



Guest Editorial: The Reward System of Science

Journal:	<i>Aslib Journal of Information Management</i>
Manuscript ID	AJIM-07-2017-0168
Manuscript Type:	Editorial

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Manuscripts

Guest Editorial: The Reward System of Science

At the end of the 1950s, Robert K. Merton formalized the idea of a reward system of science (Merton, 1957; 1973). Within the Mertonian framework, the scientific ethos is mainly comprised of four institutional norms: universalism, communism, disinterestedness, and organized scepticism. Its basic precepts are derived from the scientific institution's main objective, the "extension of certified knowledge" (1973, p. 270). According to Merton, "the institution of science has developed an elaborate system for allocating rewards to those who variously live up to its norms" (1957, p. 642) as they strive to participate in this institutional objective. The notion of recognition can be broadly defined as "the giving of symbolic and material rewards" (Merton, 1973, p. 429) by scientific peers; it is attributed to researchers who contribute to the advancement of scientific knowledge through their original work. Recognition therefore lies at the foundation of this reward system and constitutes, in the Mertonian view, both a driving force behind researchers' actions and the pillar upon which scientific careers are—or at least can be—built.

Many decades down the line, the transformations of scholarly communication have led to important modifications in the landscape of scientific recognition, which has traditionally been based on authorship and citations but now can also extend to the growing use of social media within the academic context. Furthermore, as well as the emergence of a multitude of new phenomena in the social practices of scientific reward and evaluation, a number of theoretical developments in science studies – quantitative and qualitative – have emerged since the publication of Merton's (1973) famous work. One such transformation has been a 'practice turn' in the study of science: whereas Merton focussed on institutionalized patterns of reward, from peer review to prizes, contemporary science studies have sought to delve into knowledge production by observing sites of modern science and research. This has important implications for the study of the reward system of science as it stands today, and can bring to light how patterns of rewards and incentives shape the very knowledge which can, and is, being produced.

Quantitative science studies and the bibliometrics field have yielded an enormous range of metrics that, today, are often separated from their more qualitative, practice-oriented counterparts. This has important consequences, given the fact that such developments may transform not only the ability to gain insight and understanding of reward dynamics, but might potentially also be transforming the very systems themselves. Questions surrounding measures based on easily available large-scale data, sometimes disconnected from the actual reality of research activity, are certainly emerging in the literature. Therefore, and although a clear interest for the host of new data sources and modes of communication has emerged in recent times, the extent of their influence, and their validity and reliability as evaluative and analytic tools, must be probed.

Although we cannot hope to index or summarize all the changes affecting the reward system of science, we believe the papers united here speak in many different ways to a number of these developments and transformations.

The team

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3 The guest editorial team for this special issue unites two important poles in the study of
4 scholarly communication and research evaluation, the Centre for Science and Technology
5 Studies (CWTS), Leiden University (The Netherlands), and the Canada Research Chair on the
6 Transformations of Scholarly Communication, University of Montreal (Canada). We are
7 researchers at various points of our careers; we further stem from various disciplinary
8 backgrounds, including anthropology, library and information science, literature, science and
9 technology studies, sociology, and theatre, and each bring our own perspective to the special
10 issue. In our previous work, we have used a variety of toolboxes to study and discuss different
11 aspects of scientific recognition. We have built upon the conceptual frameworks of Pierre
12 Bourdieu, Blaise Cronin, Lucien Karpik, Karin Knorr Cetina, Bruno Latour, and Robert K. Merton.
13 We have combined these frameworks with methodological approaches ranging from
14 ethnographic observation to qualitative content analysis and bibliometrics measures,
15 individually and at times in combination. We have touched upon an array of topics relating to
16 the reward system of science: authorship, acknowledgments, the various types of symbolic
17 capital bestowed within the scientific reward system, current practices of knowledge
18 production, responsible research evaluation, and metrics uses (e.g. Desrochers et al.,
19 forthcoming; Desrochers et al., 2016; Fochler and de Rijcke, 2017; Larivière et al., 2016; Paul-
20 Hus et al., 2017; Rushforth and de Rijcke, 2015, 2016; Hammarfelt et al., 2016; de Rijcke et al.,
21 2016).

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28 With this special issue, we wished to bring together some of the concerns that seem to be of
29 particular interest to academics today in navigating the turbulent seas of the reward system of
30 science in their own discipline and at each stage of their own career. We received 22
31 manuscripts and ten papers were accepted for publication following a peer review process
32 performed by 32 external reviewers, for a final acceptance rate of 45 percent.

33 34 35 **Themes and trends**

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37 A brief analysis of the keywords provided by the authors to describe their contribution offers an
38 informative portrait of the content of the special issue. The reward system of science —
39 mentioned in four papers, along with the related keywords “currencies of science” (1),
40 “monetary reward” (1), and reward triangle (1) — appears as a dominant theme, as expected.
41 Research evaluation also emerges as a prominent topic of investigation with the keywords
42 “research evaluation” (4), “impact”(1), “peer review” (1), “performance indicators” (1), “REF”
43 (1), and “research quality” (1). Writing and publishing are also important themes in this special
44 issue, as reflected by keywords such as “academic writing” (1), “cash-per-publication” (1),
45 “predatory publishing” (1), “publication cultures” (1), “publishing motivation” (1), and
46 “publishing oligopoly” (1).

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49 More broadly, the academic context, central to this issue, appears through such keywords as
50 “academia” (1), “academic careers” (1), “career stage” (1), “higher education” (1), “geopolitics
51 of the academy” (1), and “research profession” (1). Conversely, specificity is found in different
52 forms of scientific recognition explored in a certain number of papers, as demonstrated by the
53 following keywords: “authorship” (1), “contributorship” (1), “acknowledgements” (2), and
54 “subauthorship” (1). In terms of methods, “bibliometrics” (2), “scientometrics” (1), “citation
55 analysis” (1), and their tools are mentioned in some papers, along with the sources of data used,
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3 such as “Web of Science” (3), “Elsevier” (1) and “DataCite” (1). Finally, “data sharing” (1) and
4 “Mendeley readership” (1) are also present, as they are analysed with regards to their potential
5 integration within the reward system of science.
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8 While the keywords certainly reflect the thematic coherence of the issue, it is in the conceptual
9 and theoretical frameworks used in the contributions that the mosaic begins to reveal its
10 richness and diversity. Given the focus of the issue, it is not surprising to see Merton (1973,
11 1988) cited in six of the ten papers. Whitley’s work on the social and intellectual organization of
12 academia (e.g. Whitley, 2000; Whitley et al., 2010) is cited in four papers, while Cronin (e.g.
13 Cronin, 1995; 2001; Cronin and Weaver-Wozniak, 1993; Cronin et al., 2003; 2004) is cited in
14 three papers. Bourdieu (1975; 1986; 1988) and Knorr Cetina (1999) are cited in two papers each.
15 Other conceptual and theoretical frameworks include the work of Hagstrom (1965), Latour and
16 Woolgar (1986), Karpik (2010) and Ziman (1987; 2000), each cited in one paper.
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20 Looking now at the methodologies of the studies included in this special issue, we see again an
21 array of approaches, with an almost perfect balance between quantitative and qualitative
22 designs. While four papers adopted a quantitative approach, including bibliometric analyses
23 (Costas et al., 2017; Mongeon et al., 2017; Quan et al., 2017; Sundling, 2017), qualitative
24 content analysis, of assessment reports or interviews with academics, were used in three papers
25 (Hammarfelt, 2017; Hangel and Schmidt-Pfister, 2017; Mcculloch, 2017). Two papers proposed
26 conceptual frameworks based on literature reviews and theoretical analyses (Díaz-Faes and
27 Bordons, 2017; Hallonsten and Vico Perez, 2017), and one paper was built around a case study
28 (Vostal and Stockelova, 2017).
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31 In summary, the topics, conceptual frameworks and methodological approaches covered in the
32 special issue provide a snapshot of how a sample of researchers stemming from various
33 traditions view the current state of the reward system of science. The perspectives of these
34 researchers emerge, indirectly, through the toolboxes they use, the outputs they analyse, and
35 the people they portray. However, it is also important to see the collective picture drawn by the
36 concerns, warnings, and recommendations conveyed through the theoretical outlooks they
37 propose, the paths to new indicators they devise, the conclusions they draw, the opinions and
38 hopes they offer. Indeed, the contributions included in this issue are also the voices of
39 academics who currently work and evolve within this system, and look to amass its rewards
40 while making sense of its historical background, its demands and contradictions, its
41 contemporary reality. Therefore, rather than simply outline the special issue by reproducing the
42 contents of the papers which constitute it, we looked at their conclusion sections in order to
43 extract the driving forces and position statements that reflect the authors’ concerns.
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48 Here are some of the things they had to say.
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50 *Money doesn’t just talk, it writes*
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52 According to the oft-quoted Goodhart’s Law, whether in its original phrasing or its more
53 common adage form, once a measure becomes itself the goal, it ceases to perform well as a
54 measure (Newton, 2011). Indicators like journal impact factors and rankings are increasingly
55 mobilized as “technologies of government” (Miller and Rose, 1990, p.7) to steer and modify
56 “from a distance” the behaviours and decisions of researchers. Indeed, how bibliometric
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3 indicators and other tools are being exercised in the current context of academic audit and
4 economic pressure seems precisely about establishing goals and benchmarks against which
5 researchers are expected to adjust their behaviours. This is made clear in several contributions
6 to the special issue.
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9 Quan et al. (2017) tell us of the “cash-per-publication” model in place in Chinese institutions
10 since the late 1990s. This business-inspired model can astonish many of us since “the amount of
11 cash reward for publications is much higher than university professors’ annual salaries” (p.xx).
12 This puts a clear focus on increasing productivity, which becomes the crux of recognition and
13 therefore of the reward system as a whole in the institutions concerned. This has seemingly
14 contributed to “a historic high” in articles’ corrections after their publication (Quan et al., 2017,
15 p. xx). Furthermore, even though some quality-based criteria have been put in place, warnings
16 are presented by the authors due to an “abusive use of bibliometric indicators”, along with an
17 almost-exclusive reliance by many policies on the Journal Impact Factor and the Web of Science,
18 thereby excluding “millions of papers published in Chinese journals” (Quan et al., 2017, p. xx).
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21 While such policies may seem extreme, one can ponder whether their foundational motives are
22 so different from those of the Research Excellence Framework (REF) currently in place in
23 England. Here, according to McCulloch (2017), expectations push researchers “to align their
24 writing practices with a neoliberal culture that fundamentally misunderstands the nature of the
25 scholarly writing process as an easily reproducible technical skill rather than a difficult, creative
26 and rather unpredictable endeavour” (p. xx). This is detrimental, in the author’s view, to the
27 “forms of knowledge creation” that are not rewarded in the REF scheme and points to the
28 effects this can have on all aspects of research, from topics to methods, as well as how this can
29 affect, namely, “risky or innovative research” (McCulloch, 2017, p. xx). It is also seen as a
30 hindrance to (particularly younger) researchers trying to build their resumes in institutions that
31 do not value research as much as teaching — thereby limiting the time and resources available
32 for the former. These tensions create a fundamental contradiction that can go so far as to create
33 a climate of fear when academics’ choices become “not really choices at all, since writing
34 towards REF-driven targets is something academics have to do not only in order to progress in
35 their career, but also to keep their current job and avoid sanction” (McCulloch, 2017, p. xx).
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39 In the face of for-profit oligopolies, the “entrenched geopolitical asymmetry” between Western
40 and reputed “local” standards, as well as the rise of predatory publishing (along with the type of
41 practices it fosters), Vostal and Stockelova (2017, p. xx) use the Czech context to call for “more
42 non-profit publications and qualifying initiatives cultivated by academic communities and
43 institutions [...] out of the Anglophone West” and for “community-based initiatives [to] be
44 specifically supported within the EU framework schemes in order to strengthen the open
45 access” (p. xx). They wish for more “geopolitically inclusive” Western platforms and for
46 “dedicated attention [to] be paid to geopolitical issues and entrenched asymmetries in play”
47 (Vostal and Stockelova, 2017, p. xx). They end with a plea to all academics involved to “nourish
48 transversal, truly open-access connections and relations”, away from the “ghettos” or artificial
49 solutions that can threaten inclusion endeavours (Vostal and Stockelova, 2017, p. xx).
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53 Hangel and Schmidt-Pfister (2017) look at different types of motivations to publish throughout
54 academic career stages; not surprisingly, they use words like “uncertainty” (doctoral students
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3 and post-doctoral researchers) and “survival” (professors). The authors are eloquent in stating
4 what many academics feel: “the tension between wanting and having to publish reveals a shift
5 from publishing as a consequence of getting interesting research results, to doing research in
6 order to publish” (Hangel and Schmidt-Pfister, 2017, p. xx). While “extensive strategically
7 oriented pressures do not (yet) completely override researchers’ epistemic motivations to
8 publish” (Hangel and Schmidt-Pfister, 2017, p. xx), the authors warn against the particular
9 effects of the pressures to publish on more vulnerable groups “in unsecure positions”, such as
10 “postdocs and new professors” (Hangel and Schmidt-Pfister, 2017, p. xx). So while this may not
11 be related to money per se, support is most needed where the question of a secure job in
12 academia —and one of basic financial survival as well — is concerned.
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17 *Don't use what you don't understand*

18 The deluge of new data sources that accompanies and supports the transformations of
19 academic writing, reading, and results sharing in the current digital context has opened the door
20 to new sets of indicators. However, the heterogeneity, validity, and reliability of these metrics
21 continue to generate discussions regarding their meaning and value in the reward system of
22 science, as demonstrated by the following contributions to the special issue.
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25 Mongeon et al. (2017) show that while data sharing could become part of the reward system of
26 science, current practices on platforms such as DataCite demonstrate that “self-reported tools”
27 “are still more of a promise than a reality” (p. xx). Furthermore, at this time, there is no concrete
28 measure of “the impact of this output”, which also remains one of broad “diversity and
29 heterogeneity” (Mongeon et al., 2017, p. xx). Further steps should therefore be made with a
30 view to “recognize responsible practices and open science, ensuring greater transparency and
31 data reuse” (Mongeon et al., 2017, p. xx).
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34 The same can be said of Mendeley-based indicators, for which “in-depth research about the
35 differences and similarities between the distribution of [readership and citations] across fields,
36 and empirical support for the suitability of field normalization of Mendeley readership are still
37 lacking” (Costas et al., 2017, p. xx). As noted by the authors, there are situations where a
38 “currency conversion” between different metrics could become “a bone of contention in the
39 determination of scientific recognition” (Costas et al., 2017, p. xx). Further research, here, is
40 once more needed to “disentangle the potential values” (Costas et al., 2017, p. xx) of
41 readerships and citations in terms of what these indicators claim to measure.
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45 Vagueness has surrounded another potential indicator, acknowledgements, for many decades.
46 It has often been said that acknowledgements can highlight “the contribution of acknowledged
47 individuals, which may deserve recognition” (Díaz-Faes and Bordons, 2017, p. xx). As Díaz-Faes
48 and Bordons (2017) remind us, acknowledgements reveal what otherwise cannot be seen in the
49 scholarly communication process, such as “author interactions” in the humanities, where
50 “single-authored papers are the norm” (p. xx); yet the authors warn us once more that “we
51 need to improve our understanding of acknowledgement practices, which will support decision-
52 making about the interest, convenience and manner of using these indicators in research
53 performance assessments” (Díaz-Faes and Bordons, 2017, p. xx). They also adopt a stance
54 whereby “[s]etting measures to foster the standardization of acknowledgement data so far as
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3 authors, journals and databases are concerned would contribute to enhance the scope and
4 reliability of the studies” (Díaz-Faes and Bordons, 2017, p. xx).

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6 Sundling (2017), in looking at the age-old tension between authorship and acknowledgements in
7 terms of recording contributions, notes that there is “a disconnect in author attribution
8 between traditional author guidelines and scientific practice” for contributions such as
9 “providing important compounds and samples, or expertise and advice”, as well as an
10 “arbitrariness” in the bestowment of authorship status in other cases (p. xx) — something to
11 which much of the literature surrounding this topic can testify, despite the established
12 supremacy of the authorship status in the reward system of science. The author therefore calls
13 for “the need to extend the normal use of coauthorship as a proxy for collaboration, to also
14 include individuals and organizations mentioned in the acknowledgements section” (Sundling,
15 2017, p. xx) in order to reflect current lab practices. Once again, while the potential indicator is
16 there, the questions on how to use it and what to measure with it remain unanswered.

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21 *If context counts, shouldn't it matter?*

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23 The importance of context has been brought to the forefront of science and technology studies
24 recently, and context seems, indeed, to be very much on the minds of certain authors
25 contributing to this special issue.

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27 If potential indicators and their use can create uncertainty, the weight of this uncertainty is
28 perhaps never more felt than when a whole career is at stake, as is the case in the evaluation of
29 applicants to academic positions. As Hammarfelt's (2017) work shows, while criteria can span
30 multiple fields, the subtlety may lie in “the emphasis placed on these criteria”, making it clear
31 that “disciplinary differences do have great influence on evaluation procedures” (p. xx). The
32 relationship to “temporality and trajectorial thinking” (Hammarfelt, 2017, p. xx) is also brought
33 forth as potentially discipline specific. Perhaps more importantly still, Hammarfelt (2017)
34 reminds us that the criteria themselves should be subject to evaluation since, and contrarily to
35 what sometimes appears like popular academic belief, “the actual tools and devices used to
36 make these criteria tangible and comparable are distinct and not easily generalised” (p. xx).

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40 And what of indicators meant to measure the relationship between research and society? As
41 Hallonsten and Vico-Perez (2017) suggest, “it is of course naïve to think that empirical studies no
42 matter how well-equipped with theoretical tools, can make full justice to the organizational
43 complexity of contemporary academic work on micro-level, or the societal impact of academia
44 in every thinkable aspect” (p. xx). The authors posit that, “impact is something far more complex
45 than quantitatively oriented performance assessment can measure” (Hallonsten and Vico-Perez,
46 2017, p. xx) and call not only for the long-heralded “mixes of qualitative and quantitative
47 methods”, but also for “further conceptual refinement” in the imbrication of theoretical
48 frameworks and toolboxes (including their own) and empirical studies (Hallonsten and Vico-
49 Perez, 2017, p. xx). They end their paper with a warning that context and adaptation are key in
50 applying their framework — a warning that is oft-repeated in the literature but not, seemingly,
51 always heeded, since it bears repeating.

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57 **Looking back, thinking ahead**
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3 If these voices have one collective concern, it seems it could be summed up in one word:
4 respect. Respect for varying contexts, needs, topics, methods; respect for the academic process
5 of research, its transparency, its accountability; but also respect for the people entrusted with
6 the pursuit of knowledge and their choices, away from the pressures of non-realistic and unduly
7 rigid measures of recognition. The current reward system of science seems to have little
8 forgiveness for subject niches, new pursuits, innovative methods, autonomy of judgement, dead
9 ends, or mistakes—even the most natural, evolutionary mistakes, like the ones linked to the state
10 of knowledge, its contexts, and the experimentations that come with research; it is as though
11 we have forgotten that the Earth was once flat. These voices raise a collective warning that
12 undue pressure on academics can ultimately cause the very concept of research to lose its
13 meaning as investigation, exploration, and the quest for understanding; it becomes less about
14 results than about delivering them in a certain way, in certain venues, and according to certain
15 pre-set standards.
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20 Most academic articles pave the way for and even at times demand “further research”. Will the
21 further research announced in this issue be pursued? Especially given the fact that it concerns
22 us all directly?
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24 This special issue is a reality check, but also a call to arms and integrity. We hope that putting
25 together this rich mosaic of papers, which was made possible by a dedicated group of authors
26 and reviewers, leads to new discussions of the barriers and reinforcements of values that foster
27 responsible reward systems in science. While the Mertonian view of the reward system of
28 science and its norms can be seen as somewhat too idealistic in the current context, there is
29 something to be said for ideals in times of imbalance or turbulence. A new reading of some of
30 these texts, not as abstract norms, but as reminders of the community and knowledge we build
31 in our endeavours, may push us to become more collectively reflexive about the tools we use. If
32 this is indeed an era of financial pressures, misunderstood metrics, and loss of contextualization,
33 such ideas may inspire new ways to promote awareness, in order to then generate more
34 responsiveness in concrete and situated practices. In short, as is so often the case in science, we
35 are always invited to look back if it can help us think ahead.
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40 Happy reading.
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57 **Acknowledgement**
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The guest editors would like to thank all authors for submitting their work and contributing to this special issue, as well as the 32 reviewers for their time and valuable expertise.

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