Who funded Taiwan-Germany research collaboration? A co-funding network analysis on the basis of funding acknowledgements

Carey Ming-Li Chen[1] and Daniel Sirtes[2]

[1] Science & Technology Policy Research and Information Center (STPI), Taipei, Taiwan, *carey.mlchen@gmail.com ; carey.mlchen@narlabs.org.tw*

[2] Institute for Research Information and Quality Assurance (iFQ), Berlin, Germany, *sirtes@forschungsinfo.de*

The funding of international collaboration

The perspective and effect of funding on international collaboration are seldom studied, and the main reason for it is the lack of information on how funds are allocated and influence international collaboration.

- In fact, the allocation of budgets of research projects can be considered as the resource flow which is able to be traced in order to know how research activities are executed on the trans-national level (Reale, Inzelt, Lepori & van den Besselaar, 2012).
- Nevertheless, resource flow usually belongs to the internal data of funding agencies and is hard access by the public; hence it is necessary to find other ways to solve this problem in order to start the analysis of input of international collaboration.

Funding acknowledgements (FA) as approach

- Since 2008 Thomson Reuters' Web of Science (WoS) has extracted the text of acknowledgements in journal articles. Besides a mere text copy of the acknowledgements, WoS further extracts from this text the fundingorganization (FO) and grant number (GN). This provides a new way to assess input information of third party funded research projects, which eventually might lead a way to link the relationship between the input and output of research. Several new studies have been conducted on the basis of this data in recent years.
- The study of Shapira & Wang (2010) investigated the funding network in nanotechnology, and the study applied FA to examine the assumption that the more money invested, the more publications are generated. The study indicated that nanotechnology has become an international endeavor, however, it also showed that the funding network has not reached global activity yet, as most of the developing countries have not participated in this large-scale international research collaboration.

Research objective

- In order to gain deeper understanding of funding networks among countries, this pilot study decided to focus on Taiwan-Germany co-research to explore the co-funding network among funding organizations in Taiwan and Germany and attempted to utilize FA to complement co-authorship analyses in order to circumvent its problems, such as multi-affiliated authors.

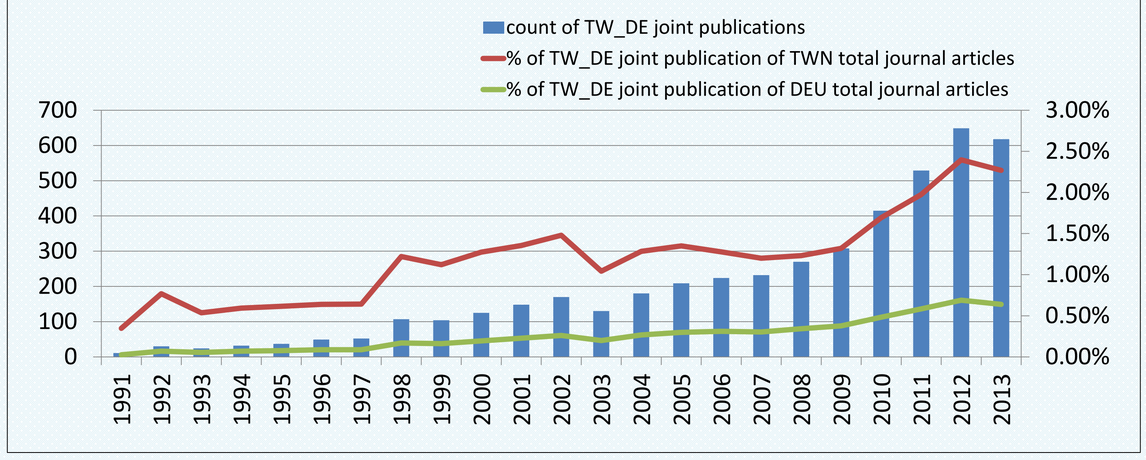
Data source

- This study focuses on Taiwan-Germany joint publications as target data and attempts to find out the network of co-funding among Taiwanese and German funding organizations. The data is collected from WoS in-house database of Competence Centre for Bibliometrics for the German Science Systems (KB).
- The publication year of all the Taiwan-Germany joint publications is restricted in 2010-2013, and the document type is journal article, and the total number is 2,211. The impact analysis is restricted to 2010-2011 (944 publications).

Taiwan-Germany research collaboration

- This study utilizes data of FA which is contained in WoS to identify the important FO in Taiwan and Germany at first, then to link funding information and bibliographic information together to illustrate the network of funding between these two countries.

The growing trend of Taiwan-Germany joint publication



- The number of Taiwan-Germany (TW-DE) joint publication has grown up smoothly, and it shows that the research collaboration between these two countries has a solid history. Although the percentage of Taiwan-Germany joint publication as a share of total Taiwanese *international collaborations* (2010:7.3%) is higher than as a share of total Germany journal articles (2010: 0.9%), the collaboration preference (*Preference Index* (PI)) of both countries to each other is underwhelming at 0.4. This result might indicate that the authorities in Taiwan should review their policy of international collaboration with Germany.

The unification funding organization aliases

- Since WoS does not execute a unification of entries in the FO field, and the staggering amount of variant entries for a single FO (e.g. DFG has more than 14.000 aliases) the issue of unification of funding organizations is required to be addressed at the first.
- Moreover, the issue of homonymous abbreviations happens quite often, for example, both the United States and China have the funding organization which is called National Science Foundation (NSF), or even worse, National Science Council (Taiwan) and National Science Centre (Poland) share the exactly same abbreviation, NSC.
- This study utilized the automated method which developed by Sirtes and Riechert (2013, 2014) to deal with the problems of homonymous abbreviations of NSC, which is the major funding agency in Taiwan, to reach higher precision and recall of unification.
- Often an intricate knowledge of the funding schemes and language skills are still needed in order to identify the entries that belong to the same FO. Hence, collaboration should be attempted as in this case between Taiwan (STPI) and Germany (iFQ) in order to achieve reliable results. A total of 10 German FOs have already been cleaned by the iFQ.

Results

- Only 309 journal articles were authored by researchers only from Taiwan and Germany, which means that only 14% of articles were the output of collaborations between only these two countries. The result indicates that most of TW-DE joint collaboration involved at least a third country (e.g. USA).
- The top 3 research fields are "Astronomy & Astrophysics", "Physics, Particles & Fields", and "Physics, Multidisciplinary". These research fields are all the large-scale research disciplines, so the result might imply that the research collaboration between Taiwan and Germany belongs to large-scale research projects, and Taiwan and Germany are just the two participators in that projects, which is further consolidated by the fact that 52% of the publications have more than 200 authors.

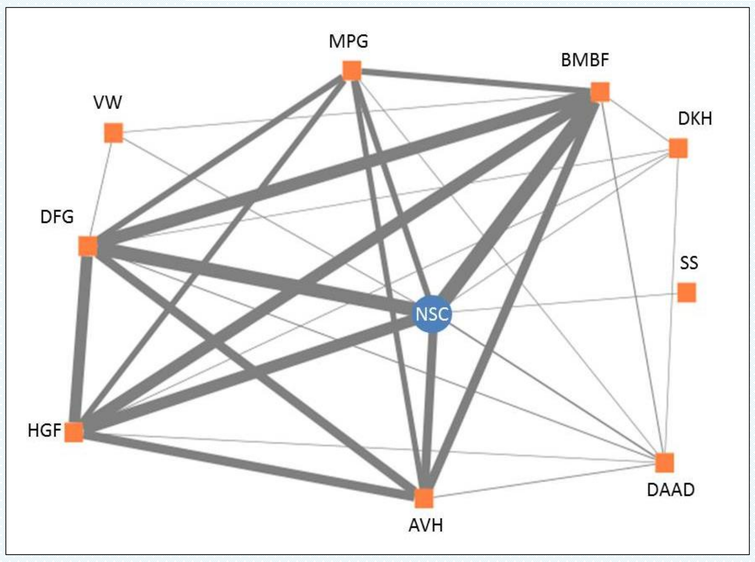
TW-DE joint publication mentioning FO in funding acknowledgement

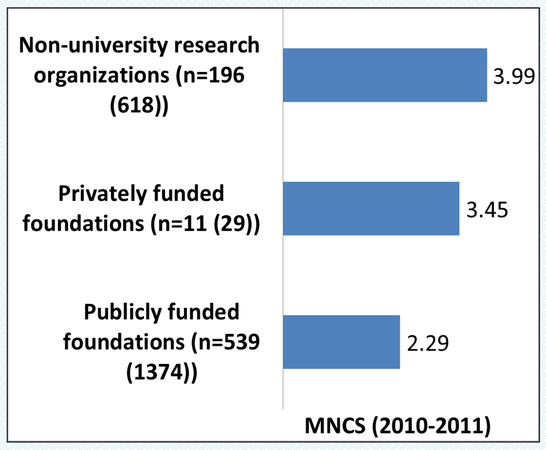
Publish Year	No. of items mentioning TW-NSC in FA	No. of items mentioning DE-FO in FA
2010	177	158
2011	276	260
2012	382	379
2013	326	331
Total	1,161	1,128

Distribution of FO in TW-DE joint publication

Country	FO	Type	CNT (total=2,211)
Taiwan	NSC (National Science Council)	Publicly funded	1,161
Germany	DFG (Deutsche Forschungsgemeinschaft)	Publicly funded	777
	BMBF (Bundesministerium für Bildung und Forschung)	Publicly funded	768
	HGF (Helmholtz-Gemeinschaft Deutscher Forschungszentren)	Non-university research organization	547
	AvH (Alexander von Humboldt-Stiftung)	Publicly funded	440
	MPG (Max-Planck-Gesellschaft)	Non-university research organization	334
	DAAD (Deutsche Aka-demische Austauschdienst)	Publicly funded	87
	VW (Volkswagen-Stiftung)	Privately funded	15
	DKH (Deutsche Krebshilfe)	Privately funded	14
	FCI (Fonds der Chemischen Industrie)	Privately funded	2
	SS (Studienstiftung des Deutschen Volkes)	Publicly funded	1
N/A	NULL (not identified yet)	N/A	764

Co-funding network





- **The result indicates that the linkages among German FOs are quite strong, although NSC has collaborative agreements with some FOs (DFG, DAAD, AvH), but the co-funding network highlights that other German FOs make major contribution on the research collaboration, and it might imply that NSC probably is only one participator instead of being a leader in this co-funding network.**
- **The result shows that non-university research organizations received the highest citation scores. In fact, MPG and HGF are well-known institutes in the world, their academic achievement is extremely high, and inevitably their research is paid more attention to in the scientific community . However, even the lowest Mean Normalized Citation Score of publications sponsored by publicly funded foundations is much higher than the world average (or of Taiwanese journal articles (2010: MNCS=0.94). This result might imply that the research funded by NSC in Taiwan is benefited by this type of research sponsorship as the research has more opportunities to be disseminated.**

References

- Reale, E., Inzelt, A., Lepori, B. & van den Besselaar, P. (2012). The social construction of indicators for evaluation: Internationalization of funding agencies. Research Evaluation, 21(4), p. 245-256.
- Sirtes, D. & Riechert, M. (2014). A fully automated method for the unification of organizations in the Web of Knowledge. Proceedings of the 19th International Conference on Science and Technology Indicators, 2014 Leiden. p. 594-597.
- Sirtes, D. (2013). Funding Acknowledgements for the German Research Foundation (DFG). The Dirty Data of the Web of Science Database and How to Clean It Up. Proceedings of the 14th International Society of Scientometrics and Informetrics Conference, 2013 Vienna.Volume1, p. 784-795.
- Shapira, P. & Wang, J. (2010). Follow the money: What was the impact of the nanotechnology funding boom of the past ten years? Nature, 468, p. 627-628.

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