Influence of International Collaboration on the Research Citation Impact of Young Universities

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Introduction

It is widely presumed that international collaboration benefits the researchers and the organisations involved, and enhances the quality of research (Persson, 2010). However, research also suggests that the effects of international collaboration may vary across disciplines and the authors' countries (Moed, 2005).

In this study, we investigated the effect of international collaboration on the impact of publications of selected young universities, and compared to that of renowned old universities. The 5-year citations per paper (CPP) data, the international collaboration rate, the CPP differential between publications with and without international collaborations, and the difference between the percentages of international collaborated publications falling in the global top 10% highly cited publications and the percentage of overall publications falling in the global top 10% highly cited publications (Δ%Top10%) are used as the impact indications. These data are extracted from the Thomson Reuters Web of Science (WoS) database and Essential Science Indicator (ESI) based on papers published from 2004 to 2013. Young institutions ranked by the 2014 Times Higher Education (THE)'s 100 under 50 Universities are selected in this study, and some renowned universities (> 100 years old) are selected as references for "old universities".

To eliminate the discipline difference effect, the increment of 5-year (2010-2014) field weighted citation impact (FWCI) of internationally collaborated papers over the 5-year overall FWCI of the institutions in SciVal® of Elsevier is used as another indicator. The collaboration among 8 old institutions and 8 young institutions are investigated.

Results and Discussion

Correlation between International Collaboration rate and CPP in 5-year interval

Figure 1 shows the 5-year ESI CPP trends as a function of 5-year international collaborations rate trends for selected young and old universities. While old universities have higher CPP in general, there are strong correlation between international collaboration rate trends and 5-year CPP trends. For example, for old universities, the CPP increased 4.12 for every 10% increase in international collaboration rate for MIT, 3.42 for Univ Oxford, and 3.01 for Stanford Univ. Among young universities, for Nanyang Technol Univ (NTU), it is 2.24 CPP per 10% Intl Collab increment, and that for Plymouth Univ is 3.02, and 0.73 for King Fahd Univ of Petr and Min.

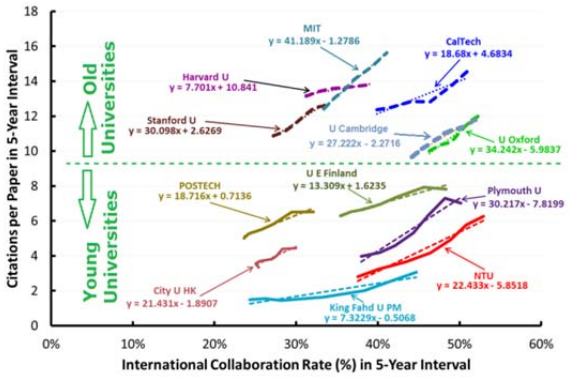

Figure 1. 5-Year CPP Trends vs. 5-Year International Collaborations Rate Trends for Selected Young and Old Universities.

The ΔCPP trends for publications with and without international collaborations for selected institutions are examined, and listed in Table 1.

Table 1. 5-Year Citations per Paper Differential between Publications with and without International Collaborations.

5-Year Period	Citations per Paper Difference between Publications with and without International Collaboration											
	Caltech	U E Finland	Univ Florence	Univ Tsukuba	Univ Melbourne	Univ Waikato	Kyushu Univ	MIT	NUS	HKUST	NTU	USM
2004-2008	5.5	3.04	3.59	5.19	4.5	2.68	2.26	3.24	0.78	1.03	0.2	1.08
2005-2009	5	3.38	3.68	5.65	4.06	1.68	2.62	3.25	0.66	1.44	0.51	0.97
2006-2010	4.2	3.42	3.79	4.87	4.3	2	2.55	3.38	0.63	0.55	0.43	0.65
2007-2011	4.2	4.1	3.91	4.85	4.42	2.1	1.85	2.68	0.82	1.33	0.47	0.11
2008-2012	4.8	4.44	4.38	4.65	4.77	2.86	1.75	2.29	1.28	1.44	0.05	-0.3
2009-2013	6.1	5.28	5.3	5.2	4.87	3.61	2.4	2.16	1.67	0.87	0.02	-0.7
ESI 2009-2013 CPP	15	8.53	7.68	6.48	8.66	5.43	5.28	15.7	7.83	6.7	6.92	3.47

From Table 1, we can find that in the case of Caltech, U Melbourne and U Tsukuba, the CPP difference between their international collaborated

publications and their publications without international collaboration is roughly 4 to 5. This explains the typical 5-year ESI CPP vs. international collaboration rate trends of these institutions: with the increase of international collaboration rate in their publications, the overall CPP of their papers has more weight from their international collaborated publications, and the overall CPP of their publications increased. Yet, for Hong Kong Univ of Sci & Techn (HKUST), Natl Univ Singapore (NUS) and NTU, the CPP gaps between publications with and without international collaboration are relatively small (around 0 to 1 CPP). This is because the fact that these institutions have attracted a lot of researchers with international background to work in these institutions, which makes the difference between their national research and international collaborated research relatively small.

Trends of difference between percentage of international collaborated publications falling in global top 10% highly cited publications and that for all publications (Δ%Top10%)

The study on difference between the percentage of international collaborated publications for an institution falling in the ESI global top 10% highly cited publications and the percentage of all publications of the same institution falling in the ESI global to top10% highly cited publications (Δ%Top10%) shows that, for all the selected young and old institutions, this difference is generally positive, means that internationally collaborated publications generally have a higher rate of high citation publications among all publications. Yet, this difference varies from one institution to another institution. For some renowned top universities like Caltech, Stanford University and University of Cambridge, although their overall CPP for their publications is already very high, the Δ%Top10% is still higher than the percentage of their overall publications falling in the global top 10%. Further investigation is needed to have an adequate explanation for this phenomenon.

Increment of field weighted citation impact (FWCI) of internationally collaborated papers over the FWCI of the involved institutions

Figure 2 shows the increment of FWCI for internationally collaborated papers over the overall FWCI of the two collaborating institutions among the selected 8 old institutions and 8 young institutions. 57 bilateral collaboration couples with 50 and more collaborating publications are identified among these 16 institutions, and the FWCI increment data for these collaboration couples are include in the plot. It can be seen that, international collaboration benefits both the young and the old institution, with the old institution to old institution collaboration provides the highest FWCI increment, followed by the old institution to young institution collaboration. Among the 57 bilateral collaborations, only 3 involved young institution to young institution collaboration, indicating that there are untapped potential for enhancement on bilateral collaboration among young institutions.

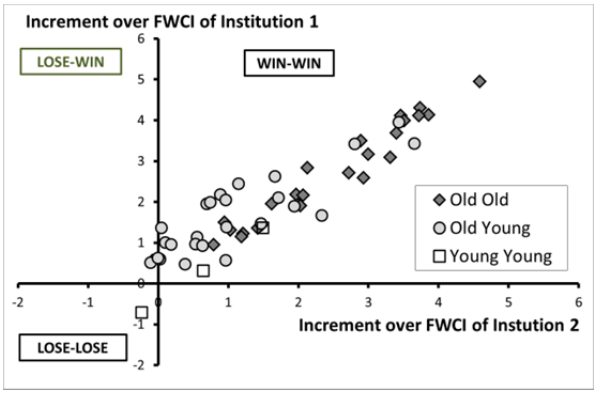

Figure 2. Increment of 5-year FWCI of internationally collaborated papers over the overall FWCI of the involved Institutions.

Conclusions

The investigation on the effect of international collaboration on the impact of publication of selected young universities and well established renowned universities show that, both young and old institutions received benefit from international collaboration using citation impact of their publications as indicator. For example, for old universities, the CPP increased 4.12 for every 10% increase in international collaboration rate for MIT and 3.42 for U Oxford. Among young universities, for NTU, it is 2.24 CPP per 10% Intl Collab increment, and that for Plymouth U is 3.02 CPP per 10% Intl Collab increment.

The percentage of publications fall in the ESI global top 10% highly cited publications for international collaborated publications is generally higher than that for all journal publications of the same institution. Yet, this difference varies from one institution to another institution.

The international collaboration also increases the FWCI of the institution, yet there are untapped potential to enhance the collaboration among young institutions.

References

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Moed, H.F. (2005). *Citation analysis in research evaluation.* Dordrecht, Netherlands: Springer.