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|  | <p>E-publishing of scientific research at academic institutions in Japan</p> <p>Mikiko Tanifuji National Institute of Materials Science (NIMS), 1-2-1 Sengen, Tsukuba 305-0047, Japan E-mail: tanifuji.mikiko@nims.go.jp</p> |
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Abstract

The economic models of these journal publishing are categorized in three models; supported by

- 1) societies and their members (members fee),*
- 2) institutions such as universities or research institutes (institution budget), and*
- 3) a combination of government and institutions (institution budgets and government funding).*

The main return is from the institutional subscriptions. The cost performance of the system development for e-journals publishing is not yet proved. However, society members or people related to journal publishing for scientific communities are quite aware of that it is more important to have own publishing system/method (not only computer system but also a development of human resources) to allow them to control themselves rather than outsourcing whole publishing roles outside Japan. It is true that most of organizations have been struggling to balance the cost, especially, the development expenses of e-journals system and the income from e-journals sales. It is still hard to battle to a myth of impact factor to authors and readers.

However, there are more new journals are appearing towards 2007. This is the positive aspect of the hardship of e-publishing that

Japanese government has introduced “The Third Science and Technology Basic Plan” with a budget, 25 trillion yen for coming 5 years. The plan is formulated by the Council for Science and Technology, Law, and indicates the basic framework of Japan’s science and technology policies. The White Paper on Science and Technology 2005 reports research performance in science and technology by measuring number of scientific papers and their citations, patents, technology trade balance etc. The paper summarizes that the share of Japan’s scientific papers of all written worldwide demonstrates that Japan’s research is flourishing particularly in materials science, physics, chemistry and pharmacology.

1. Introduction

In Japan, there are more than 500 journals (Fig. 1) published by academic societies, not-for-profit organizations and government laboratories. About 23% of these journals are international peer-review journals, which are published exclusively in English, and nearly half of them have partnerships with professional publishers (Fig. 2). The rest of them receive support from agencies of the Japanese government or from private publishers. Most of these journals find it difficult to compete in the international marketplace and do not receive appropriate recognition for the quality of their published articles. This lack of recognition also means that these journals do not receive an appropriate number of citations, which in turn results in low impact factors and low subscription rates among customers outside Japan (Table 1). Ironically, these journals are not expensive, when considering the number of published pages they contain, and their low average annual increase in subscription costs when compared to the annual increase of the major commercial publishers.

Fig. 1 Journals published in English by fields

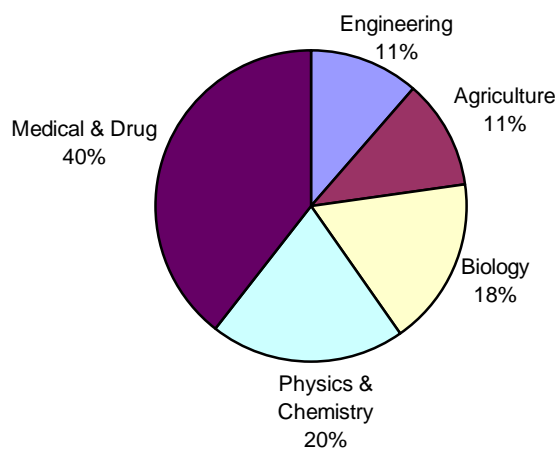
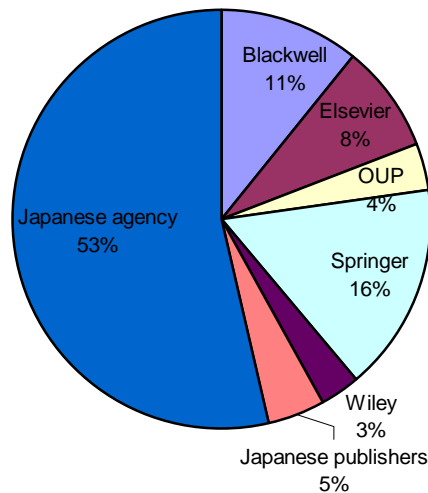


Fig.2 Partner publishers



2. E-journals

Most of the current e-journals were originally published in print form and then changed to publishing both print and on-line forms, and now some of them switched to online-only form. The economic models for paying for these publishing depended on the structure of the individual organization.

(1) Publishing and economic models

Academic societies

Their publishing costs are covered by (i) author publication charges, (ii) institutional subscriptions, (iii) individual membership fees and (iv) government funding. Their rates depend on the size of each society, the number of its members and the size of its journal(s). Although many major journals are available online nowadays, the cost of developing online editorial- and publication-systems including such as citation linking functions, and the cost of digitizing and indexing of back issues, are initial investments, not covered by income from subscription. The subscription pricings are generally based on the costs of editorial, production and labor for current issues.

Not-for-profit organizations and government agencies

There have been three specific projects in Japan.

- (i) One of them was an establishment of a non-profit organization, the Institute of Pure and Applied Physics (IPAP). IPAP is an umbrella organization for both

physics and engineering societies, and it has successfully taken a leadership role in the e-publishing field. It provided the first full-text online publishing platform in late 1990's, "IPAP Online Journals"¹⁾ (subscription model) and "IPAP Conference Series Online"²⁾ (free access model).

- (ii) The second one is the initiative that was taken by a government agency, the Japan Science and Technology Agency (JST), developed the platform for e-journals, "J-Stage"³⁾ with government funding since 1999. JST brought together more than 250 journals (journals published in English) from various academic societies and organizations. This government-funded project accelerated and supported the publishing of e-journals by academic societies and organizations.
- (iii) National Institute of Informatics (NII) has established the International Scholarly Communication Initiative (ISCI)⁴⁾ with government funding since 2003. The initiative encourages better access to Japanese e-journals, and support scholarly communication process, such as an establishment of e-journal subscription agency, "UniBio Press"⁵⁾ in 2004 that aims to broaden marketing scale and to sale site-licensing of e-journals for academic societies in biology. The initiative brings together Japanese academic librarians, scholars and researchers and learned societies in order to improve scholarly communications in Japan.

All projects have demonstrated the economies of scale in e-journal publishing systems. They have also shown that these projects have contributed in improving services for not only society members, but also journal authors, reviewers, editors and subscribers such as more rapid publishing workflow systems, while maintaining high quality copy editing and dealing with large quantities of articles with limited human resources, without putting those investments onto subscription pricing.

Research laboratories

Since 2000, the National Institute for Materials Science (NIMS) has published a peer-review journal, "Science and Technology of Advanced Materials".⁶⁾ Since 2004, National Information Informatics has renewed the journal, "Progress in Informatics"⁷⁾ as an interdisciplinary forum for researchers and practitioners of informatics. Both cases tend to indicate that national research laboratories are becoming aware that it is now important to create publishing platforms, edited by academics in particular research fields, which are open to the public in order to engage society.

Professional publishers

There are few major publishers in Japan. They publish only 5% of Japan's journals while the remainders are published either in partnership with, or exclusively by

publishers outside Japan (Fig. 2). This produces two negative consequences for Japan. One is that a large proportion of the financial underpinning of Japanese research by the Japanese government flows out of Japan each year. And the other is that this outflow of publishing undermines Japan's publishing industry. There is an awareness in Japan of the pressing need for the Japanese publishing industry to compete in terms of quality and function in e-publishing, but clearly the industry has not developed to the point where it is able to compete on a worldwide basis⁸⁾.

(2) Pricing of e-journals⁹⁾

Japanese e-journals, up to the present, have not been involved the 'Big Deal'. A long calm ended by late 1990s, and the wind began to blow. There are several pricing models are introduced for major e-journals, and few of them have started site-licensing. However, Japanese e-journals which are published by Japanese organizations are still generally less than half of other journals which are published by others. For example, the subscription price, per printed page, of journals related to materials science that NIMS subscribes to, are as follows.

Table 1. Subscription pricing per printed page: NIMS case

| Field | Producer | Journal | pages/year | price/page[yen] |
|-----------------------|----------------------|---------|------------|-----------------|
| Materials | Government/Publisher | A | 1000 | 65 |
| Optics | Publisher | B | 1100 | 482 |
| Optics | Publisher | C | 1000 | 359 |
| Materials | Publisher | D | 3068 | 127 |
| Materials | Publisher | E | 5448 | 65 |
| Materials | Publisher | F | 6601 | 216 |
| Optics | Society (Jpn) | G | 420 | 261 |
| Materials/Engineering | Society (Jpn) | H | 10300 | 17 |
| Physics | Society (Jpn) | I | 3400 | 25 |
| Materials | Society (Jpn) | J | 3091 | 4 |
| Optics | Society (USA) | K | 2900 | 86 |
| Materials | Society (USA) | L | 3448 | 36 |

(3) New e-journals¹⁰⁾

New journals that cover specific research area have appeared in the last five years. Further e-journals will appear in 2007. For example;

- *Plasma and Fusion Research* was launched 2006, published by the Japan Society of Plasma Science and Nuclear Fusion Research. The journal is an Open Access journal supported by the society and author-publication charge.

- *BIOPHYSICS* was launched in 2005, published by The Biophysical Society of Japan. The society intends to publish a journal to promote biophysical research in the Asian-Pacific Area. The Editorial Board consists of scientists in China, Taiwan, Hong Kong, Korea, India and Australia as well as Japan.
- *e-Journal of Surface Science and Nanotechnology* was launched 2003, published by The Surface Science Society. The journal presents quick and versatile-style publication platform for research papers collecting from the broad range of surface science filed. This is free publication charge, and is the society-sponsored Open Access journal.
- The Japan Society of Mechanical Engineers has planed to establish new e-journals under each umbrella division of the society. There are/will be appearing five titles; *J. Fluid Sci. & Technol.*, *J. Thermal Sci. & Technol.*, *J. Biomechanical Sci. & Eng.*, *J. Environment & Eng.*, *J. Mechanics, Mater. & Processing* toward 2007.
- *Chemistry - An Asian Journal* was launched in 2006, and is co-owned by 6 societies; the Chinese Chemical Society, the Chemical Research Society of India, the Chemical Society of Japan, the Korean Chemical Society, the Singapore National Institute of Chemistry, and the Chemical Society Located in Taipei, China, which form the Asian Chemical Editorial Society (ACES). The journal has cooperated with a journal, *Angewandte Chemie* that is published by the German Chemical Society.

There are several backgrounds behind of these launches. One of them is that papers as an achievement of scientific research, which is usually funded by government, has increasingly been published in journals outside Japan.⁸⁾ Academic societies and organizations has strengthened not only e-publishing speed or functions, but also distributing worldwide to get wider recognition and receiving higher citations, and to reach higher status of journals. There are great editorial efforts also involved, as an essential mission of academic journals, such as international editorial boards' members, web-based editorial and manuscript tracking services, focused issues on active research topics in specific fields, so on.

3. Government policy

The Japanese Council of Science and Technology has introduced the third term of its Science and Technology Basic Plan. The Plan established as key points the promotion of systemic reforms for the construction of a new research and development system and the wide expansion of investment in research and development. The budget for the plan has been increased as follows: first term, 17 trillion yen by FY1996, second term, 24 trillion yen by FY2001 and third term 25 trillion yen for FY2010. Regarding the trends related to research

performance throughout the term, the White Paper on Science and Technology 2005 summarizes as follows¹¹⁾:

Scientific papers are the results of R&D. ... Of the scientific papers published in major scientific journals around the world between 1981 and 2003, Japan's share of scientific papers and citations was as shown in Figure 2-3-1. Japan's share of scientific papers in 1981 was fourth in the world, after the United States, the United Kingdom, and Germany. However, ever since Japan surpassed the United Kingdom in 1992 to obtain the No.2 ranking, Japan has maintained its position at No.2. Moreover, since excellent papers tend to attract large numbers of citations in other papers, the number of citations can be viewed as one indicator of a paper's quality. A look at the number of citations of papers authored by Japanese researchers through the year 2000 by year of publication reveals that Japan's share of total citations has tended to rise over time. Nevertheless, Japan has ranked after the United States, the United Kingdom, and Germany in the number of citations ever since 1989, and the ratio to total citations remains much lower than the share of the total number of scientific papers published (Figure 2-3-1).

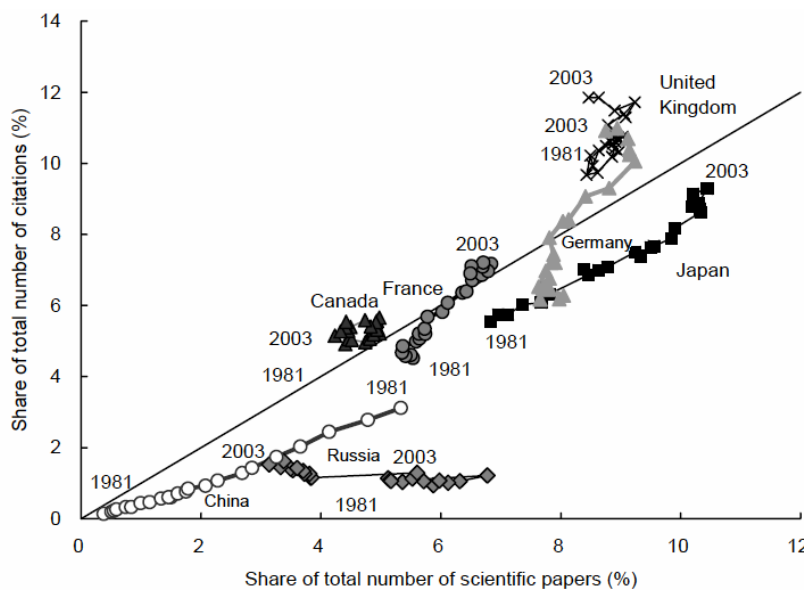


Figure 2-3-1 Relationship between the world total for scientific papers and for citations in scientific papers

Notes: 1. The figures for Russia include those for the Soviet Union.
 2. The figures for Germany include those for the former East Germany.

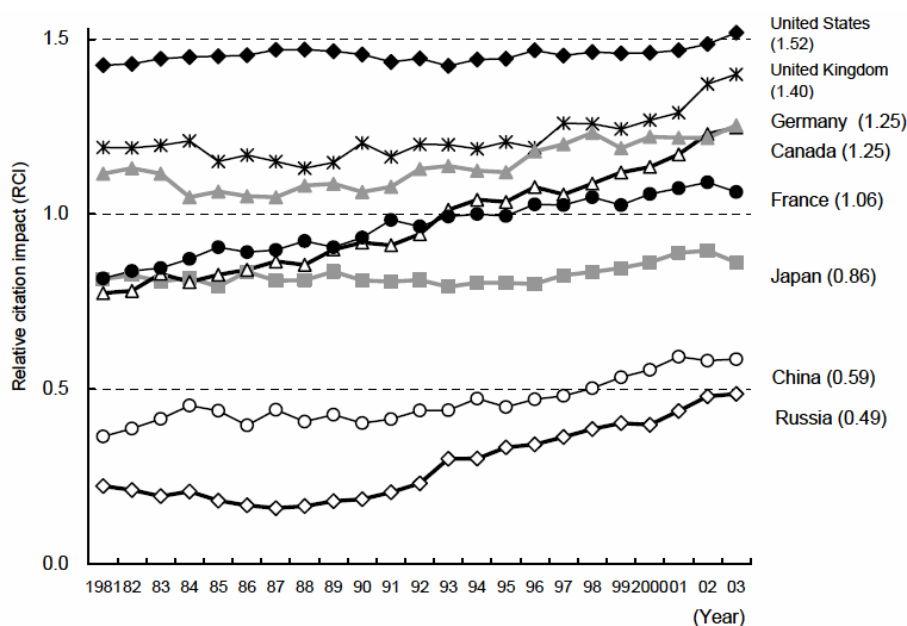


Figure 2-3-2 Trends in the relative citation impact for scientific papers in selected countries

Source: Collected by the Ministry of Education, Culture, Sports, Science and Technology based on "National Science Indicators, 1981-2003" (Thomson Scientific)

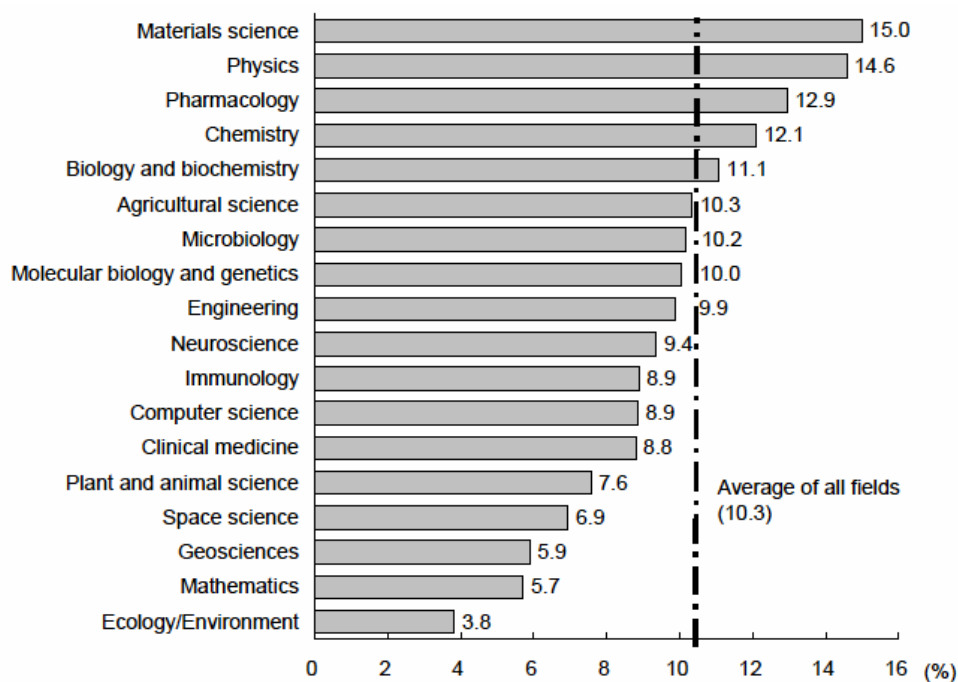


Figure 2-3-5 Japan's share of scientific papers, by field

Notes: 1. Figures are calculated from the aggregate values for 1999-2003.

2. Figures are Japan's share of all scientific papers in the world for each sector.

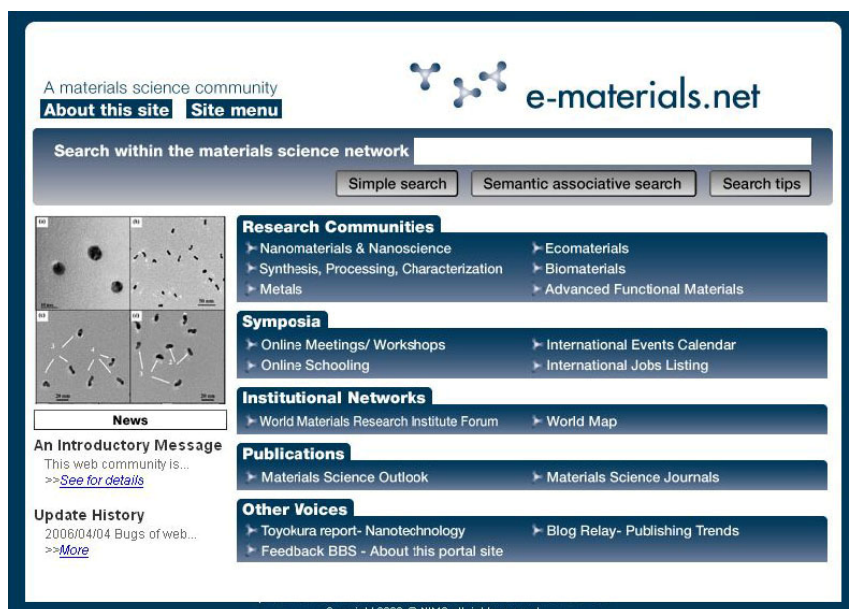
Source: Collected by the Ministry of Education, Culture, Sports, Science and Technology based on "National Science Indicators, 1981-2003" (Thomson Scientific)

The report mentioned that it is impossible to make a simple comparison between scientific papers because of the language normally used by the researchers and the language they are written in, etc. However, there are certain trends that we can observe, that Japan's research performance is relatively flourishing even though the relative citation impact is lower than other major selected countries. (Source: White Paper on Science and Technology, 2005)

4. Trials, Web portal sites

The NIMS is supporting the development of a trial project, a web-based community for research activities called "e-materials.net"¹²⁾. The missions of this portal are firstly, to strengthen the information infrastructure within the laboratory, and secondly, to provide a

web-based free tools for use by the materials science community. A key function of the portal is the Semantic Associate Search that focuses in materials science. The search function targets specifically academic literature; academic articles from major journals, patents, research information from institutional repositories (IR) and databases or data books. These information



resources will be made available through cooperative relationships with major organizations and laboratories. This project is now in development, and will be available by the end of 2006.

In parallel with the project, another web service, "Materials Journal Portal Site"¹³⁾ was launched recently by a group of academic societies and institutions. They took the initiative specifically collecting academic journals and additional information to each articles related to editorial information provided by member organizations.

These trials are to strengthen information dissemination, by different approach from publishing journals, which is to integrate journal articles and other types of research information and to serve a communication platform for scientists.

5. Conclusions

It is clear that there is high publication rate of academic papers produced in Japan (Figure 2-3-1). This means that there is a lot of research being done in Japan, and that there is a high

output of academic papers being generated from that research. It is natural that those in Japan responsible for funding higher education and research, and those supporting and involved in research in Japan's various institutions, should be concerned about the high proportion of Japanese research papers being published outside Japan. This phenomenon has the effect of threatening the survival of Japanese academic journals, particularly as they incur the added expenses of trying to both develop digital versions of their publications, and create a sound economic model for their distribution on the internet.

This problem will not be easy to solve, and it is anticipated that the phenomenon of many researchers wanting to publish outside Japan will continue for the near future. However, Japanese e-journals will vigorously compete in this market, and continuously improve their functionalities to attract a greater audience and to survive in the worldwide marketplace.

6. References

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- 3) <http://info.jstage.jst.go.jp/eng/index.html>
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- 5) <http://www.ll.chiba-u.ac.jp/~kikaku/online/EJ/unibio.html> [in Japanese]
- 6) <http://e-materials.net/stam/>
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- 8) See the president's statement of the Science Council of Japan, May 2005, <http://www.scj.go.jp/ja/info/comment/050915.html> [in Japanese].
See also S. Murase: *J. Information Processing & Managements* **47** (2004) 149 [in Japanese].
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- 10) See the URL for e-journals in details.
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- 11) The Science and Technology Basic Plan,
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White Paper on Science and Technology, Ministry of Education, Culture, Sports, Science and Technology, <http://www.mext.go.jp/english/news/2005/12/05121301.htm>
- 12) The portal site "e-materials.net" is a web community for materials scientist that is supported by NIMS. The site will be active late 2006.
- 13) <http://matjournal.org/>