Country Report – Japan

STINT
The Swedish Foundation for International
Cooperation in Research and Higher Education

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Background

Recognising the importance of intelligence and analyses for the development of international strategies for higher education and research on various levels within the knowledge system, STINT has compiled a series of brief country reports with a focus on the academic profile and performance.

Released as a pilot series of three countries – Brazil, Japan, and South Africa – these country reports aim to provide national overview using current and reliable data. They give insight into each country's higher education system as well as its respective demographic and economic context.

The intention is that both policy-/decisionmakers and practitioners within the Swedish higher education system will utilise these reports in furthering international strategic collaboration on various levels.

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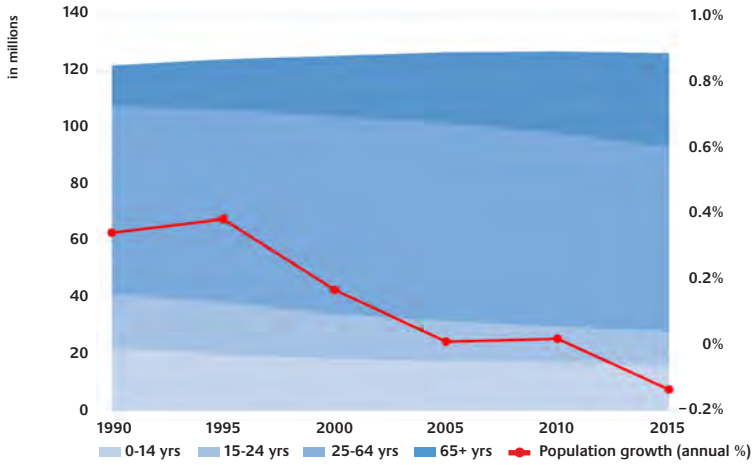
Country data

Since the end of the Second World War Japan has been at the forefront of Asian and global development. The phenomena of Japanese development, often dubbed 'the Japanese miracle', saw staggering degrees of economic growth in the post-war period. Although factors such as economic growth and demographics have been key in propelling Japan's development the very same factors have also mired its development in recent years.

Figure 1. **Japan – Demography & population**[1]

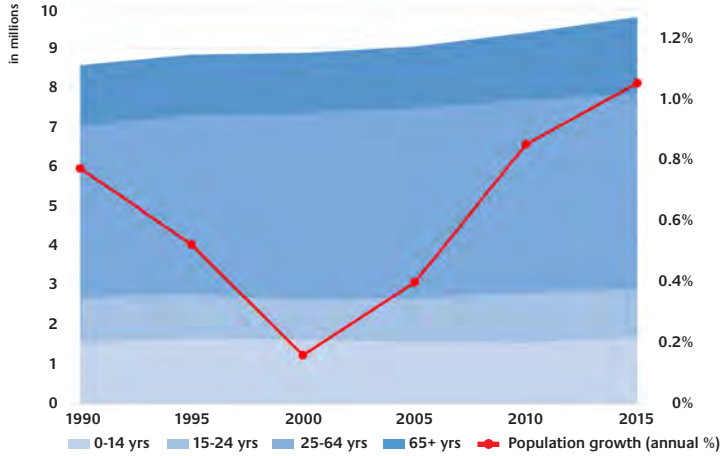


The unique combination of a fertility rate that has been below the replacement rate since 1974, the longest life expectancy of any OECD country and a nearly inexistent immigration has given Japan an advanced and inverted demographic profile that is at the frontier of global demographic transition. Its total population peaked in 2010 at 128 million and is believed to reach its 1984 levels of 119 million by 2030.[1]

[1] Liu & Westelius (2016) 'The Impact of Demographics on Productivity and Inflation in Japan', IMF Working Paper, accessed on 20/1/2017

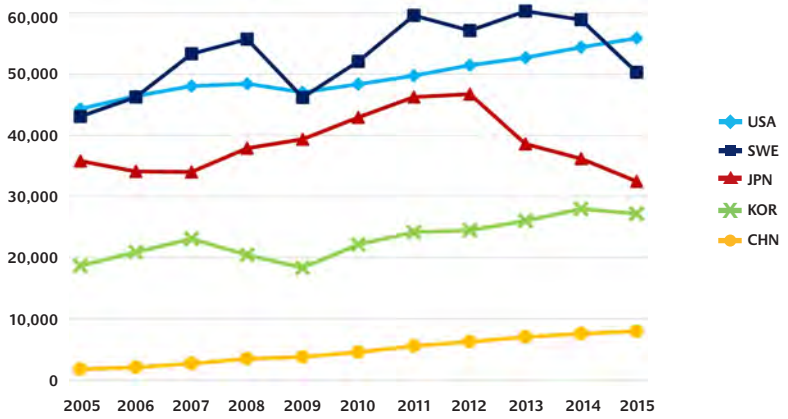
Though Sweden share similar demographic challenges its demographic profile is not in such an advanced stage as that of Japan. With a high life expectancy and a decreasing birth rate, the older demographic groups in Sweden are also increasing in both numbers and percentage causing increased dependency ratios. Although similarly troubled by sub-replacement fertility rates the scenario in Sweden is bolstered, both demographically and economically, by strong net migration rates.

Figure 2. **Sweden – Demography & population**[1]



Many of Japan's demographic challenges have also been compiled by its economic woes. With a sluggish economic growth, rampant central government debt (believed to reach 240% of national GDP by 2018) and a long term economic stagnation, the swiftly decreasing working age population will have to run ever faster to sustain itself.[2]

Figure 3. **GDP per capita (current USD)**[3]



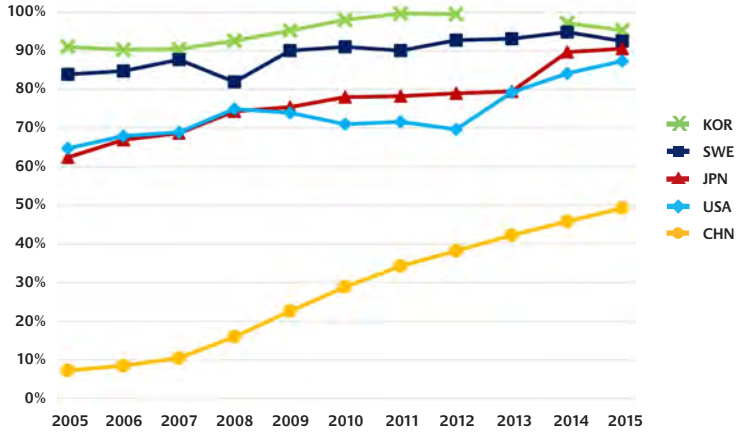
[1] Liu & Westelius (2016) 'The Impact of Demographics on Productivity and Inflation in Japan', IMF Working Paper, accessed on 20/1/2017

[2] N.B. For all country codes the official ISO 3166 has been used as follows: SWE-Sweden, USA-United States of America, JPN-Japan, CHN-China, KOR-The Republic of Korea

[3] World DataBank: World Development Indicators, accessed on 22/12/2015

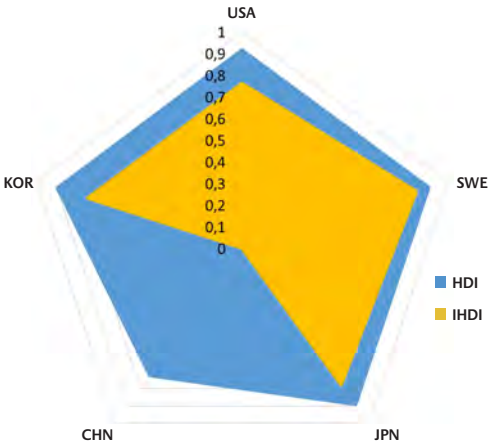
With an advanced ICT economy in both industry and users Japan places itself in the top ten most developed countries in the world according to the ICT development index.[4] This high level of ICT development appear all the more striking when looking at some of the country's issues with regional development. With extremely high levels of urbanisation – the metropolitan areas of Tokyo, Osaka and Nagoya alone inhabit 46% of the country's population[5] – matters of not only transport infrastructure but also communication connectivity in the sparsely populated countryside becomes key. Nevertheless Japan maintains a high level of internet penetration (90.58%) and has with its 109,3 million the world's fifth largest population of internet users.

Figure 4. **Share of internet users**[6]



With regards to the UNDP indices in Figure 5, Japan has a Human Development Index (HDI) of 0.891, placing itself in the upper end of the reference countries and in a very high human development category. Positioning itself as the 7th highest in Asia and the Pacific and 20th of 188 countries surveyed globally.[7] Though a corresponding drop of 12.4% is seen when discounting Japan's HDI value for inequalities (Inequality-adjusted HDI, IHDI) the decrease is in fact lower than both many other Asian countries and the global average of its development category. As a contrary example we can see that when looking at the IHDI index value in the Swedish case the drop is significantly smaller and the country in fact climbs in international rankings.

Figure 5. **UNDP indices 2014**[8]

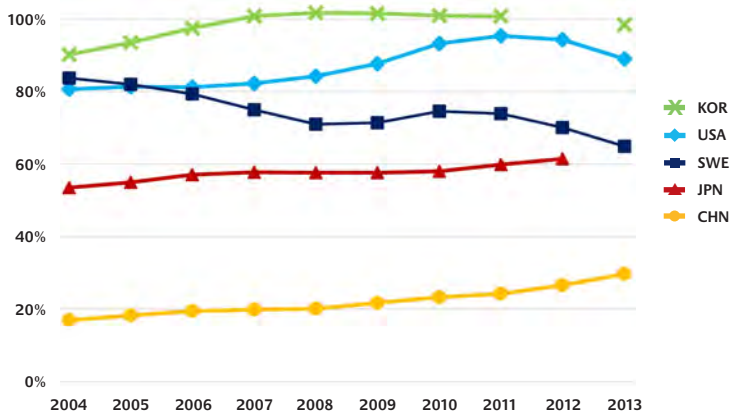


[4] ITU (2016) 'Measuring the Information Society Report 2016', accessed on 20/1/2017, p. 12
[5] OECD (2016) OECD Territorial Reviews: Japan 2016, p. 15, accessed on 27/12/2016
[6] World DataBank op cit
[7] UNDP (2015) Human Development Report 2015: Japan Briefing note, accessed on 21/1/2017.
[8] UNDP: Human Development Reports, accessed on 13/1/2016, no data point for Chinese IHDI value available.

Academic Profile: National level

Though the tertiary enrolment rates appear low in international comparison in figure 6, between 2000-2012 the proportion of tertiary educated people in Japan increased from 34% to 47%. These improvements in tertiary education attainment rates could also be seen with Japanese women although the gender differences remain large. Whereas 92% of Japanese men with a university-level degree are employed, that figure for women is only 69%. And on average a tertiary educated women in Japan earns only 48% of what a similarly educated man does.[9] In the country's pursuit of increased productivity women remain an unused asset in the labour force.

Figure 6. **Gross enrolment, tertiary, both sexes (%)**[10]



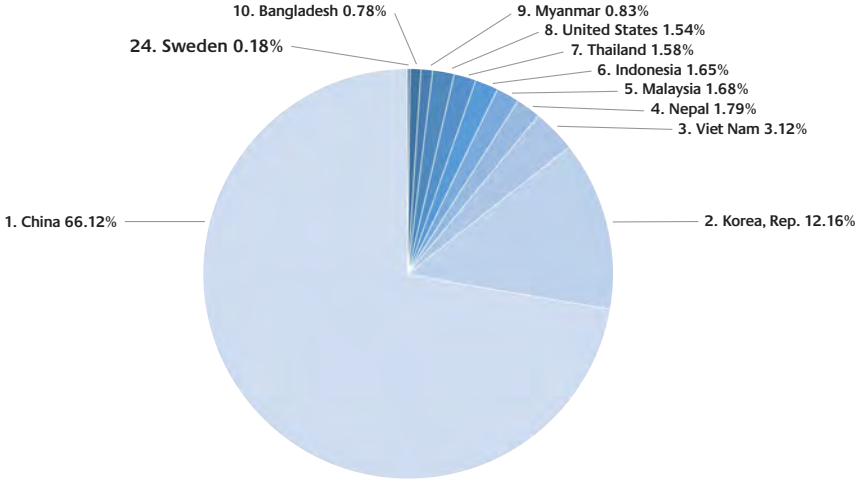
An indication to the quality and strong regional presence of Japanese higher education is given when looking at the student mobility flows in figures 7-8. With regards to incoming international student mobility we can see a dominance by students of Chinese nationality. Furthermore this incoming mobility is almost exclusively regional in nature, in fact 81% of foreign students in Japan come from its neighbouring countries and 94% from Asia.[11]

The strong regional identity of Japanese higher education become apparent when looking at the significant degrees of international incoming student mobility in figure 7. Dominated by the incoming mobility of Chinese students, the mobility overall remain quite regional in identity. On the other hand looking at figure 8 we can see that Japanese students themselves are more sedentary. Despite government study abroad initiatives and scholarship programmes, such as the 'Tobitate! Ryugaku Japan' programme launched in 2013, the OECD estimates that only 1% of Japanese students are enrolled abroad.[12]

[9] OECD (2014) Education at a Glance 2014: Country Note Japan, accessed on 23/1/2016, p. 9
[10] United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, accessed on 25/04/2016
[11] OECD (2014) op cit, p. 4
[12] Statistics, accessed on 22/12/2015

Percentage of total mobile student population – IN

Figure 7. **Japan – Tertiary-level student inflow – 2012**[13]

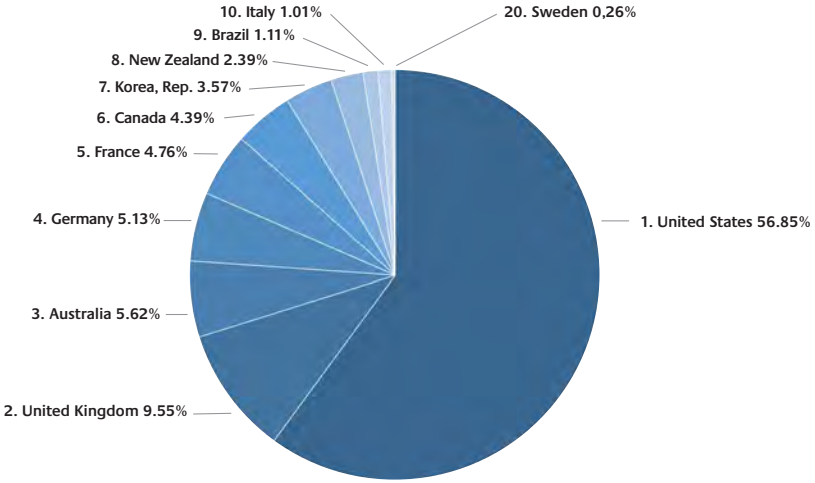


Rank	Country of origin	Mobility volume	% of total student population
1	China	89,788	2.31%
2	Korea, Rep.	16,509	0.42%
3	Viet Nam	4,241	0.11%
4	Nepal	2,426	0.062%
5	Malaysia	2,275	0.059%
6	Indonesia	2,244	0.058%
7	Thailand	2,150	0.055%
8	United States	2,098	0.054%
9	Myanmar	1,133	0.029%
10	Bangladesh	1,054	0.027%
24	Sweden	241	0.0062%
	Total student pop:	**3,884,638**	**100%**

[13] United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, accessed on 22/12/2015

Percentage of total mobile student population – OUT

Figure 8. **Japan – Tertiary-level student outflow – 2012**[13]

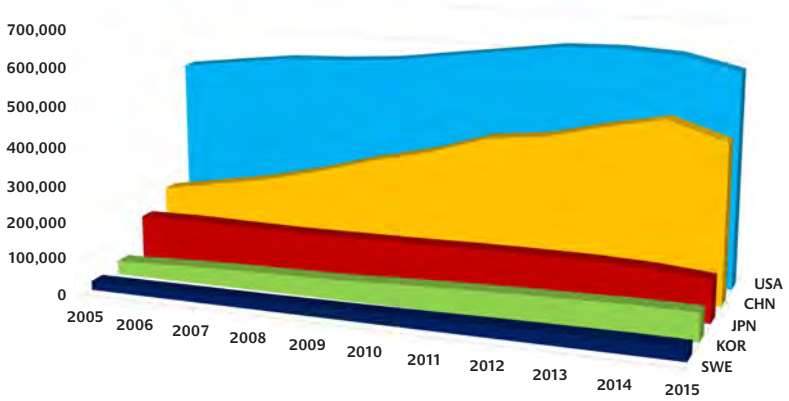


Rank	Country of origin	Mobility volume	% of total student population
1	United States	18,381	0.47%
2	United Kingdom	3,089	0.080%
3	Australia	1,817	0.047%
4	Germany	1,658	0.043%
5	France	1,540	0.040%
6	Canada	1,419	0.037%
7	Korea, Rep.	1,154	0.030%
8	New Zealand	774	0.020%
9	Brazil	358	0.0092%
10	Italy	326	0.0084%
20	Sweden	85	0.0022%
	Total student pop:	**3,884,638**	**100%**

[13] United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, accessed on 22/12/2015

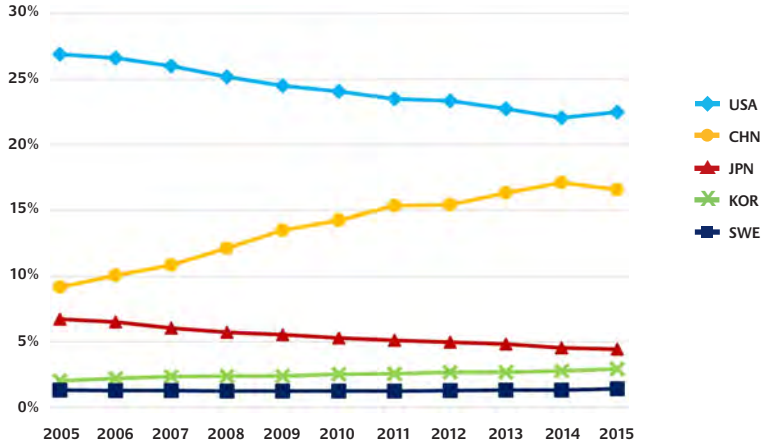
In the early 2000s Japan had an overall output that equalled that of the United Kingdom. Though in comparison to its regional neighbours, where countries like China and South Korea have seen severalfold increases in publication volumes, Japanese figures have been mostly stagnant. Nevertheless Japan remains responsible for 16.8% of all publications in the Asia-Pacific region, and is as such the second largest contributing country after China.

Figure 9. **Annual volume of scholarly publications**[14]



With over 5% of all global scholarly publications between 2005-15 Japan remains a world leader, only falling behind USA, China, UK and Germany. Nevertheless looking at figure 10 we can also see a stagnating trend in Japan's global influence over the last ten years.

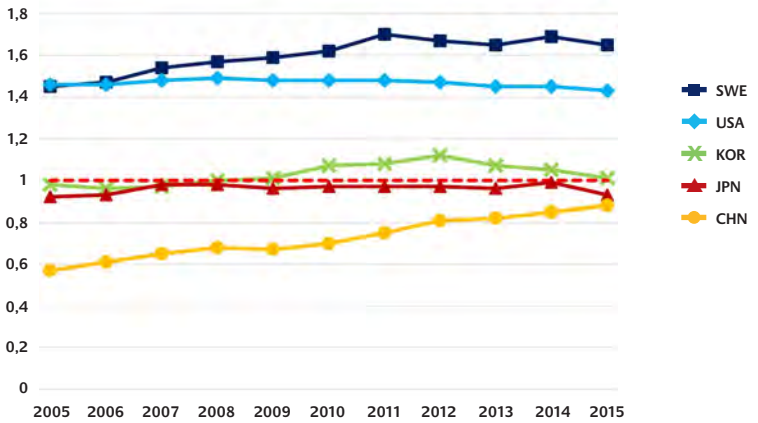
Figure 10. **Global share of scholarly publications** (%)



[14] All the data included below has been collected from SciVal® database, Elsevier B.V., http://www.scival.com, accessed on 18/1/2016

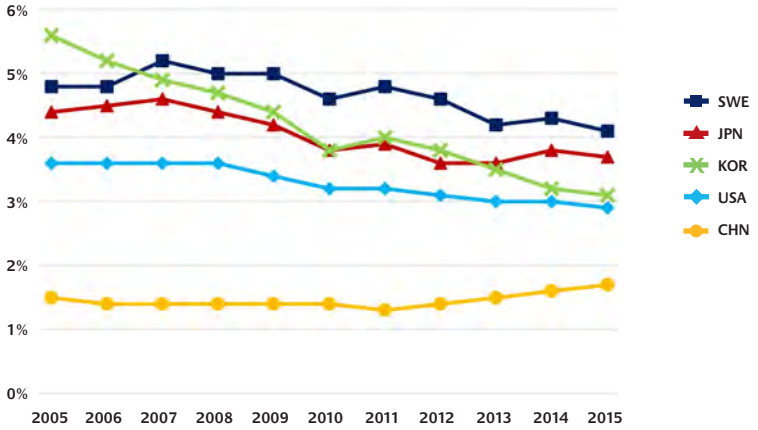
Looking at the quality of said publications in figure 11, through using an index measuring the field-weighted citation impact (FWCI), we see that Japan has remained below the world average (shown below as index value 1) over the last ten years. Consequently, placing itself just below Argentina and South Korea as well as just above Thailand and Nepal.

Figure 11. **Quality of scholarly publications, FWCI**[15]



The international steading of Japan's higher education system becomes even further apparent when looking at its innovation system. Japan alone is responsible for 18% of all patents filed in the world and 29% of all patents granted.[16]
With strong innovations systems both Japan and Sweden also have strong dispositions for academic-corporate collaborations in their publications. And both countries place themselves not only in the upper strata of the referenced countries but also amongst the top five in the world.

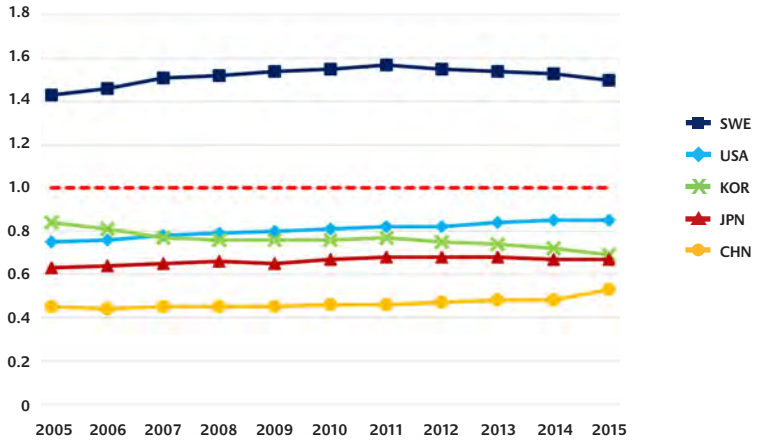
Figure 12. **Academic-Corporate Collaboration, publications with both academic and corporate affiliations (%)**



[15] Field-Weighted Citation Impact (FWCI) is the ratio of citations received and citations expected from the average in its field of study.
[16] Elsevier (2015) 'World of Research 2015: Revealing patterns and archetypes in scientific research', Elsevier B.V., p. 155

Although a recent study by the The Guardian showed Japan to be the 7th most attractive study destination in the world,[17] a somewhat different image emerges when looking at international mobility in research. In terms of international collaboration, measured as a Field-weighted internationalisation score (FWIS) in figure 13, the make up of the referenced countries is more polarised. With Sweden placing itself well above the world average with an index value of 1.5, more than twice as high as that of Japan. Though the lack of internationalisation in Japan's higher education system has not gone unnoticed by its government. Several initiatives have aimed at addressing this dilemma, such as the Top Global University Project launched by the Ministry of Education in 2014 which has set out an ambitious university reform programme to assist 37 leading Japanese universities in enhancing their international competitiveness and compatibility.

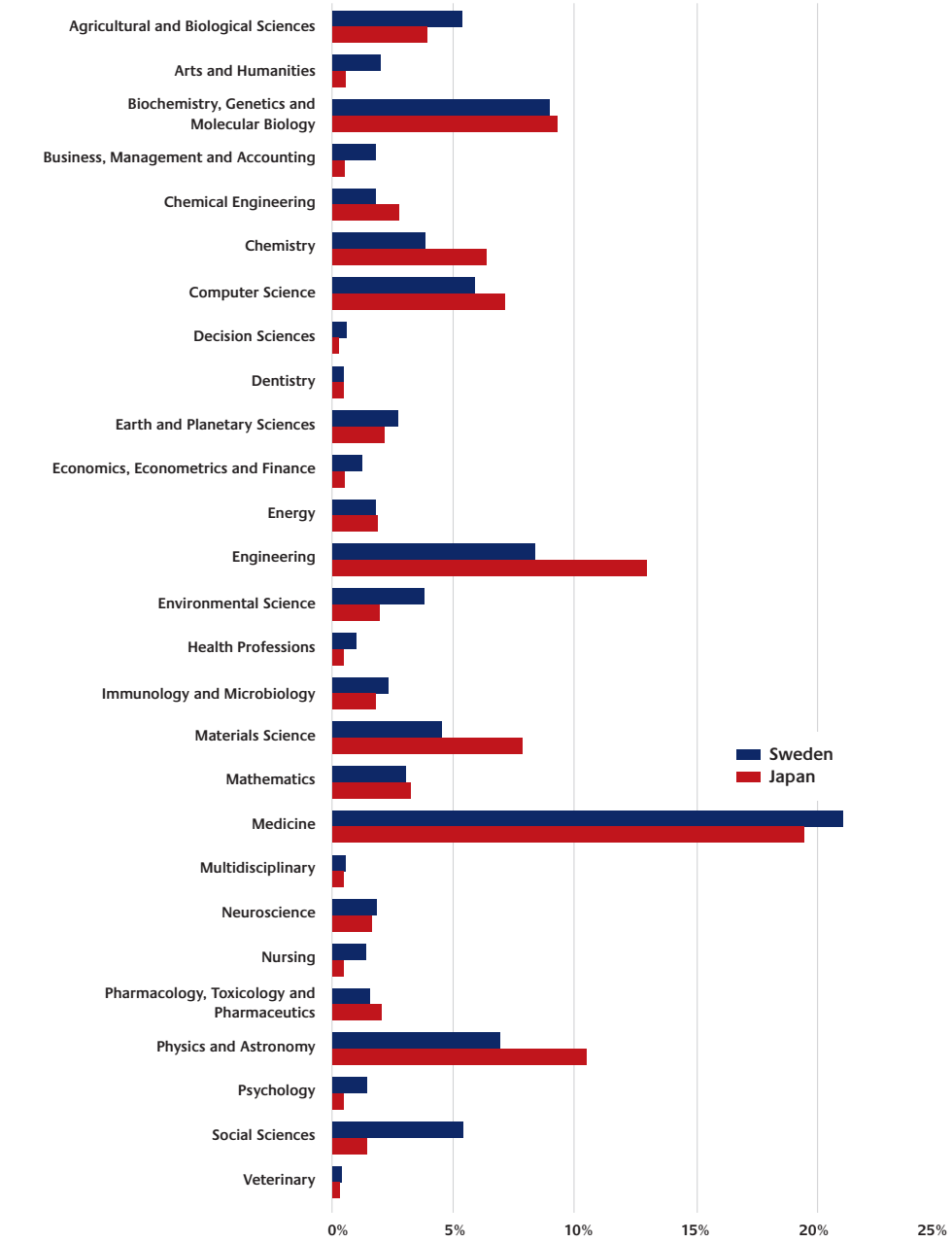
Figure 13. **International collaboration, in Field-weighted internationalisation score (FWIS)**



Looking at the composition of the Japanese and Swedish publications by their corresponding fields of study in figure 14, we can see the strong dominance of the technical and natural sciences in Japan. In particular Japan displays a strong affinity for engineering, materials science, physics and astronomy. Whereas the social sciences, medicine, agricultural and biological sciences are more pronounced in the Swedish case.

[17] The Guardian (2014) 'Top 20 countries for international students', accessed on 25/1/2017

Figure 14. **Publications by journal category – 2011-15 (%)**

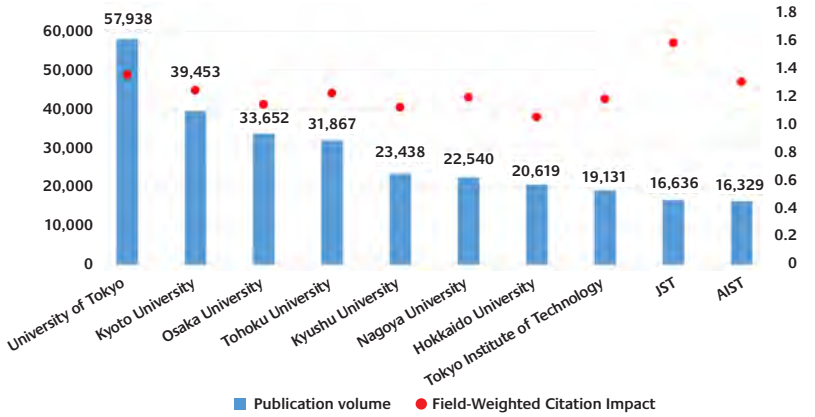


Academic profile: Institutional level

Looking closer at the ten most published institutions in Japan we see the prominent place of the University of Tokyo amongst the country's 86 national universities. The Univeristy of Tokyo is responsible for at least 40% more publications than any other university in Japan.

Though when looking at the quality of said publications we see a more equal distribution with the second tier of Japanese universities. In fact we even see an increase in publication quality with the smaller, technical institutes, giving credence to Japan's reputable international performance in the STEM subjects. Lastly when looking at the degree of international collaboration, we see no vast improvements on the institutional level, instead all referenced universities place themselves around the national average and well below world average.

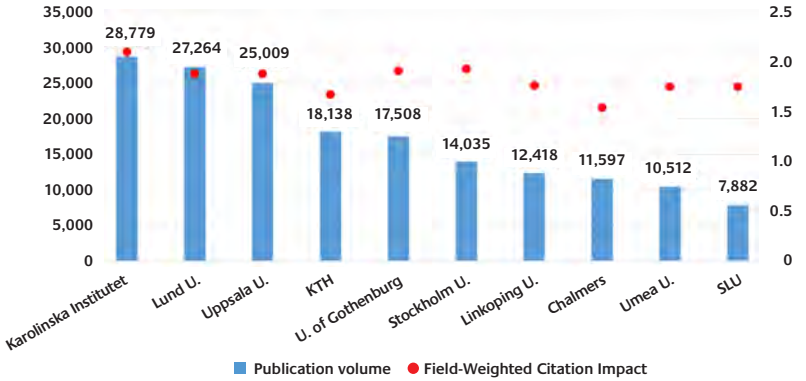
Figure 15. **Japan – Ten most published institutions, by volume and quality (FWCI) 2011-15**



Institution	Number of publications	% of all JPN publications	FWCI	FWIS
University of Tokyo	57,938	8.91%	1.35	0.74
Kyoto University	39,453	6.07%	1.24	0.72
Osaka University	33,652	5.17%	1.14	0.66
Tohoku University	31,867	4.90%	1.22	0.76
Kyushu University	23,438	3.60%	1.12	0.71
Nagoya University	22,540	3.47%	1.19	0.68
Hokkaido University	20,619	3.17%	1.05	0.67
Tokyo Institute of Technology	19,131	2.94%	1.18	0.72
Japan Science and Technology Agency	16,636	2.56%	1.58	0.57
National Institute of Advanced Industrial Science and Technology	16,329	2.51%	1.30	0.6
Japan	650,434	100%	0.97	0.68

Comparing the same cross-sectional perspective with the Swedish case, we see that the total publication output of Sweden is less than a third of Japan's overall output. Nevertheless when looking at the field-weighted citation impact of these publications we see a vast improvement in quality with the Swedish national average as well as its most prolific institutions. We also find a closer tie between the top three institutions and a more equitable relation between the remaining institutions in terms of output, publication quality and international collaboration.

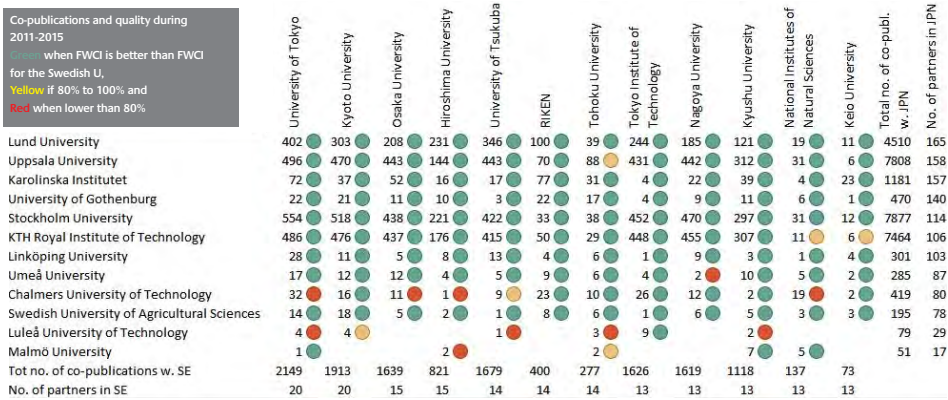
Figure 16. **Sweden – Ten most published institutions, by volume and quality (FWCI) 2011-15**



Institution	Number of publications	% of all SWE publications	FWCI	FWIS
Karolinska Institutet	28,779	16.03%	2.10	1.62
Lund University	27,264	15.19%	1.88	1.51
Uppsala University	25,009	13.93%	1.88	1.49
KTH Royal Institute of Technology	18,138	10.10%	1.67	1.59
University of Gothenburg	17,508	9.75%	1.91	1.43
Stockholm University	14,035	7.82%	1.93	1.42
Linkoping University	12,418	6.92%	1.76	1.34
Chalmers University of Technology	11,597	6.46%	1.54	1.41
Umea University	10,512	5.86%	1.75	1.42
Swedish University of Agricultural Sciences	7,882	4.39%	1.75	1.45
Sweden	176,494	100%	1.68	1.54

When looking at the co-publication pattern between Sweden and Japan in figure 17, two of the most striking points are the extent of co-publications between both countries and the overall quality of these publications compared to Swedish institutions' respective average. The University of Tokyo has co-publications with 20 Swedish institutions and Lund University has the broadest collaborations with 165 Japanese institutions.

Figure 17. **Sweden-Japan co-publication matrix**



Co-publications and quality during 2011-2015 Green when FWCI is better than FWCI for the Swedish U, Yellow if 80% to 100% and Red when lower than 80%	University of Tokyo	Kyoto University	Osaka University	Hiroshima University	University of Tsukuba	RIKEN	Tohoku University	Tokyo Institute of Technology	Nagoya University	Kyushu University	National Institutes of Natural Sciences	Keio University	Total no. of co-publ. w. JPN	No. of partners in JPN
Lund University	402	303	208	231	346	100	39	244	185	121	19	11	4510	165
Uppsala University	496	470	443	144	443	70	88	431	442	312	31	6	7808	158
Karolinska Institutet	72	37	52	16	17	77	31	4	22	39	4	23	1181	157
University of Gothenburg	22	21	11	10	3	22	17	4	9	11	6	1	470	140
Stockholm University	554	518	438	221	422	33	38	452	470	297	31	12	7877	114
KTH Royal Institute of Technology	486	476	437	176	415	50	29	448	455	307	11	6	7464	106
Linköping University	28	11	5	8	13	4	6	1	9	3	1	4	301	103
Umeå University	17	12	12	4	5	9	6	4	2	10	5	2	285	87
Chalmers University of Technology	32	16	11	1	9	23	10	26	12	2	19	2	419	80
Swedish University of Agricultural Sciences	14	18	5	2	1	8	6	1	6	5	3	3	195	78
Luleå University of Technology	4	4			1		3	9		2			79	29
Malmö University	1			2			2			7	5		51	17
Tot no. of co-publications w. SE	2149	1913	1639	821	1679	400	277	1626	1619	1118	137	73		
No. of partners in SE	20	20	15	15	14	14	14	13	13	13	13	13		

The Swedish Foundation for International Cooperation in Research and Higher Education, STINT, was set up by the Swedish Government in 1994 with the mission to internationalise Swedish higher education and research.

STINT promotes knowledge and competence development within internationalisation and invests in internationalisation projects proposed by researchers, educators and leaderships at Swedish universities.

STINT promotes internationalisation as an instrument to:

- Enhance the quality of research and higher education
- Increase the competitiveness of universities
- Strengthen the attractiveness of Swedish universities

STINT's mission is to encourage renewal within internationalisation through new collaboration forms and new partners. For example, STINT invests in young researchers' and teachers' international collaborations. Moreover, STINT's ambition is to be a pioneer in establishing strategic cooperation with emerging countries in research and higher education.

STINT
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