis methods to construct network diagrams illustrating citation-based connectivity between websites. These use advanced search engine queries, data processing strategies and visualisation tools within Thelwall's Webometric Analyst software. The *linked citation* concept and algorithm of Sud [R5], is critical to generate network diagrams by indirectly finding hyperlink connections between a set of websites. This gives much richer network connections than academic-type citations and supports web impact evaluations when web citation counting methods are ineffective due to ambiguous names.

Scientometrics1: Proposed statistical models fit citation counts poorly in some fields

We investigated the fit of statistical models to citation data, finding that no previously proposed models fitted well in some Scopus fields due to magazine-style articles being indexed [R6]. Because of this, that citation benchmarking with Scopus is unreliable for some fields.

Networks1: Agglomerated co-inlink network diagram method

The co-inlink type of network, with our own link agglomeration algorithm exploiting different link methods [R5], as built into Thelwall's Webometric Analyst, has been shown to be effective at creating meaningful network diagrams.

3. References to the research

All the underpinning research outputs have been through rigorous peer-review in Scopus-indexed recognised journals from the host discipline. R4 has 102 Google Scholar citations and R5 has 87, indicating wide academic use.

R1. Thelwall, M. & Cugelman, B. (2017). Monitoring Twitter strategies to discover resonating topics: the case of the UNDP. *El Profesional de la Información*, 26(4), 649-661 (<https://doi.org/10.3145/epi.2017.jul.09>) [Output derived from UNDP funded study].

R2. Thelwall, M., Kousha, K., Dinsmore, A. & Dolby, K. (2016). Alternative metric indicators for funding scheme evaluations. *Aslib Journal of Information Management*, 68(1), 2-18 (<https://doi.org/10.1108/AJIM-09-2015-0146>).

R3. Wilkinson, D., Sud, P., & Thelwall, M. (2014). Substance without citation: Evaluating the online impact of grey literature. *Scientometrics*, 98(2), 797-806 (<https://doi.org/10.1007/s11192-013-1068-7>).

R4. Thelwall, M. (2008). Extracting accurate and complete results from search engines: Case study Windows Live. *Journal of the American Society for Information Science and Technology*, 59(1), 38-50 (<https://doi.org/10.1002/asi.20704>).

R5. Thelwall, M. & Sud, P. (2011). A comparison of methods for collecting web citation data for academic organisations. *Journal of the American Society for Information Science and Technology*, 62(8), 1488–1497 (<https://doi.org/10.1002/asi.21571>).

R6. Thelwall, M. (2016). Are there too many uncited articles? Zero inflated variants of the discretised lognormal and hooked power law distributions. *Journal of Informetrics*, 10(2), 622-633 (<https://doi.org/10.1016/j.joi.2016.04.014>).

4. Details of the impact

SCRG consultancy has directly impacted public policy, law and services by supporting the decision making of United Nations organisations through their self-evaluations, and by helping research management decision making for the UK, the European Union and Belgium. The reach of our impact is worldwide (UN), international (EU) or national (UK, Belgium), with substantial significance to the scope of the activities supported (environment, women, food and agriculture, research fields or general research). The resultant improvements in decision making also benefitted societal end users. Evidence of the impact is in the form of public acknowledgements of the contributions to evaluation reports and public committee memberships. Follow-up contracts/consultancy from the same provider are additional evidence that our work was valued.

I1. The work of an NGO has been influenced by the research

The United Nations Food and Agricultural Organisation (UNFAO) developed improved strategies from its 2014/5 self-evaluation with the help of our 49-page report, “Evaluation of FAO’s Contributions to Knowledge on Food, Agriculture and Natural Resources: Cybermetric Analysis” [C1]. Drawing on our methods to map web communities [Networks1] and evaluate the online impact of grey literature [Altmetrics2], this report illustrated the web communities of the UNFAO compared to related organisations, evaluated the web impact of UNFAO reports (grey literature) and other outputs based on traditional and web citations, and tabulated online evidence of UNFAO contributions to national policies and programmes. Our work gives a uniquely wide international overview enabling UNFAO to assess its impact more broadly than before.

The United Nations Development Programme (UNDP) evaluated its gender equality and women’s empowerment strategy with our help, allowing it to make improvements (2014/5). The report “Thematic Evaluation of UNDP’s Contribution to Gender Equality and Women’s Empowerment (2008-13): Cybermetric analysis” was incorporated into the overall evaluation report [C2]. UNDP used our evidence about the online impact of their grey literature (leaflets, reports, briefings) [Altmetrics2] and factors associated with success in their Twitter social media strategy [SocialMedia1].

Our unique co-inlink analysis methods and software [Networks1] were used by the UN Environment Programme to identify web communities in their evaluation report [C6] and by other consultants working for UNEP [C3], enabling UNEP to better understand its past performance when planning strategies.

I2. Policy decisions or changes to legislation, regulations or guidelines have been informed by research evidence

a) Belgium:

The Belgian government made better informed decisions about future research funding plans, with our support, for Flanders Marine Institute (2014), Antwerp Management School (2016), Flanders Make (manufacturing industry research) (2017), and Belgian Space Agency Infra (2019). With IDEA Consult (www.ideaconsult.be), we provided innovative tailored sets of grey literature impact indicators [Altmetrics2] and website impact indicators [Altmetrics4], aided by comprehensive search engine query results extraction [Altmetrics3]. The results were combined into reports about the non-academic impacts of Belgian funded research (a tailored set of indicators for each). Reports are strictly private [except C10], but our IDEA Consult income data is evidence that the four projects exist and were valued enough for repeated contracts. “Wolverhampton’s Cybermetrics allows us to assess aspects of research impact that would be impossible to measure otherwise” (Van Hoed, IDEA Consult).

b) European Union (EU):

EU DG-Research made better mobility policy decisions based on reports [C4] we contributed to. We identified appropriately targeted survey samples of online academics with advanced search engine querying [Altmetrics3] for the MORE3 EU researcher mobility survey. Our method allowed the survey to include academics without published journal articles, in contrast to international surveys using email addresses from Scopus or the Web of Science. This ensured high representation from EU countries without substantial English-language publishing.

c) England and the UK:

The UK higher education sector (via HEFCE, Research England, and Universities UK) used our advice to employ citation and other indicators appropriately within research evaluations, helping make the sector more efficient. Our advice drew on citation analysis [e.g., Scientometrics1 was used] and alternative indicator expertise [e.g., Altmetrics1 was used]. This included advice to avoid indicators when counterproductive. In particular, Thelwall provided appropriate indicator use advice to multiple UK committees. Thelwall was an altmetrics specialist in the Independent Review of the Role of Metrics in Research Assessment and Management (2014-5), gave a short presentation to David Willets, then Minister of State for Universities and Science and co-authored its final report, the Metric Tide [C7]. Thelwall and Kousha authored the associated literature review [C7]. Thelwall helped ensure that altmetrics were not mandatory for REF2021 because they are not robust enough [Altmetrics1].

Thelwall is the altmetrics/scientometrics specialist Member of the UK Forum for Responsible Research Metrics (FFRRM) (2016-). He helped to ensure that expert, informed indicator advice was given to the UK higher education sector both at key stages, including for REF decision making, and for general advice. The latter includes ongoing recommendations [C9] about responsible and ethical uses throughout academia and advice on quantitative indicators for the REF2021 environment component and the standardised impact metrics [C8]. For example, the indicator research validated the Web of Science technical claim to have more “balanced” journal coverage than Scopus [Scientometrics1], helping the decision to choose it instead of Scopus.

5. Sources to corroborate the impact

C1. Costa, N. (2016). Application of a theory-based approach for evaluating knowledge in FAO. 12th EES Biennial Conference 2016 (<https://www.slideshare.net/jamesfal/application-of-a-theory-based-approach-for-evaluating-knowledge-in-fao>) [The UNFAO report is private but this UNFAO presentation demonstrates that it was influential enough to be shared by a UNFAO executive, and the Cybermetrics slides 12 and 13 include pictures from our contribution].

C2. Independent Evaluation Office (2015). Evaluation of UNDP’s Contribution to Gender Equality and Women’s Empowerment (2008-13) (<https://erc.undp.org/evaluation/documents/download/8794>).

- C3. Kallick Russell Consulting (2018). Evaluation of the Information and Networks in Asia and Sub-Saharan Africa (INASSA) Program (<https://idl-bnc-idrc.dspacedirect.org/handle/10625/56889>) (see p78).
- C4. MORE3 (2016). Final report (<https://www.more3.eu/deliverables>).
- C5. The UK Forum for Responsible Research Metrics (<https://www.universitiesuk.ac.uk/policy-and-analysis/research-policy/open-science/Pages/forum-for-responsible-research-metrics.aspx>) [This website links to multiple Forum reports, including some in response to REF team requests].
- C6. UNEP Evaluation Office (2017). Evaluation of the UN Environment Project: “Green Growth Knowledge Platform” (<https://wedocs.unep.org/handle/20.500.11822/22348>) (p.67).
- C7. Wilsdon, J., Allen, L., Belfiore, E., Campbell, P., Curry, S., Hill, S., Jones, R., Kain, R., Kerridge, S., Thelwall, M., Tinkler, J., Viney, I., Wouters, P., Hill, J., Johnson, B. & Tinkler, J. (2015). The metric tide: The report of the independent review of the role of metrics in research assessment and management (<https://responsiblemetrics.org/the-metric-tide/>) [Summary of advice to the sector. Over 500 Google Scholar citations evidences its widespread recognition].
- C8. UKFFRRM (2018). Reports including, “UK Progress towards the use of metrics responsibly”, and “Research Excellence Framework 2021” (On the website: <https://www.universitiesuk.ac.uk/policy-and-analysis/research-policy/open-science/Pages/forum-for-responsible-research-metrics.aspx>).
- C9. Parks, S., Rodriguez-Rincon, D., Parkinson, S., & Manville, C. (2019). The changing research landscape and reflections on national research assessment in the future (https://www.rand.org/content/dam/rand/pubs/research_reports/RR3200/RR3200/RAND_RR3200.pdf) acknowledgement to Thelwall for contribution (p.31).
- C10. Idea Consult (2015). Economic impact of Vliz (http://www.vliz.be/sites/vliz.be/files/public/150611_impactstudie.pdf) (the citation and web components are from Wolverhampton).