How the digital era has transformed ILL services in Japanese university libraries: a comprehensive analysis of NACSIS-ILL transaction records from 1994 to 2008

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Abstract
Purpose – The purpose of this study is to identify and examine the factors that affected the scale of ILL photocopy requests between Japanese university libraries from 1994 to 2008.

Design/methodology/approach – Based on the newly developed conceptual framework to interpret the rise and fall in ILL, more than 10 million requests, sent through a nation-wide system called NACSIS-ILL from 1994 to 2008 were quantitatively analyzed.

Findings – The number of photocopy requests for articles in foreign journals started to decrease in 2000, due to the dramatic increase of e-journal titles made accessible through “Big Deal” contracts that came into effect in 2002 as well as other similar trials prior to it. On the other hand, requests for articles in domestic journals, mostly written in Japanese, continued to increase until 2006. The main factor for this increase was the expansion of journal title coverage in bibliographic databases, which enabled users to retrieve more references. However, requests decreased in 2007, because of advances in digitization in the Japanese academic environment.

Research limitations/implications – This research proposes a conceptual model to understand document demand and service patterns observed in nation-wide ILL services. It also successfully draws a comprehensive picture of ILL in Japanese higher education institutions, based on more than 10 million request records over 15 years, and it shows how the number of ILL requests correlates with the availability of requested journals in electronic form.

Originality/value – This research proposes a conceptual model to understand document demand and service patterns observed in nation-wide ILL services. It also successfully draws a comprehensive picture of ILL in Japanese higher education institutions, based on more than 10 million request records over 15 years, and it shows how the number of ILL requests correlates with the availability of requested journals in electronic form.

Keywords Interlending, Document delivery, Academic libraries, Electronic journals, Japan

Paper type Research paper

1. Introduction

The interlibrary loan (ILL) is a result of a mismatch between the supply and demand of documents in a library. The analysis of ILL transactions in a particular library group should, therefore, shed light on the library’s conditions of information access. The purpose of this study is to identify and examine the factors that affected the changes in ILL photocopy requests between Japanese university libraries from 1994 to 2008. We based our analysis on a hypothetical model of ILL and document delivery that takes various factors into consideration: document demands, electronic journals with a “Big Deal” contract, full-text digitization, discoverability of documents, user population, journal prices, journal cancellations, ease of ILL order, turn-around time of ILL transactions, and so on.

We also map the environment of Japanese academic libraries in this time of transition from print to online. The data we analyzed has the unique advantage of summarizing almost all the ILL transactions made by nearly one thousand Japanese academic libraries since the 1990s. Added to this comprehensiveness, the environment of Japanese academe makes this study distinctive. Today, most international
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Publishers bring out scholarly journals electronically, and responding to this tendency, library consortia in Japan are facilitating “Big Deal” contracts. Japanese journals, however, still remain in print format, and their digitization has started only recently. Amidst this dramatic transition, this paper provides a thorough picture, capturing the ongoing changes in information access since the advent of the worldwide web, and electronic journals, etc. The particular situation Japan is facing right now has made this kind of analysis possible.

In section 2, referring to earlier studies, we devise a theory of the relationship between the factors that are expected to determine trends in ILL requests. Then we propose a conceptual model for understanding ILL transactions and their relationship with document requests; this will be the frame of reference for the following sections. In section 3, we summarize the current status of scholarly communication in Japan in the hope that this overview will facilitate the understanding of the particularities of ILL in Japanese academe. We also introduce the analytical framework for this study in this section. Section 4 details the trends in ILL statistics as recorded in the NACSIS-ILL system and identifies the issues that need clarification from the viewpoints of library practices and scholarly communities. Finally in section 5, we provide an account of the dramatic changes that the Japanese ILL service underwent between 1994 and 2008, identifying their causes and consequences.

2. Factors affecting ILL requests

2.1 Literature review

There have been many studies on the relationship between the diffusion of electronic journals and the volume of ILL transactions. Some have analyzed nationwide ILL statistical data and pointed out that the introduction of electronic journals resulted in a reduction of document delivery requests (Echeverria and Barredo, 2005; Tonta and Unal, 2006; Shin, 2008). The last two in particular, revealed that the deployment of electronic journal collections under consortial arrangements such as ANKOS in Turkey and KESLI in South Korea resulted in fewer ILL requests.

Other researchers, however, have argued that the expansion of electronic journal titles did not always lead to a reduction in the number of ILL requests. Jackson (2004), for example, based on a study by the Association of Research Libraries (ARL), found that users made more ILL photocopy requests despite the increasing number of electronic journals. She identified the factors causing this increase as:

- the ease of finding articles by searching on Google and bibliographic databases;
- the improvement in ILL services, principally the improvement in turn-around time; and
- users’ lack of awareness of the existing institutional contracts with the journals they needed.

San Jose and Pacios (2005) also found that the improvement in findability brought about an increase in ILL requests in health science. Rheiner (2008) observed that ILL requests decreased as the number of available electronic journals increased. However she also found that the requests “fluctuated but remained relatively stable” after 1999/2000, when a new ILL request system – web requests transmitted and delivered electronically (Ariel) – was introduced which made ILL easier to use.

2.2 A conceptual model for the changes in ILL transactions

While the above-mentioned studies found various factors affecting the changes in ILL transactions, they remain unclear about the relationships between them. What we attempt to do here, therefore, is to develop a model that describes the complex correlations that exist. These are illustrated in Figure 1. The rectangle in the center of this figure represents the total demand for documents. If the collections at users’ institutions satisfy their total demand, we can consider the “availability in local and/or remote collection” to be excellent and consequently, ILL transactions do not occur. The converse is also true: the smaller the number of journal titles available at their institutions, the larger the number of ILL requests. If users’ requests cannot be satisfied through the use of libraries, they may request reprints from authors, while some may give up on obtaining the articles altogether.

Though not shown in the figure, such cases may occur in the demand square, somewhere outside the two delineated ovals.

The factors that affect this demand structure are placed around it. The ovals at the bottom are the factors that determine the availability of documents. For example, an increase in the number of electronic journal titles obtained through “Big Deal” contracts improves document availability. Mass digitization of library collections, as indicated by Google Book Search, makes books available immediately to the user. Furthermore, open access articles come to be used widely when subject and institutional repositories are developed. Full-text digitization of print journal collections improves the user’s chance of obtaining journal articles immediately and online. Conversely, journal cancellations reduce the size of library collections and potentially increase unsatisfied demand.

For the sake of clarity, Figure 1 has only two nodes in the left-hand side. In reality, however, several factors affecting ILL requests are connected with each other, and each of them is related to the others. Therefore, in the model we have developed, we try to describe the complex correlations that exist. These are illustrated in Figure 1. The rectangle in the center of this figure represents the total demand for documents. If the collections at users’ institutions satisfy their total demand, we can consider the “availability in local and/or remote collection” to be excellent and consequently, ILL transactions do not occur. The converse is also true: the smaller the number of journal titles available at their institutions, the larger the number of ILL requests. If users’ requests cannot be satisfied through the use of libraries, they may request reprints from authors, while some may give up on obtaining the articles altogether.

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Figure 1 Conceptual model for ILL rise and fall

Yoneda et al. (2006) identified three factors affecting the increase in document requests in nursing science and related areas in Japan:

- the increase in nursing schools at graduate and undergraduate levels and the consequent increase in researchers and research activities;
- the expansion of journal title coverage in Japanese bibliographic databases; and
- researchers seeking to publish more articles.

This conceptual model suggests the following: if at least one of these factors is present, the demand for documents increases, which will lead to an increase in ILL transactions. On the other hand, the ILL transactions will have an opposite effect on the demand for documents. The improvement in ILL transactions, principally the improvement in turn-around time, facilitated “Big Deal” contracts. Japanese journals, however, still remain in print format, and their digitization has started only recently. Amidst this dramatic transition, this paper provides a thorough picture, capturing the ongoing changes in information access since the advent of the worldwide web, and electronic journals, etc. The particular situation Japan is facing right now has made this kind of analysis possible.

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The ovals in the top left area represent the factors that influence ILL requests. For example, Jackson’s study suggests that improving the ILL requesting system results in an increase in ILL transactions.

The rounded rectangles at the upper right show the factors that shape the demand itself. As shown by Yoneda et al. (2006), changes in user population and research activities affect the scale of document requests. The improvement in findability and discoverability of articles also stimulates demand. For example if a library installs a link resolver, in order to make its users’ search for the articles in its licenced journals easier, the availability of such journals expands. Meanwhile, a journal price rise leads to an increase in the demand on a local and/or remote collection because academics may stop subscribing to it individually. On the other hand, the cancellation of journal subscriptions by institutions due to an increase in costs causes users either to resort to ILL services or to give up on obtaining articles.

3. Changes and trends in ILL in Japanese academic institutions

3.1 Background
3.1.1 The Japanese academic environment
Higher education in Japan has experienced a quantitative expansion. There were 552 colleges and universities in Japan in 1994, which increased to 765 by 2008. Figure 2 shows the population change in universities and colleges over the past 14 years. Undergraduate and graduate student numbers and staff and faculty members have grown since 1994. However the number of undergraduate students dropped 1.4 percent, from 2,610,571 in 2005 to 2,573,441 in 2008. Graduate students and faculty members, in contrast, showed a dramatic increase from 273,601 in 1994 to 432,600 in 2008.

The increase in researchers also led to an increase in research output in Japan (NISTEP, 2009). Research areas have become more and more specialized and segmented, and a climate of “publish or perish” has been driving researchers to publish more. Combined together, factors like these have been expanding the demand for academic literature in the Japanese scholarly world of recent years.

Japanese researchers often submit their articles to leading international journals. In addition, there are many domestic journals, mainly written in Japanese, circulating within Japan. International journals are important resources particularly in science, technology and medicine (STM) while domestic journals are the major sources for researchers especially in humanities and social sciences.

Although there are some exceptions, the electronic delivery of Japanese scholarly journals has only just begun. However, many of these journals are not the equivalent of the western “electronic journals”; what is progressing in Japan, instead, is the provision of digitized journal collections consisting of the materials that are published originally in print format and scanned later; academic journals provided through CiNii and Medical Online are of this kind. Therefore, there is no counterpart of Big Deal packages in Japanese journal publishing. Moreover, the digitization efforts for the back issues are often less than comprehensive.

3.1.2 Holding of serials and electronic journals in universities
Monbukagakusho (the Ministry of Education, Culture, Sports, Science and Technology MEXT) makes an annual survey of the current status of academic libraries and reports their findings in their Gakujutsu joho kiban jittaichosa kekka hokoku [Science Information Infrastructure Statistics of Colleges and Universities]. They reported that the number of journal titles in print format held in Japanese academic libraries had decreased in the last decade, while the availability of electronic journal titles had increased. Our analysis of the data endorsed their observations. When we looked at national universities with eight or more faculties, the availability of electronic journals started to grow in 2000, and the average number of accessible titles per university reached its peak at 14,294 in 2007. Research-oriented private universities also started to widen their access to electronic journals in 1999. A sharp increase was seen in 2002, 2006 and 2008 when the number reached an average of 21,833 titles per university (Figure 3).

Figure 2 Change in university/college population

Figure 3 Average holdings of print and electronic journal in national and private universities
3.1.3 Interlibrary loans in Japanese university libraries and the role of NACSIS-ILL

Tutiya et al. (2007) chronologically traced the policy actions taken to promote ILL cooperation in Japanese university libraries. The first effort to foster resource sharing and ILL services was made in the 1920s, when a group of medical libraries established an association in order to enhance library cooperation. Monbusho (Ministry of Education; the former name of MEXT) compiled and published the first edition of Gakujutsu Zasshi Sogo Mohokuro [Union List of Scientific Periodicals] in 1953, with the ambition to cover all subjects. This union catalog expanded the coverage from one edition to the next and later became the basis of the periodicals file of NACSIS-CAT.

Monbusho designated several national university libraries as “foreign journal centers” in the fields of medicine, engineering, agriculture and social sciences/humanities in 1977. Unlike the British Library Document Supply Centre, the designated centers were not expected to serve as a centralized nationwide document supply center; their role was mainly to supplement the collections of individual university libraries. Monbusho aimed to construct a national information infrastructure for research in such a way that all Japanese university libraries could assure their researchers of the availability of the documents they needed even if their local collections could not satisfy their needs.

The Scientific Research Council of Japan recommended that the government establish a national science information system in 1980. Consequently, Monbusho founded the National Center for Science Information System (NACSIS) in 1986 to serve as the center for this system. One of the goals of NACSIS was to provide Japanese university libraries with a bibliographic utility service named NACSIS-CAT, which led to the construction of national union catalog databases for books and serials. In 1992, NACSIS launched the NACSIS-ILL, a communication system for interlibrary loans between requesting and potentially supplying libraries, which relied on the NACSIS-CAT union catalog database for holding information.

NACSIS-ILL has since played a central role in facilitating the ILL service in Japanese university libraries. As of March 2010, 717 universities and four-year colleges were NACSIS-ILL clients, that is 92 percent of all universities and colleges in Japan. A variety of other institutions and organizations, such as junior colleges, colleges of technology, inter-university research institutes and other libraries, also participate in this system. In 2008, according to surveys by MEXT, Japanese university libraries made, in total, 935,755 requests for article photocopies and 137,949 requests for book loans. Of these, 848,336 (91 percent) requests for articles and 98,511 (71 percent) requests for book loans were processed via NACSIS-ILL. The transaction records of NACSIS-ILL, therefore, give us a fairly representative picture of ILL services in Japanese academic libraries especially for article copies.

Japanese academic libraries, as noted above, work together for nation-wide resource sharing activities, and the ILL service is built on such mutual relationship. The fee for a photocopy request, for example, has remained very low all through these years. It was customary among national university libraries to charge only the cost of photocopying (35 yen per page) and postage until 2004. Even after each university library came to set their own ILL fee, it has stayed about the same to this day. Delivering electronic files directly to users is of course simpler and cheaper, but Japanese copyright law does not allow libraries to do so.

3.2 Methodology

Based on the transaction log records of NACSIS-ILL from 1994 to 2008 provided by the National Institute of Informatics (NII), an analysis was made to follow up the study by Tutiya et al. (2007), which dealt with the data from 1994 to 2005. The following is the summary of their findings:

- A salient characteristic of the “Interlibrary loan (ILL)” in the Japanese university context in the 1990s was the heavy slant toward photocopy requests for foreign journal articles.
- Most of the articles in foreign journals became available online through site licensing under consortial arrangements beginning in 2002. Requests for domestic journal articles, particularly in the field of nursing science, showed a conspicuous increase as if to compensate for the decline in requests for foreign journal articles.
- Requests for book loans, which had accounted for only a small portion of requests in the past, apparently increased as the union catalog database NACSIS-CAT grew.
- The NACSIS-ILL system was remarkably efficient, with fill rates in lending/supplying constantly high and an average turn-around time of less than a week.
- While the original intention of NACSIS-ILL was to construct a mutually beneficial collaborative system, some libraries were found to be mainly on the requesting side while others were on the supplying side, due partly to the existence of libraries that had been designated as “subject foreign journal centers” in the 1970s.
- Some small or mid-sized libraries have begun to be suppliers in recent years.

In the present paper, we make an analysis adding new data collected since 2005 to supplement these findings and we follow the same analytic method as Tutiya et al. (2007). Furthermore, we give an in-depth examination to clarify how the rise and fall of photocopy requests in ILL services in Japan has been influenced by new types of contract, digitization, and other factors.

4. Findings and discussion

4.1 Quantitative changes in ILL requests since 1994

Figure 4 shows the breakdown of the ILL transactions divided into photocopies and book loans from 1994 to 2008. There

Figure 4 Filled requests for photocopies and book loans from FY1994 to FY2007

In a...
were 468,321 photocopy requests in 1994 that grew dramatically to a peak of 1,099,774 in 2005 and decreased slightly thereafter to 945,624 in 2008. Book loan requests in 2008 amounted to 105,877. Although they showed a gradual increase during the 15 years of the study, they remained quite stable at a low level.

4.1.1 The impact of electronic journals and “Big Deal” contracts on photocopy requests for articles in foreign journals
Photocopy requests are made not only for articles published in foreign journals but also for articles in domestic journals mostly written in Japanese. While worldwide publishers have been publishing journals electronically for quite some time now, the digitization of domestic journals has only just begun in Japan. Since the characteristics of these two groups of journals are inherently different, we divided the data into requests for foreign journals and those for domestic journals to examine how the emergence of electronic journals and “Big Deal” contracts has been affecting photocopy requests.

Figure 5 reveals the changes in requests for articles in foreign and domestic journals. After peaking at 666,562 in 1999, requests for articles in foreign journals declined to 378,918 (43 percent) by 2008. Electronic journals and in particular Big Deal packages came to be known and widely accepted in Japanese universities in the late 1990s and the dramatic drop in ILL requests shows their immense influence.

In order to examine the impact of the “Big Deals,” in more detail we selected 149 journal titles from the top 500 titles requested via ILL in 1994. These were published by Elsevier, Academic Press, and Pergamon and as a result of mergers are now distributed via Elsevier’s ScienceDirect. Figure 6 shows the change in the number of filled requests for articles published in these journals. The requests started to decline from 65,402 in 1998, to 22,081 in 2008. There were two striking drops between 1999 and 2000, and then between 2001 and 2002. The first drop coincided with the introduction of Elsevier’s SD21 at some university libraries. Another decisive change in the environment of academic libraries was ongoing at the time of the second drop; MEXT started to provide financial support for purchasing electronic journals and for the “Big Deal” contracts between Elsevier and university libraries, thereby rapidly expanding the availability of electronic journals.

Out of the 149 journals identified, we selected the ten most frequently requested titles for further examination. As shown in Figure 7, requests from national university libraries started to decrease sharply in 1998. This decrease, from 1998 onward, exactly corresponded with the years when national university libraries tried to widen their access to electronic journals under consortial arrangements[1]. “Big Deal” contracts opened up remote access to a vast collection of journals and the swift improvement of availability indeed caused a sea change in the environment surrounding the ILL service in Japan.

4.1.2 Photocopy requests for articles in domestic journals
According to the data we dealt with, photocopy requests for domestic journal articles increased consistently from 1994. They reached their peak at 527,718 in 2006 and then began to decrease (see Figure 5). We analyzed the corresponding data through the factors set up in the conceptual framework in section 2 in order to fully describe the Japanese situation:

- **User population.** The number of users increased (see Figure 2). For example, in nursing science, many schools were newly founded and this led to an increase in researchers (Yoneda et al., 2006).
- **Findability and discoverability.** Bibliographic databases on the worldwide web grew from 2000 onwards: for example...
Google (2000); Ichushi Web (bibliographic database for Japanese medical journals, 2000); Medical Online (2000); Zasshikiji Sakuin [Japanese Periodicals Index] (2002); JDream (bibliographic database for science and technologies, 2003); Google Scholar (2004); and CiNii (a scholarly and academic information navigator, 2005).

- **Ease of ILL ordering.** Library management systems facilitated ILL requests by letting users fill out easy-to-use web forms and by using open linking technology (i.e. OpenURL).

- **Turn-around time.** Turn-around time in NACSIS-ILL improved from an average of 8.7 days in 1994 to 4.4 days in 2008.

- **Full-text digitization.** CiNii started to provide full-text documents stored in NII-ELS (Electronic Library Service) in 2006, and by August 2008, 2,759 titles, mainly in Japanese, were available online; Medical Online, a commercial digitizing service offered by Meteo Inc., had 621 titles, mainly in medical science, available online by April 2008.

- **Journal cancellations.** According to the statistics issued by MEXT, the average number of Japanese journal acquisitions by university libraries has declined in recent years; a sharp decrease was apparent between 2004 and 2005. This tendency seems to reflect the budget growth for the electronic resources including electronic journals and the consequent budget cut for the print materials.

After analyzing the data in terms of these factors, we narrowed our focus to “findability and discoverability” and “full-text digitization” and in particular the influences of CiNii and Medical Online. Both services provide free access to their bibliographic records and fee-based access to full-text services, and except for the open access journals included in CiNii, full texts are available only to licenced or pay-per-view users. Considering their service characteristics, it seemed most appropriate to analyze them in terms of these two factors.

**Case 1: CiNii (NII-ELS).** CiNii started as a bibliographic database accessible via the worldwide web in 2005. It has a wide coverage of subjects and journal titles published in Japan. A recent user survey indicated that CiNii was the most popular bibliographic database among Japanese researchers in the subjects of humanities and social sciences (SCREAL, 2008). In 2006, a service of NII-ELS (Electronic Library Service) was integrated into CiNii enabling users to have seamless access from bibliographic records to the full-text articles.

Figure 8 illustrates 11 years’ worth of ILL requests for articles published in journals that were provided by CiNii. The journals were categorized into three types:

1. Open access titles.
2. Titles charged with flat-rate institutional licensing.
3. Titles charged in other ways (e.g. pay-per-view).

The “open access titles” here included the journals whose current issues were openly accessed as of August 2008. It is to be noted that not all of them had been published in this way since 1998. Some titles with embargo policies were included in types 2 and 3 journals; therefore these types were inclusive of the articles that were to be distributed free of charge after a certain period of time. The range of digitization of their back issues, moreover, varied from journal to journal.

As shown in Figure 8, the number of requests for types 1 and 2 began to grow steadily in 1998 and to decline in 2006. In contrast, requests for type 3 continued to increase after 2006, peaking at 5,586 in 2007. These results indicated two things: first, digitization was the major influence for the reduction of ILL requests, and second, ILL fee-based full-text services for institutions were still competitive and presumably will continue to be so as long as publisher pay-per-view remains more highly priced.

**Case 2: Medical Online.** Medical Online is a commercial digitizing service. As of April 2008, 621 titles, mainly in medical science and mainly in Japanese, were available online. Of these titles, only 193 received photocopy requests via NACSIS-ILL between 1998 and 2007. The requests for them made during the past ten years increased till 2005, when they numbered 17,140. After that came a gradual decrease to 13,771 in 2007.

Medical Online inaugurated its service in 2000, but the institutional site licence was not introduced until November 2004. The number of contracted institutions grew from eight in 2004, 50 in 2005, 105 in 2006, and finally to 193 in 2007. To clarify the effects of site licensing, we analyzed the requests by the institutions with and without a contract with Medical Online. We narrowed the range of analysis to the ten most frequently requested journals and acquired the results shown in Figure 9. The ILL requests from the contracted institutions started to decrease in 2004. The analysis clarified that ILL requests diminished as the number of licences grew while the...
requests from the non-contracted institutions kept increasing till 2006.

Institutional repositories. The recent growth of institutional repositories is an element that cannot be ignored when considering the factors affecting ILL requests. Backed by a nationwide initiative called the Cyber Science Infrastructure (CSI) and promoted by NII, 130 institutional repositories were operating in Japan by September 2010. According to the website “NII Institutional Repositories Database Contents Analysis,” there were 706,700 deposits by 2010. As shown in Figure 10, about half were scholarly papers published in departmental research bulletins, which academic institutions published originally in print form and distributed usually on an exchange basis. Such bulletins have been regarded as important resources in Japanese scholarly communication, particularly in the fields of humanities and social sciences.

The advent of institutional repositories is accelerating the digitization of departmental bulletins and is gradually reducing the number of photocopy requests. For example, Takeuchi(2008) reported that the number of ILL requests for articles in Chiba Kango Gakkaishi [Journal of Chiba Academy of Nursing-Science] decreased from 343 in 2006 to 82 in 2007 mainly because most of the articles in this journal had been stored in Chiba University Institutional Repository (CURATOR) and were available via the worldwide web by 2007. According to Suzuki and Tsuruoka (2008), of the ILL requests received by Chiba University Library between April 2007 and January 2008, 91 were cancelled because they were available free of charge in CURATOR or other Internet sources.

Our analysis of the ILL requests for domestic journal articles suggests that:

- The growth of bibliographic databases via the worldwide web improved their discovery, and this was one of the most influential factors that affected ILL requests. Still, there is a need for further investigation before we can come to a definitive conclusion.

5. Conclusion

Supported by the national ILL transaction log data, the conceptual model proposed in section 2 was shown to be an efficient framework for understanding ILL service and various influencing factors. As a whole, the analysis revealed that the degree of availability of journal articles online did have an impact on the rise and fall of ILL requests.

The analysis also showed that there was a rising demand for research documents and that this demand was created by the increase in the number of schools during the past two decades, the accompanying rise in the number of researchers, and growing pressure for them to publish more. The development of a nationwide union catalog online, made available on the worldwide web, also stimulated demand. Taken together, these phenomena account for the increase in ILL requests in the 1990s although requests for foreign journal articles began to decline in 2000. Our analysis identified the cause of this decline as the coming of electronic journals and the development of the “Big Deal” contracts that promoted consortial purchases.

Moreover, in the early 2000s, ILL requests for articles published in domestic journals showed a persistent increase. The growth in the number of researchers and graduate students of course had an influence on this kind of demand but the improved findability offered by services such as CiNii also played a role. The number of requests in this category showed a slight decline in 2007. The change reflected the advancing degree of digitization in the Japanese academic environment; by that time, not only new titles but also older ones that had originally been published in print form had been digitized. Along with digitization, institutions started to create repositories in order to store the digitized materials, and this no doubt played a role in reducing ILL requests. Considering that about half of the requests in this category were for articles in departmental research bulletins, the influence of the development of institutional repositories cannot be overlooked (see Figure 10).

Amidst all these transformations, our analysis indicated that the ILL service still remained competitive. Users chose to acquire documents through ILL when they were not satisfied with the pricing or mode of payment offered to individual users via pay-per-view. NACSIS-ILL, as shown by Tutiya et al. (2007), grew more efficient during this period: 50 percent of the requested photocopies were delivered to the requesting libraries within four days. All these considerations lead us to conclude that the ILL service through NACSIS-ILL will continue to meet users’ needs, at least for the time being albeit at a reduced level of demand.

In this study, the authors studied the ILL service in an effort to understand how it satisfies users’ demands for documents, and we identified the factors that affect it. As

Figure 10 Change in content growth of Japanese Institutional repositories

![Graph showing change in content growth of Japanese Institutional repositories]

- The full-text digitization of domestic journals, distributed via CiNii and Medical Online, played a major role in reducing ILL requests. As explained above, however, they are not the equivalent of the western “electronic journals” but merely the digitized version of the printed journals, and thus there are no “Big Deal” contracts for Japanese domestic journals.

- The development of institutional repositories also reduced ILL requests, particularly for articles published in departmental research bulletins.
how in our model, ILL is one of the several means users resort to in order to fill their needs. Further investigation and examinations are required to paint a fuller picture that portrays the complexity surrounding the document supply and demand in the library setting; such a picture will be essential in rationalizing the allocation of information resources at a national level.

Note

1 As of 2009, there were three consortia that negotiate contracts for purchasing electronic resources: Japan National University Libraries (JANUL), Public and Private University Libraries Consortium (PULC) and Japan Medical Library Association (JMLA)/Japan Pharmaceutical Library Association (JPLA).

References


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