Scientometric frameworks for the management of open science

– Beyond the rhetoric –

Soós Sándor
Debates about outdoor cat policy are rarely productive and are often confrontational. This is in part because there are no broadly-accepted or objective criteria for estimating cat population size or evaluating the impacts of population...
1. Open Science (Access) and scientometrics
The role of scientometrics in managing OS

• **Role as perceived** by research managers and sales managers
• Situation: contemporary collection management (subscriptions, APCs etc.)
• Framework: evaluative
• Argument:
  – highly ranked journal collection (along some measures) →
  – high quality content →
  – Necessary scientific information → must subscribe
  – OS-management questions: paywall vs. OA and APCs
  – Problem: are these the real factors behind the supply of and demand for scientific information?
The role of scientometrics in managing OS

- **Role as provided by the unexploited potential** of different scientometric frameworks
- **Scientometrics**: quantitative science studies (bibliometrics: quantitative study of scholarly communication)
- **Areas of OS management aided by scientometric evidence**:
  - Scientific information services, optimal portfolio balancing paywall subscriptions, OA venues and APC-related deals:
  - Incentives for OA publishing:
  - Interventions for OA publishing: Plan S
  - Evaluation of OA mandates and policies
Area: scientific information services

- Scientific information services, optimal portfolio balancing paywall subscriptions, OA venues and APC-related deals: actual use of scientific information ➔ bibliometric reference analysis

Area: incentives for OA publishing

- Factors of OA publishing (versus paywall publishing): **bibliometric modelling of OA publishing**

Table 5: Logistic regression of access type by authors’ institutional affiliation (odds ratios).

<table>
<thead>
<tr>
<th></th>
<th>Closed</th>
<th>Gold (APC)</th>
<th>Gold (Free)</th>
<th>Green</th>
<th>Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First author</td>
<td>Last author</td>
<td>First author</td>
<td>Last author</td>
<td>First author</td>
</tr>
<tr>
<td>Company</td>
<td>.641 (.254)</td>
<td>.800 (.295)</td>
<td>1.284 (.591)</td>
<td>1.112 (.509)</td>
<td>1.885 (1.178)</td>
</tr>
<tr>
<td>Government</td>
<td>.635 (.167)</td>
<td>.815 (.201)</td>
<td>.856 (.301)</td>
<td>.838 (.283)</td>
<td>3.437*** (1.206)</td>
</tr>
<tr>
<td>Hospital</td>
<td>1.062 (.199)</td>
<td>1.254 (.229)</td>
<td>.708 (.205)</td>
<td>.825 (.218)</td>
<td>.711 (.343)</td>
</tr>
<tr>
<td>Non-profit</td>
<td>.847 (.160)</td>
<td>.784 (.144)</td>
<td>1.511 (.342)</td>
<td>.849 (.211)</td>
<td>2.676*** (.795)</td>
</tr>
<tr>
<td>Research Institute</td>
<td>1.203 (.301)</td>
<td>1.023 (.257)</td>
<td>1.198 (.397)</td>
<td>1.059 (.349)</td>
<td>1.146 (.617)</td>
</tr>
<tr>
<td>Scientific Association</td>
<td>.892 (.492)</td>
<td>1.091 (.467)</td>
<td>.428 (.445)</td>
<td>.505 (.377)</td>
<td>[Null]</td>
</tr>
<tr>
<td>University</td>
<td>[Omitted]</td>
<td>[Omitted]</td>
<td>[Omitted]</td>
<td>[Omitted]</td>
<td>[Omitted]</td>
</tr>
<tr>
<td>Constant</td>
<td>.561*** (.040)</td>
<td>.550** (.040)</td>
<td>.167*** (.016)</td>
<td>.180*** (.017)</td>
<td>.051*** (.008)</td>
</tr>
</tbody>
</table>

Factors of OA publishing (versus paywall publishing): behavioral models

Area: incentives for OA publishing

• Some important factors identified in bibliometric and behavioral models:

  – Need to publish in esteemed/highly ranked/quality journals (scepticism for OA journals, Hybrid choices)
  – Availability of financial resources
  – Sensitivity to the risk non-conservative publication venues
  – Adoption of innovative methods
2.
Plan S: a scientometric approach
• **Plan S:** top-down approach to implementing OA mandates
• Direct intervention to publishing behavior
• Key notion: compliance
• Assumes free choice and substitution of outlets
• However...
• Publication behavior constrained by field culture and social factors of the community (peer review, outlet quality, collaboration etc.)
• Conservative
• **Scientometric evidence:** elasticity of publication behavior within scientific communities
• **Plan S:** top-down approach to implementing OA mandates
• Direct intervention to publishing behavior
• Key notion: compliance
• Assumes free choice and substitution of outlets
• However...
• Publication behavior constrained by field culture and social factors of the community (familiarity with venue-related practices, expert perceptions of journal quality, collaboration etc.)
• Therefore is expected to be conservative
• Scientometric evidence: elasticity of publication behavior within scientific communities
A scientometric study of publication behavior

- **Goal**: Characterizing the long-term flexibility of publication profiles (in terms of outlets) for communities
- **Key factor**: field culture
- **Data**:  
  - Hungarian WoS-indexed output within Subject Categories 2010-2017
- **Method**:  
  - Comparing the distribution of publication venues along the entire time period  
  - Mapping the similarity of the journal profiles for different periods (publication years)  
  - Measure: Cosine similarity between annual journal profiles
Agronomy

AAFM: AGRICULTURAL AND FOREST METEOROLOGY
CERC: CEREAL RESEARCH COMMUNICATIONS
CISSAPA: COMMUNICATIONS IN SOIL SCIENCE AND PLANT ANALYSIS
CROP: CROP PROTECTION
EUPH: EUPHYTICA
EJOPP: EUROPEAN JOURNAL OF PLANT PATHOLOGY
ICAP: INDUSTRIAL CROPS AND PRODUCTS
INTA: INTERNATIONAL AGROPHYSICS
PEMS: PEST MANAGEMENT SCIENCE
PSAE: PLANT SOIL AND ENVIRONMENT
TAAG: THEORETICAL AND APPLIED GENETICS
Biochemistry, molecular biology
Biochemistry, molecular biology
Computer science, information systems

COMC: COMPUTER COMMUNICATIONS
COMN: COMPUTER NETWORKS
ITOIT: IEEE TRANSACTIONS ON INFORMATION THEORY
INPL: INFORMATION PROCESSING LETTERS
INFS: INFORMATION SCIENCES
JOCIAM: JOURNAL OF CHEMICAL INFORMATION AND MODELING
JOGC: JOURNAL OF GRID COMPUTING
Computer science, information systems
ACTA: ACTA ALIMENTARIA
AJOCN: AMERICAN JOURNAL OF CLINICAL NUTRITION
AONAM: ANNALS OF NUTRITION AND METABOLISM
BJON: BRITISH JOURNAL OF NUTRITION
EJOCN: EUROPEAN JOURNAL OF CLINICAL NUTRITION
EJON: EUROPEAN JOURNAL OF NUTRITION
FOOC: FOOD CHEMISTRY
IJOBNAPA: INTERNATIONAL JOURNAL OF BEHAVIORAL NUTRITION AND PHYSICAL ACTIVITY
IJOO: INTERNATIONAL JOURNAL OF OBESITY
JOPGAN: JOURNAL OF PEDIATRIC GASTROENTEROLOGY AND NUTRITION
LIHAD: LIPIDS IN HEALTH AND DISEASE
NMACD: NUTRITION METABOLISM AND CARDIOVASCULAR DISEASES
ORVH: ORVOSI HETILAP
POTNS: PROCEEDINGS OF THE NUTRITION SOCIETY
PUHN: PUBLIC HEALTH NUTRITION
Nutrition and dietetics
Conclusions

- Subject areas (national research communities) do exhibit a conservative publishing behaviour at varying levels.
- The models also provide evidence of some elasticity through “satellite” groups of journals.
- Conservative publishing behavior is expected to be more articulated at the group or author level.

In general:
- Scientometric (bibliometric) modelling of publishing behavior is needed to inform the feasibility of Plan S.
Debates about outdoor cat policy are rarely productive and are often confrontational. This is in part because there are no broadly-accepted or objective criteria for estimating cat population size or evaluating the impacts of population.