

# Research Opportunities in Japanese Universities and Tips for Scientific Publications

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**Abstract** – *This article gives information for researcher to do research in Japanese Universities based on author's experience and some literatures. Researchers may obtain research opportunities with Japanese Universities through postdoctoral fellowship program provided by Japanese Society for the Promotion of Science (JSPS). Other financial supports to make research collaboration with Japanese Universities may also be applied through JSPS program. In addition, author summarized tips for scientific publications both in international conferences and journals. The tips may help researchers to write a scientific article to be published in an international journal.*

**Keywords** – *Research Collaboration; JSPS; Scientific Article; International Journal.*

## INTRODUCTION

In order to support ITS for realizing its vision as a world-class university with international recognition in science, technology and art, building international cooperative network is very important. It can be implemented in promoting joint research with internationally recognized universities and supporting researchers to participate in a research community. Promoting joint research with internationally recognized universities can be initiated by supporting young researchers to join postdoctoral fellowship offered by scientific foundation/organization in the world. Japan is one of the top science countries in the world who offer some programs to support foreign researchers in the world to do research in Japan.

Minister of Education, Culture, Sports, Science and Technology (MEXT), Japan, H. Shimomura, wrote that Japan welcomes creative researchers from around the world, and many opportunities are open to us for enjoying science life in Japan [1]. MEXT offers many opportunities to conduct joint research with Japanese researchers as postdoctoral fellowship as well as academic staff. To implement these activities, in 2007 MEXT designates 9 centers to create open research platforms that attract the world's best brain with English as primary operational language. Research opportunities and institutions who support research activity in Japan will be discuss in the next section.

Scientific publications are a wide spread form of scientific and technological communication used by agents of the national innovation system to deliver codified and replicable results of scientific experiments, methodologies and conceptual contributions. Publications are usually related to fundamental research but sometimes can also contain applied information and evidence of individual technologies, algorithms, methods, and processes that

may immediately be used in industry, and in the wider economy and social life [2]. Researchers' publication records are the main indicator used in career progression decisions and for measuring the excellence of research performing organizations, especially in settings where basic research predominates. Therefore, scientific publication from researchers or academic staffs is very important for ITS as a tool to be a world-class university.

In this article, authors would like to share the information of research opportunities in Japan and summarize the tips for scientific publications, especially for publication both in international conferences and journals.

## RESEARCH OPPORTUNITIES IN JAPAN

Author emphasizes research in Japan because Japan is one of the top science countries in the world. It can be noticed that Japan is 2<sup>nd</sup> country in the world for number of Nobel Prize winners (2001-2012) and number of papers (2004-2006) [1]. Moreover, universities in Japan are the places that advance and encourage international culture and engagement, which result in many synergistic activities in a wide variety of research fields. Laboratories in Japan are some of the best -maintained, -equipped, and -funded laboratories in the world. New research initiatives on key and future concepts have been characterized by longevity of funding. Furthermore, researchers can develop their ideas in accordance with the research concepts that have been defined.

MEXT offers many research opportunities in Japan for researchers around the world. Some programs have been launched by Japanese Society for the Promotion of Science (JSPS). JSPS was established with an imperial endowment in 1932. JSPS was converted into a quasi-government organization in 1967, and into an independent administrative institution in 2003. JSPS's program rests on four pillars: (1) Creating world-class knowledge in diverse fields; (2) Building robust international cooperative networks; (3) Fostering the next generations of researchers and enhancing the education and research functions of universities; and (4) Building evidence-based science-promotion systems while strengthening linkage with society. Based on them, JSPS advances scientific research through its Grants-in-Aid for Scientific Research and other funding programs; fosters young researchers through its Research Fellowships for Young Researchers and other researcher development programs, promotes international scientific exchange, and supports university reform and globalization. JSPS's budget is 99.8% subsidized by the Japanese government. JSPS's budget for the 2014 fiscal year totals ¥301.2 billion. This amount is divided into

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direct funding of ¥259.8 billion and indirect funding of ¥41.6 billion. The indirect funds are provided in MEXT's budget for program selection and assessment functions performed by JSPS [3]. JSPS's budget transition from 2009 to 2014 with the breakdown of the main items of the budget is shown in Figure 1.

JSPS offers fellowship programs to give opportunities for excellent researchers from around the world to come to Japan to conduct scientific collaboration with their Japanese colleagues. The fellowship programs are applied to all fields of research including the humanities, social sciences, and natural sciences. These programs are addressed to a full spectrum of researchers from young researchers to eminent scientists. The duration of research is flexible from short to long terms. These programs are available to all universities and research institutions in Japan. The fellowship programs are classified into 2 programs: (1) JSPS Postdoctoral Fellowships for Overseas Researchers, and (2) JSPS Invitation Fellowships for Research in Japan.

#### A. *JSPS Postdoctoral Fellowships for Overseas Researcher.*

##### 1) *Standard Postdoc*

The purpose of this program is to provide opportunities for young postdoctoral researchers from overseas to conduct, under guidance of their host, cooperative research with leading research groups in Japanese universities and other institutions. Duration of research is 12 to 24 months, and approximate number of fellowships is 350 per year. This program is eligible for researchers who hold doctorate degree when the fellowship goes into effect, which must have been received within the past 6 years. Terms of award are including round-trip air ticket, overseas travel insurance, monthly maintenance allowance of ¥362,000, settling in allowance of ¥200,000, and Grant-In-Aid for JSPS Fellows of up to ¥1,500,000 per year. This program must be applied by a host researcher in Japan.

##### 2) *Pathway to University Positions in Japan*

The purpose of this program is to promote the employment of overseas researchers in full-time position at Japanese university and research institutions. Duration of research is 12 to 24 months, and approximate number of fellowships is 20 per year. This program is eligible for researchers who hold doctorate degree when the fellowship goes into effect, which must have been received within the past 10 years, and hold a position as an associate professor or equivalent. Terms of award are including round-trip air ticket, overseas travel insurance, monthly maintenance allowance of ¥387,600, settling in allowance of ¥200,000, and Grant-In-Aid for JSPS Fellows of up to ¥1,500,000 per year. This program must be applied by a head of a university or a research institution in Japan.

#### B. *JSPS Invitation Fellowships for Research in Japan*

##### 1) *Long-term for Mid-career to Professor Level*

This program allowed researchers employed at

designated Japanese research institution to invite fellow researchers from other countries to Japan to participate in cooperative activities at their research institutions. Duration of research is 2 to 10 months, and approximate number of fellowships is 80 per year. This program is eligible for researchers who hold a full-time position in an overseas research institution, and hold a position equivalent to a university professor, associate professor or assistant professor in Japan. Terms of award are including round-trip air ticket, overseas travel insurance, monthly maintenance allowance of ¥369,000, domestic research trip allowance of ¥100,000, and research allowance of ¥40,000. This program must be applied by a host researcher in Japan.

##### 2) *Short-term for Professor and Associate Professor*

This program allowed researchers employed at designated Japanese research institution to invite fellow researchers from other countries to Japan for short periods of time to participate in discussions, attend seminars, give lectures, or conduct similar activities at their institutions. Duration of research is 14 to 60 days, and approximate number of fellowships is 240 per year. This program is eligible for researchers who hold a full-time position in an overseas research institution, and hold a position equivalent to a university professor or associate professor in Japan. Terms of award are including round-trip air ticket, overseas travel insurance, daily maintenance allowance of ¥18,000 and domestic research trip allowance of ¥150,000. This program must be applied by a host researcher in Japan.

#### C. *Short-term S for Nobel Prize Level*

Under this program, overseas researchers who have eminent records of research achievements and awards on a Nobel Prize level and who are actively leaders in their field are invited to Japan to give lectures, guide research, and conduct other activities. Duration of research is 7 to 30 days. This program is eligible for researchers who are Nobel laureates or recipients of similarly high-level international prizes with exceptionally outstanding records of research achievements and who currently occupy a leading position in their subject field. Terms of award are including business-class round-trip air ticket, overseas travel insurance, daily maintenance allowance of ¥42,000 and domestic research trip allowance of ¥150,000. This program must be applied by a host researcher in Japan.

JSPS's programs also involve counterpart institutions in overseas. Directorate General of Higher Education, Ministry of Education and Culture (DGHE) and Indonesian Institute of Sciences (LIPI) are the overseas counterpart institutions of JSPS in Indonesia. Indonesian researchers are relatively active to participate on the JSPS program compared to other Southeast Asian countries. The number of researchers exchanged from Asian countries from 2011 to 2013 can be seen in Figure 2.

Fellowships for overseas researchers are also offered by public research institutes and universities in Japan through other schemes. Other public research institutes

and universities who offer the fellowships are as follow.

#### 1) *World Premier International Research Center Initiative (WPI)*

The World Premier International Research Center Initiative (WPI) was launched in 2007 by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in a drive to build within Japan “globally visible” research centers that boast a very high research standard and outstanding research environment, sufficiently attractive to prompt frontline researchers from around the world to want to work in them. These centers are given a high degree of autonomy, allowing them to virtually revolutionize conventional modes of research operation and administration in Japan.

JSPS is commissioned by MEXT to conduct the program’s grant selection and project assessment processes and to perform other administrative functions. The selected projects for WPI is summarized in Table 1 [4].

#### 2) *RIKEN*

RIKEN is Japan’s premier research organization for basic and applied research. Since its foundation in 1917, RIKEN has been building global networks and seeking global talent.

#### 3) *Tsukuba Science City*

It is the largest cluster of science and technology city including about 30% of all national research institutes in Japan (e.g. NIMS). It is also beautiful cosmopolitan city with a lot of green.

#### 4) *JST (Japan Science and Technology Agency)*

The Japan Science and Technology Agency (JST) is one of the core institutions responsible for the implementation of science and technology policy in Japan, including the government’s Science and Technology Basic Plan. From knowledge creation -the wellspring of innovation- to ensuring that the fruits of research are shared with society and Japan’s citizens, JST undertakes its mission in a comprehensive manner. JST also works to provide a sound infrastructure of science and technology information and raise awareness and understanding of science and technology-related issues in Japan [5].

#### 5) *Others*

Other information of research opportunities in Japan can be obtained in Japan Research Career Information Network (JREC-IN) Portal [6]. JREC-IN Portal is an informative portal site that supports the career development and skills building of researchers, research assistants, technicians and other research-related human resources. This website contains a database of information on applicants searching for research jobs and job postings for research and education positions in industry, academia and the public sector. Both applicants and recruiting institutions can browse and search online for postings or individuals that meet their needs. This website also provides other contents and information about networking or other events organized by education or research institutions for the broad career development of researchers.

## SCIENTIFIC PUBLICATIONS

Scientific publications contribute to the diffusion of new codified knowledge mostly to other researchers in the public sector research system but also to those working in firms and in government (policy and regulation). In addition, the process of working towards scientific publication – which demands novelty and quality – has considerable spillover effects on other activities and outcomes associated with public sector research, thereby contributing to innovation. While largely beneficial, too much emphasis on publication performance can lead to the generation of frivolous articles and sometimes to inappropriate behavior. Therefore, the extent to which regular performance evaluations are incorporated into public sector funding regimes will be a factor in shaping contributions to scientific publication output. Availability of funding, proper R&D infrastructures, knowledge networks and quality scientific skills are also important factors influencing the number and quality of scientific publications.

It has become a good practice to control the quality of scientific and publications through the peer review process, which usually involves two or more academic experts reviewing a given manuscript in a double-blind manner, where both reviewers and the author(s) cannot easily identify each other’s names and hence can expect an objective evaluation and revision of an article to make it a genuine contribution to knowledge.

### A. *Writing Scientific Article*

Being capable of publishing in peer-reviewed journals is commonly seen as an indicator of proper scientific research. It is the duty of a researcher to publish his results for the scientific community. Research can be seen as a product that must be sold to the target audience in the form of an article. In other words, research results do not exist before they are successfully published. The key people for getting one’s article accepted for publication are the editor-in-chief, editor, and reviewers. After publication, a well-written article will attract readers, eventually resulting in a scientific impact defined by whether other scientists will cite the article.

Unfortunately, many researchers are far more comfortable conducting scientific experiments than they are reporting and publishing their findings. As a result, a considerable amount of research is not published in a way that adequately expresses its significance [7]. On the other hand, researchers who communicate well are successful in gaining recognition and support for themselves individually, but also for their institution [8]. These are among the motivations as to why it is vital to achieve proficiency in writing scientific journal articles. It is vital for a new researcher to start writing articles as soon as possible. An early start will speed up the learning process. When you are writing, you are forced to think about your substance from different perspectives.

The process of writing an article is initiated by considering the significance of the future article, its importance and potential newness to the scientific community. It is also vital to identify those who might

be interested in seeing your results, i.e. who is the target audience? In addition, it is beneficial to consider the practical implications of your research. A scientific article must be based on research that is conducted scientifically by using accepted methods. An article wraps up research by presenting it clearly and concisely to the scientific community.

The scientific article must answer the following basic questions:

- What is the problem that is addressed?
- Why is it important?
- How did you study the problem?
- What are your results?
- What are the implications of the results?
- What do you recommend as further study for others?

Articles are often written in small groups, which makes it possible to include the views of several people. Writing articles together with co-authors is a good way to obtain necessary feedback for your research. In addition, it is possible to have others to comment on your work, for example by offering favors in return. However, dynamic group work cannot afford freeloaders; everyone involved must have something to offer. Different types of capabilities and backgrounds can be a strength. Nevertheless, working for the same project does not mean your name will automatically appear among the authors of the article, as all the authors are required to provide a positive contribution to the realization of an article. Also, note that some journals limit the number of authors (e.g. four). As a rule of thumb, it is beneficial to include your supervisor as a co-author, if you are a doctoral student. This way you show respect and acknowledge the help you receive as well as maintain the work relationship.

It is beneficial to decide on a target journal during the very early stages of writing an article, rather than first preparing an article and then considering where to send it. Analyze potential journals and choose one. Write your article with your target journal in mind. This is useful because different journals have different perceptions of science as well as differing opinions on how articles ought to be written. By writing directly for your target journal, you will ensure the right type of approach and speed up your writing process. If you wish to be even wiser, you may also choose a secondary target journal for the case that your primary option fails.

Journal articles are commonly recognized above conference papers, even if many of the conference publications use peer review practices. It is recommended that a researcher, even at early stages, should start the learning process of writing for journals. Once experience is gained, one should raise his ambition level step-by-step and aim towards publishing in increasingly better journals. The impact factor is one way to measure the level of journals [9]. Note that this is not an absolute measure and there are differences among different fields of science. A researcher should see conferences as an additional medium for networking and as an avenue to obtain more face-to-face feedback. However, the ultimate

goal should be eventually publishing the work in a journal. A researcher should consider his ambition level and assess the level of his own research when choosing the publication medium.

### *B. Recommended Order of Writing*

According to author's experience the different elements of an article should not be written in the same order as the final layout of the article. The list below presents a recommended order of writing that is proven most efficient, avoiding unnecessary iterations.

- 1) Writing experimental elements
  - Results
  - Analysis
- 2) Research Process
- 3) Finalizing Theory
- 4) Introduction
- 5) Conclusions
- 6) Abstract
- 7) Title
- 8) Final revision

The order of writing presented here highlights the importance of our results for defining the focus of our article. We should define the focus of our article based on the evidence we have. This way we can set the focus of our article relatively early and avoid unnecessary re-working when writing up the theory and other elements of the text.

It is sensible to start writing an article by outlining the subject matter and content by a few bullet points or key words. This phase will act later as an aid in writing the introduction.

After outlining the initial ideas, we can try to find a suitable target journal. Once selecting a potential target journal, outline the initial theory for our article. After this, we will need to concentrate on the core: the "heart and soul" of our article and write the results and analysis of our research. Once we have these elements, it may be worth reviewing our target journal selection. If there are any reasons to change, pay attention to the potentially different format and other requirements, such as the recommended article length that our new target journal may have. Once we have the core substance ready, we can concentrate on elements critical for acceptance; the introduction, the discussion and the abstract.

Writing one's first journal article usually takes several months of intensive work, but later, through experience, the process will speed up significantly. Novice authors should especially bear in mind the importance of multiple iterations. Once we have written a paragraph, do not believe it is the final version. When we have written the other sections to our article, we will most likely have to return to this previously written paragraph, re-analyze its content, consider its place and even the justification for its very existence in the final article.

### *C. Tips for Writing Article Elements*

An article typically constitutes the following sections and elements:

- Title
- Abstract
- Introduction

- Theory/Literature review
- Research method/ process
- Results (sometimes divided into results & analysis/discussion)
- Conclusions

There are a lot of writing guides available which provide advice on the structure of proposed articles. One example is the commonly known IMRAD (Introduction, Method, Results and Discussion) structure [10]. The terminology may differ somewhat, as for example in the IMRAD scheme the literature review is integrated into the Introduction section, however, the above list presents the literature review separately. Also, discussion, which D stands for in IMRAD, is the same as conclusions in the above list. Discussion in the above list covers the interpretation of the result by the researcher. This again slightly differs from the IMRAD model. To sum up, there is no commonly accepted right structure and terminology. The differences between journals are, however, marginal, once you have understood the essence of the key elements. The best solution for a researcher is to follow the structure and terminology of their target journal.

The following will provide tips for each individual section.

#### 1) Title

When considering a title for an article, do familiarize yourself with the types of titles in the target journal, analyze whether they are more general or very specific. The editors-in-chief may want the article titles to sell and gain clicks. This is why in some cases a more general title is better than an overly specific one. Avoid abbreviations in the title as well as unnecessary "and" words. Fundamentally, a very long title is not good as the reader may have difficulties in perceiving the content. Again, there are some journal and field specific differences in the types of titles, and following the practices of the target journal is the best approach. The suitable title length depends on whether the target journal favors indicative or informative titles. Journals favoring short indicative titles may, for example prefer titles with less than eight words. On the other hand, other journals may prefer long informative titles. However, researchers ought to attempt simplifying their titles even when longer ones are allowed.

#### 2) Abstract

The Abstract is one of the most central elements of our article, luring other people to read it and may also influence the acceptance of the article. An abstract must describe the purpose of the article. Moreover, it must describe how we have realized our research and provide few key findings and any practical implications. We can build our abstract by answering the following questions with one or two sentences for each one:

- What is the bigger, more general field the article relates to?
- What is the purpose of the article?
- What methodology did we use?
- What are the key results?
- What are the practical implications of the research

(how can the results be utilized by e.g. practitioners, society or companies)?

The target journal may have some specific requirements related to formulating the abstract, such as word count. Should the target journal require a structured abstract, please follow their instructions. In addition to a conventional written abstract, some journals also use graphical abstracts, i.e. the authors include an illustration to accompany the text.

The Abstract is typically followed by key words. Follow the practices of the target journal when defining the key words.

#### 3) Introduction

The Introduction justifies the significance of the subject matter and connects your work to previous research. This chapter can also include a definition of the key terms, if necessary. In reality it is better to use a limited number of terms and be consistent in their use. One rarely needs to invent completely new terms even when discussing something totally new. It is essential for the author to understand the true meaning of the terms used and be able to communicate them clearly.

Start the Introduction with sentences that are adequately general, and simple enough to understand even for those who are not experts in exactly the same topic as our article. This way different type of readers can position our article into previous research more easily. Aim to motivate the reader and help them understand why our research topic is important. Utilize published journal articles, preferably recent ones, to point out the importance of our research by highlighting how it relates to them. This will please editors who want the scientific discussion to occur in their own medium.

The research problem the article aims to address must be described at the end of the introduction. One recommended way to deepen the description is to use research questions or hypotheses. Research questions help the reader to perceive the content of our article and the author to structure his thoughts and writing. The reader may also use the research questions to reflect the reasoning while reading through the article. When using research questions, the author must remember that the questions can be changed or adjusted during the writing process. It is also imperative that the research questions and later results match in the final version of the article.

#### 4) Theory/Literature Review

One can start writing the literature review by finding a few good articles, of which some are from the target journal, and maybe a few good books discussing our topic. Later on use these articles as a base and expand our literature review. Typically, finding one good article relevant to our research starts a chain reaction as some of the references in that article may also be relevant to your work. Write a summary of a few pages based on these articles and books. This will help in obtaining a relevant understanding of our research topic and will act later as a frame for the theoretical part of our article.

Write the theory to support the storyline of the article. Note that it is not customary to describe the

development of our own understanding in an article, but describe what others have studied that is relevant to our topic. The purpose of a literature review is not to present all possible references, but to concentrate on those that are relevant for the focus of our article. The literature review will position our research in relation to previous literature; therefore cite articles on which our research is based. Aim to depict the state of research relevant to our article before our study. We can reflect our results against the previous literature in the discussion section of our article. Minimize self-citations; only cite our own previous work if absolutely necessary.

It is wise to finalize the theory only after writing up the results of the article. This way we can once more search for related studies and can thus better focus the literature review to match our results.

#### 5) *Research Method/Process*

The article must describe our research, the set-up and research methods precisely. This way the reviewers can assess the scientific basis of our research and the justification of our results. In principle, the research method/process should be described so that another researcher can repeat the study. We must prove that the methodology we have chosen is robust and applicable for our study. Should we use research methods that are established in our field, it is enough to cite the methods and there is no need to describe these aspects in detail.

#### 6) *Result and Discussion*

Having completed the experimental research and having analyzed the results, it is time to write up and summarize the results as well as the analysis. The experimental section of a journal article must concentrate on the actual analysis of the material, not on documenting the data. Note that this differs from writing for other purposes, such as writing a research report.

Consider what the key results of our research are and present them clearly. Build the Results section of our article around these key results. Present the results in such an order that their logic is as easy for an outsider to understand as possible. Should we not have any better way to decide the order of presentation, use the funnel principle; from more general to more specific points. Remember to highlight the key results by using visual elements, such as lists, illustrations/figures and tables. This way, anyone who quickly ruffles through the article will focus on the key results and will automatically get a level of conception of the results.

We may include a Discussion section at the end of the results section to explain and contemplate the results. The discussion can either be a part of the Results section or a separate section of its own, whichever is in line with the practices of the target journal. Please note that the reader must be able to separate easily the research facts from the researcher's own thinking.

#### 7) *Conclusions*

The Conclusions section, alongside the Abstract and Introduction, is one of the core elements of a journal article. The Conclusions section can be written up by using the following structure (one paragraph each):

- Introduction
- Results (one paragraph for each research question)
- Significance of the research/practical implications, for example for the society, or business companies
- Limitations
- Recommended topics for further study

The Conclusions must be in line with the previous sections and should not present totally new results. The implications should, however, be discussed

#### CONCLUSION

Research collaboration and scientific publications from researchers are very important for universities or research institutions as a tool to be a world-class university/institution. This article gives information on the research opportunities in Japan and summarized tips for writing a scientific article to be published in international journal.

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