

# Global research collaboration: networks and partners in South East Asia

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## ABSTRACT

- The paper addresses the role of bilateral and multilateral international co-authorships in the six leading science systems among the ASEAN group of countries (ASEAN6).
- It highlights the different ways that bilateral and multilateral co-authorships structure global networks and the collaborations of the ASEAN6, throughout bibliometric analyses.
- The paper looks at the influence of the collaboration styles of major collaborating countries of the ASEAN6, particularly the USA and Japan.
- It also highlights the role of bilateral and multilateral co-authorships in the production of knowledge in the leading specialisations of the ASEAN6.
- The discussion section offers some tentative explanations for the dynamics evident in the results.

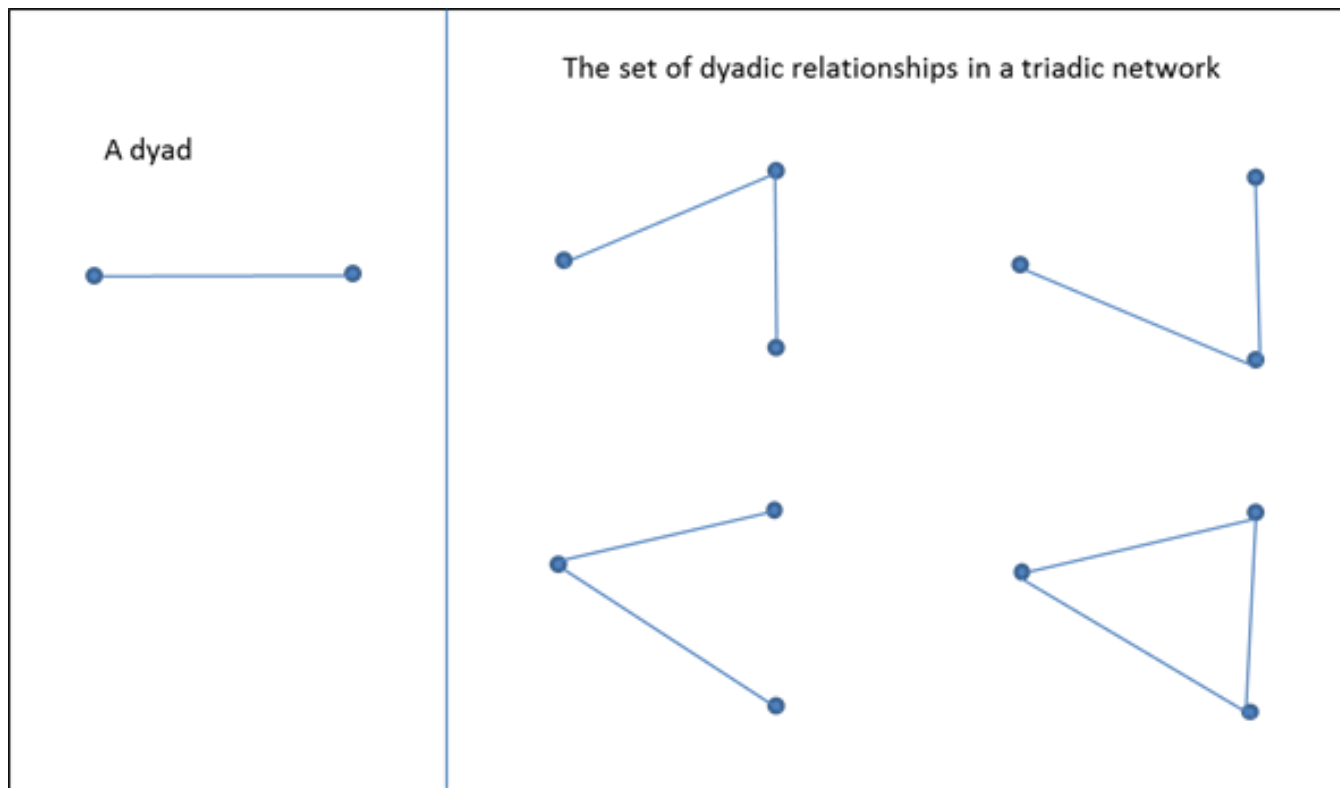
## RATIONALE

- The “flat earth” ideal of global science networks suggests and contribution to science is no longer structured by zones of inclusion and exclusion
- An alternative interpretation sees global networks as a continuation of asymmetric relations of power and control over research agenda-setting and access to resources
- The situation of developing science, research and innovation systems in relation to globalised scientific networks remains contested and uncertain
- Focus is on this continuing research gap, particularly what international co-authorships can tell us about global research networks

## CONCEPTUAL APPROACH

- Distinction between two types of international co-authorship:
  - Bi-lateral international research collaboration – papers with authors from two different countries (BIRCs)
  - Multi-lateral international research collaboration – papers with authors from three or more different countries (MIRCs)
- Distinguishing between dyads and triads+
- In science, is a dyadic relationship a network? Or is a scientific network the sum of an actor's dyadic relationships?
- Or is a scientific network a set of relations between actors in which complexity is generated?

# DYADS & TRIADS



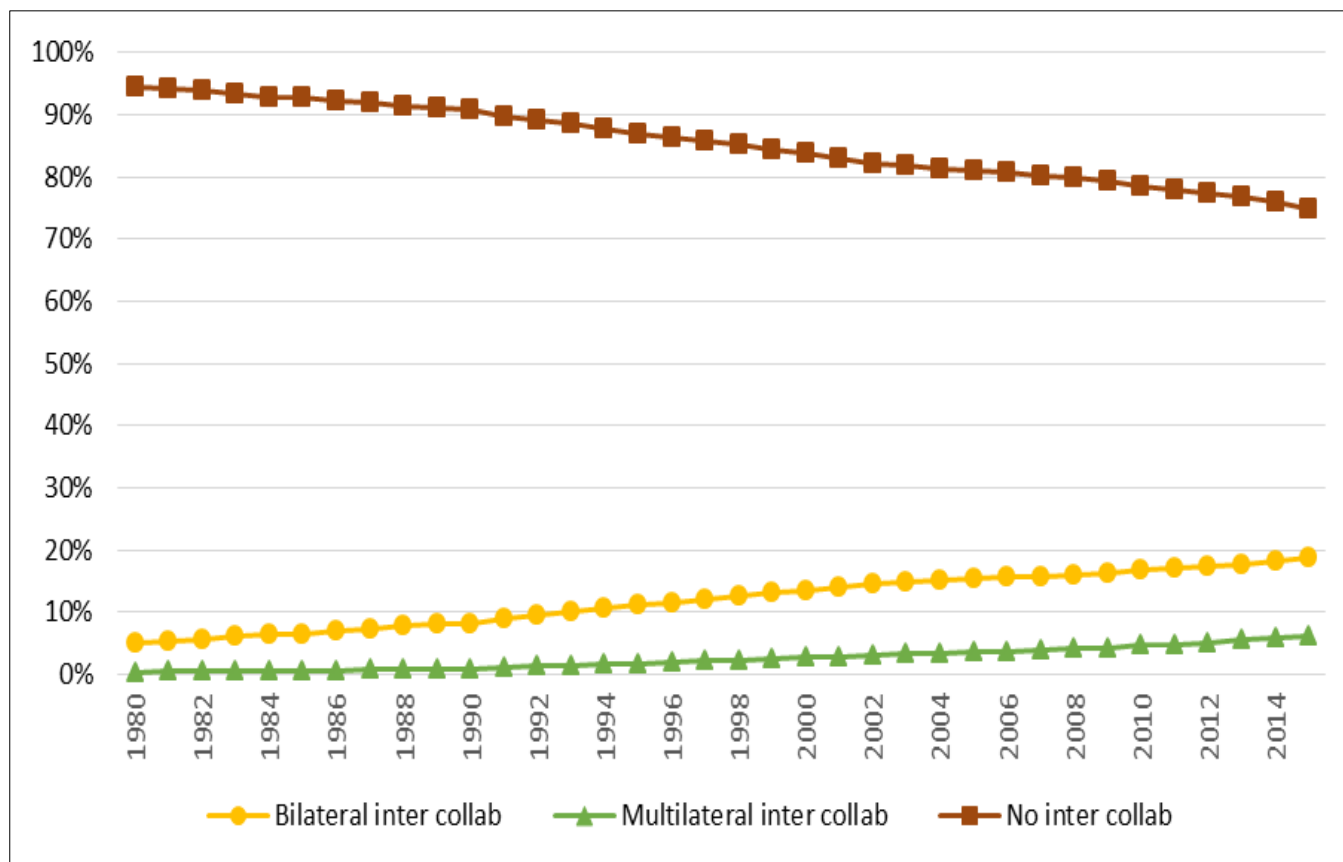
## RESEARCH QUESTIONS

- Is global scientific collaboration structured differently by bi-lateral partnerships (BIRCs) and by more complex multi-lateral networks (MIRCs)?
- Are partnerships or networks shaping developing country participation in globalised science? How is this participation evolving over time?
- Does the major collaborator structure global collaboration differently for developing countries?
- What matters more, national systems or scientific fields effects?

## EMPIRICAL APPROACH

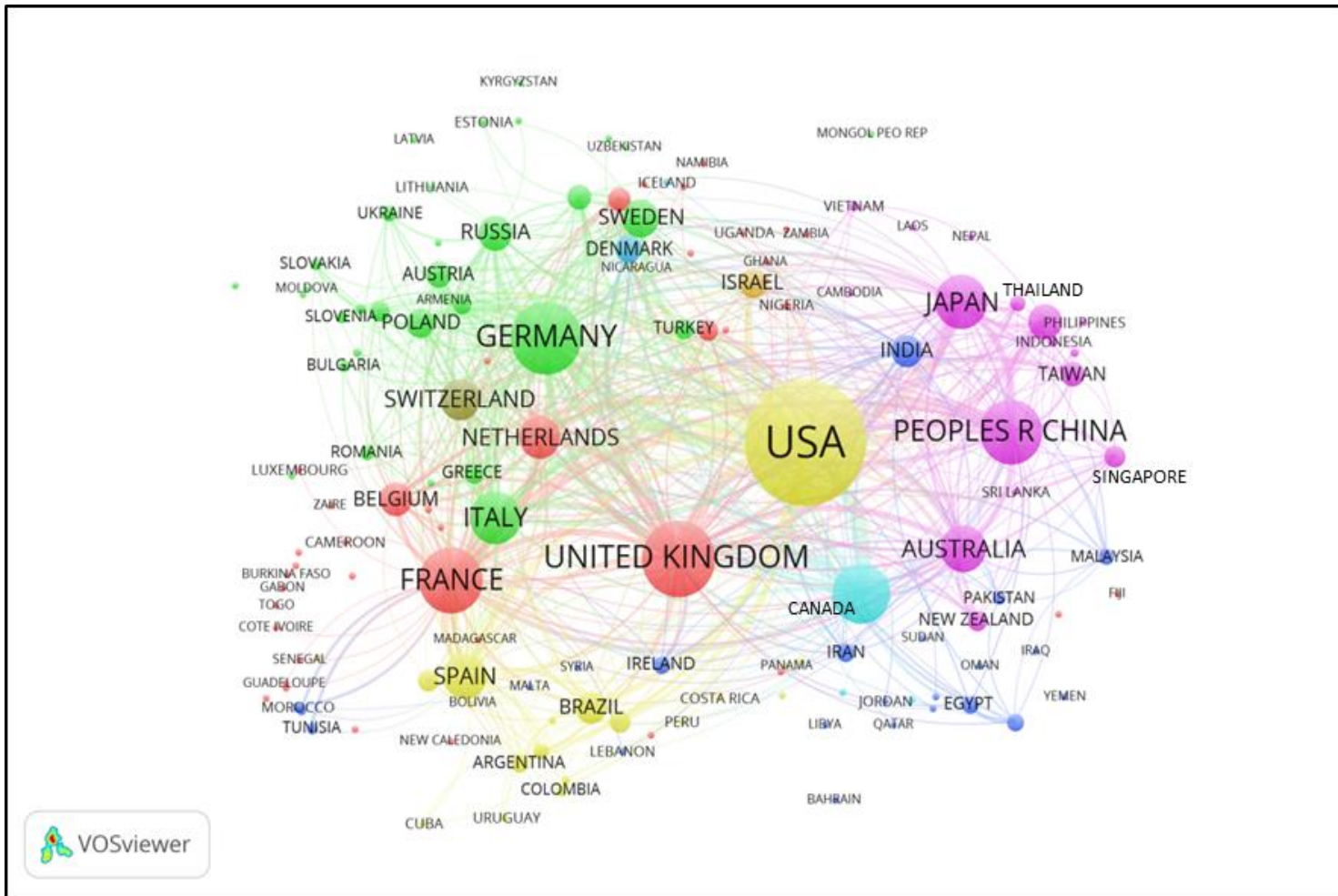
- Analysed 28.5 million publications from the Web of Science published between 1980 and 2015
- Selected all articles and reviews and defined three types of international collaboration:
  - No collaboration – all authors are from the same country
  - BIRCs – authors are from two countries
  - MIRCs – authors are from more than two countries
- We subsequently reduced this dataset to include only those papers that had at least author from one of six ASEAN countries (ASEAN6): Indonesia, Malaysia, The Philippines, Singapore, Thailand, Vietnam.

# GLOBAL PICTURE 1: Share of international collaborations by type, 1980-2015

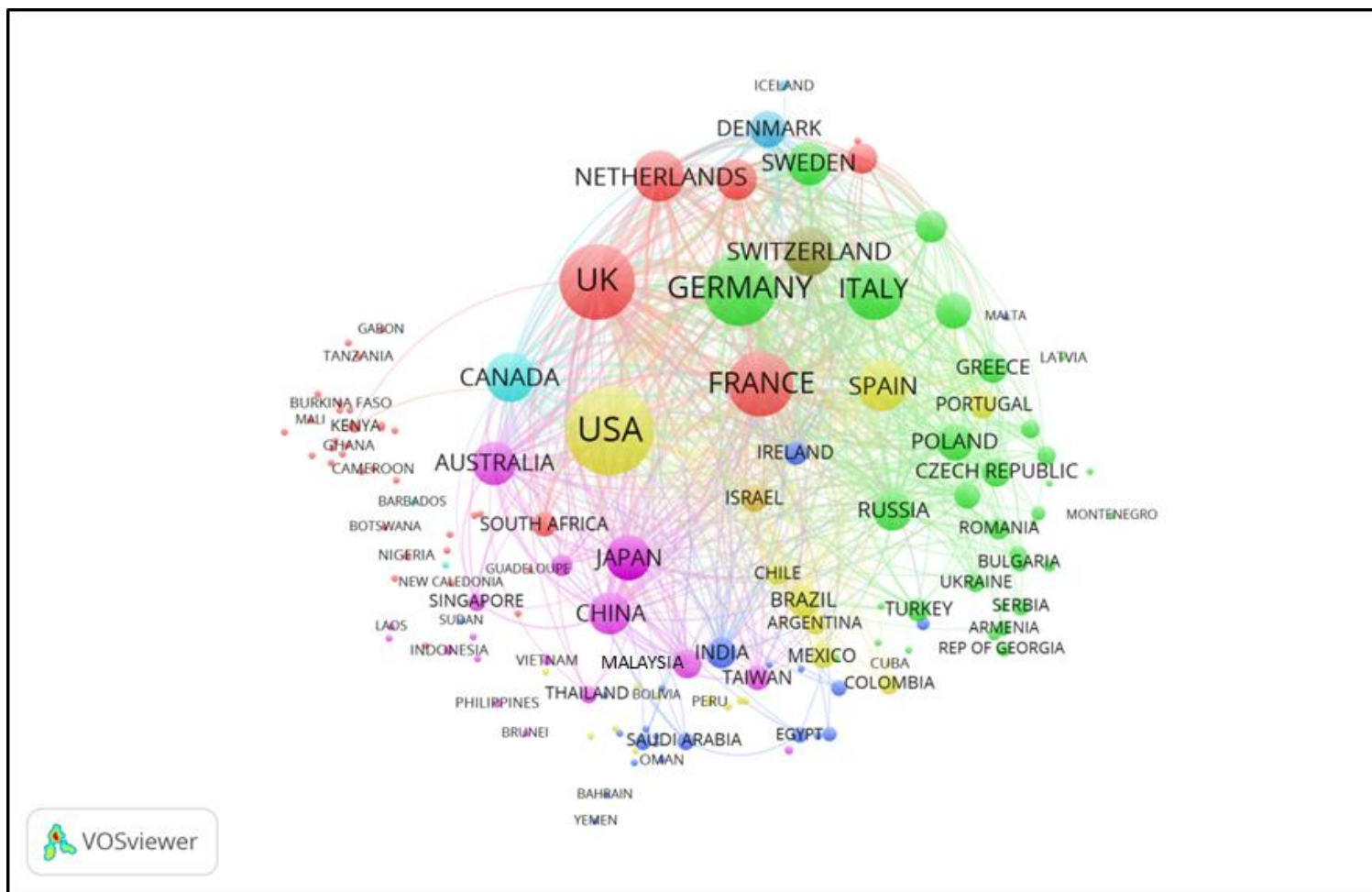




# GLOBAL PICTURE 2: BIRCs 1980-2015, minimum 1000 papers



# GLOBAL PICTURE 3: MIRC's 1980-2015, minimum 1000 papers



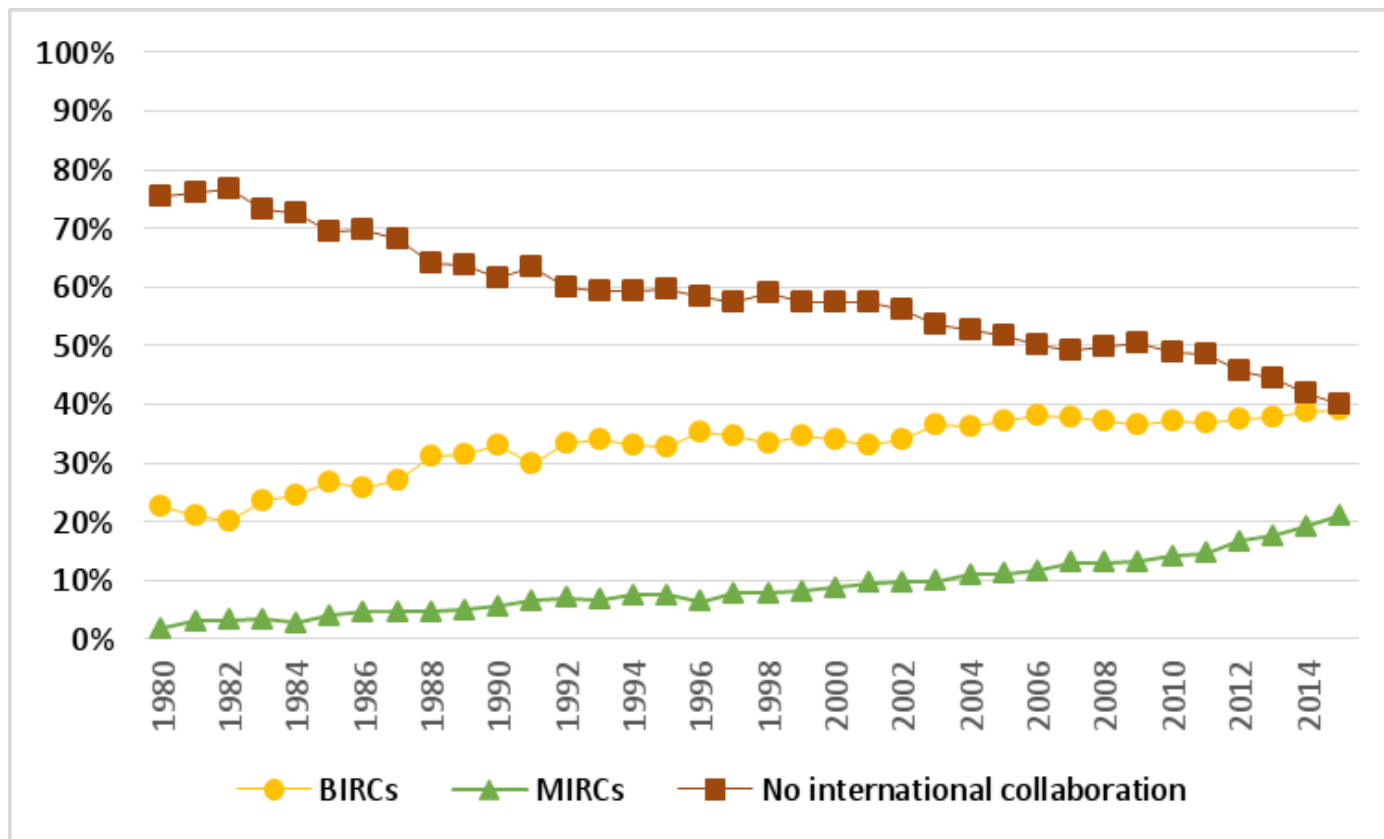
## ASEAN 6: Dataset

- Overview of the scientific production of ASEAN6, by co-authorship type, 1980-2015

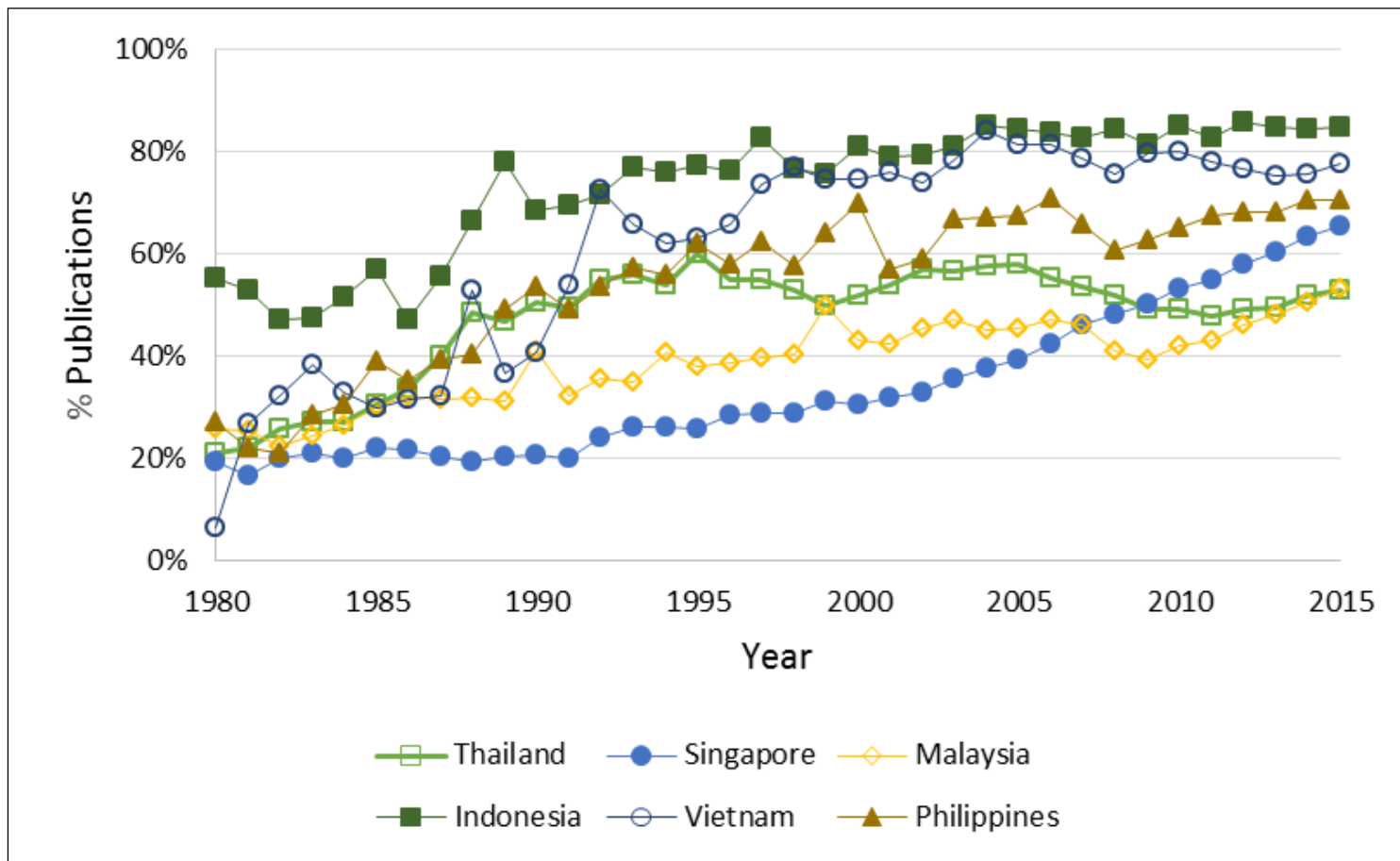
ASEAN6	# Pubs	% Bilateral Collaboration (BIRCs)	% Multilateral Collaboration (MIRCs)
Indonesia	19,038	54,2%	26,9%
Malaysia	82,452	12,5%	13,1%
Philippines	16,769	61,6%	22,6%
Singapore	149,657	6,9%	13,2%
Thailand	77,383	13,3%	15,5%
Vietnam	20,862	49,5%	24,0%
<b>TOTAL 2015</b>	<b>36,879</b>	<b>38.9% (14,351)</b>	<b>21.2% (7,800)</b>

Source: Web of Science

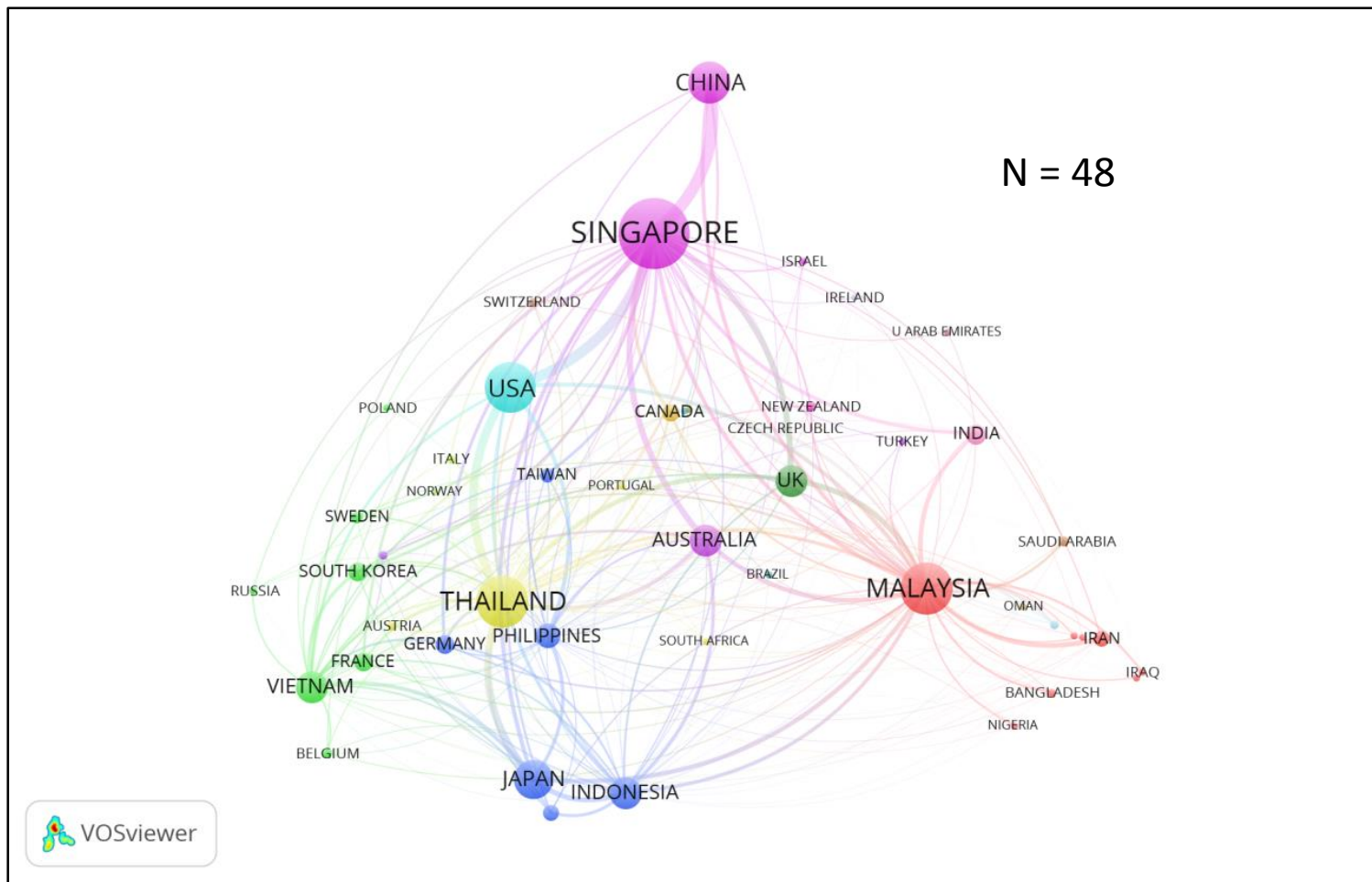
# ASEAN 6: SHARE OF INTERNATIONAL CO-AUTHORSHIPS, BY TYPE, 1980-2015



# ASEAN 6: INTERNATIONAL CO-AUTHORSHIP RATES, 1980-2015

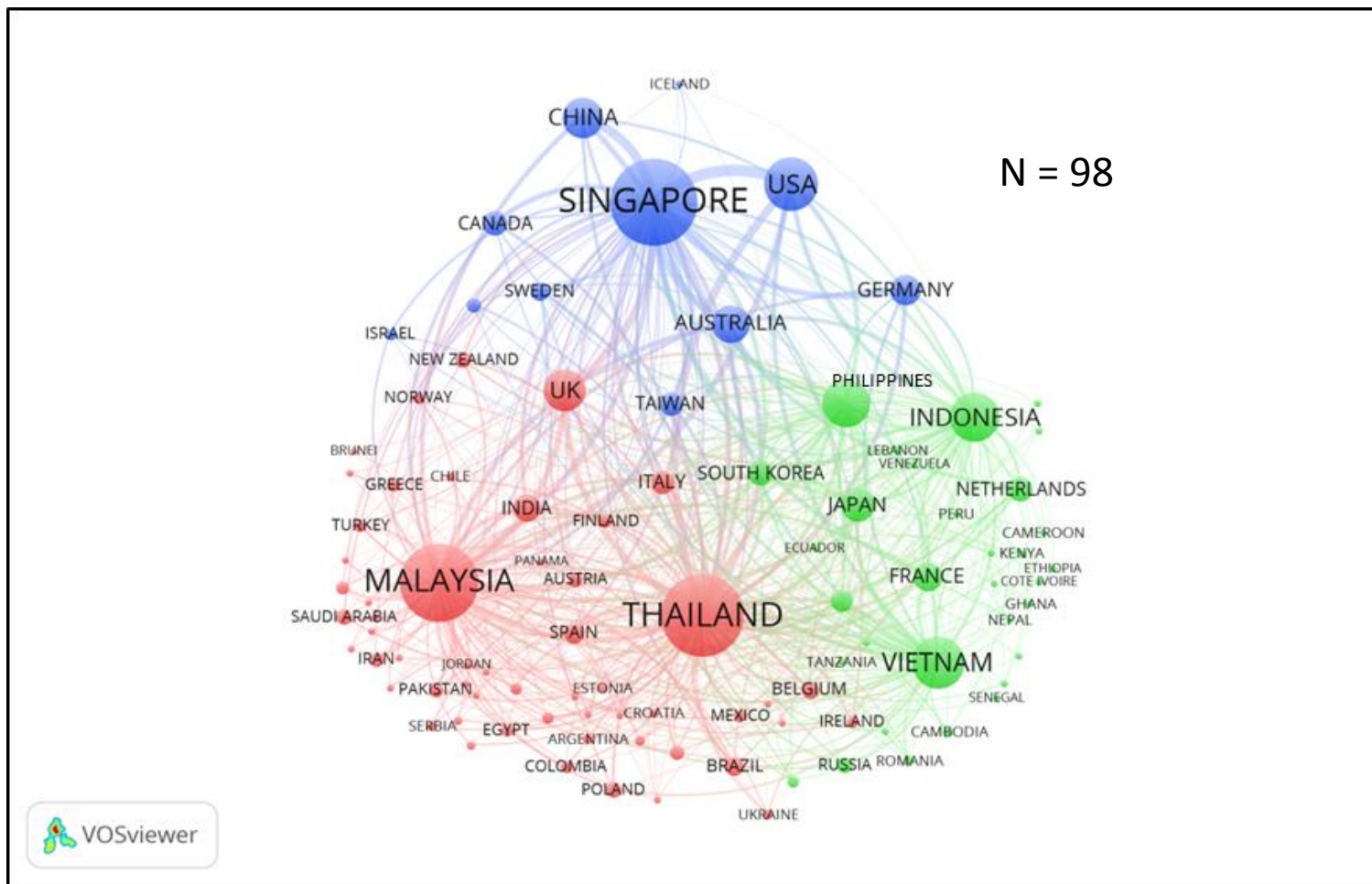


# ASEAN6 PICTURE 1: BIRCs 1980-2015, minimum 150 papers





## ASEAN6 PICTURE 2: MIRC's 1980-2015, minimum 150 papers

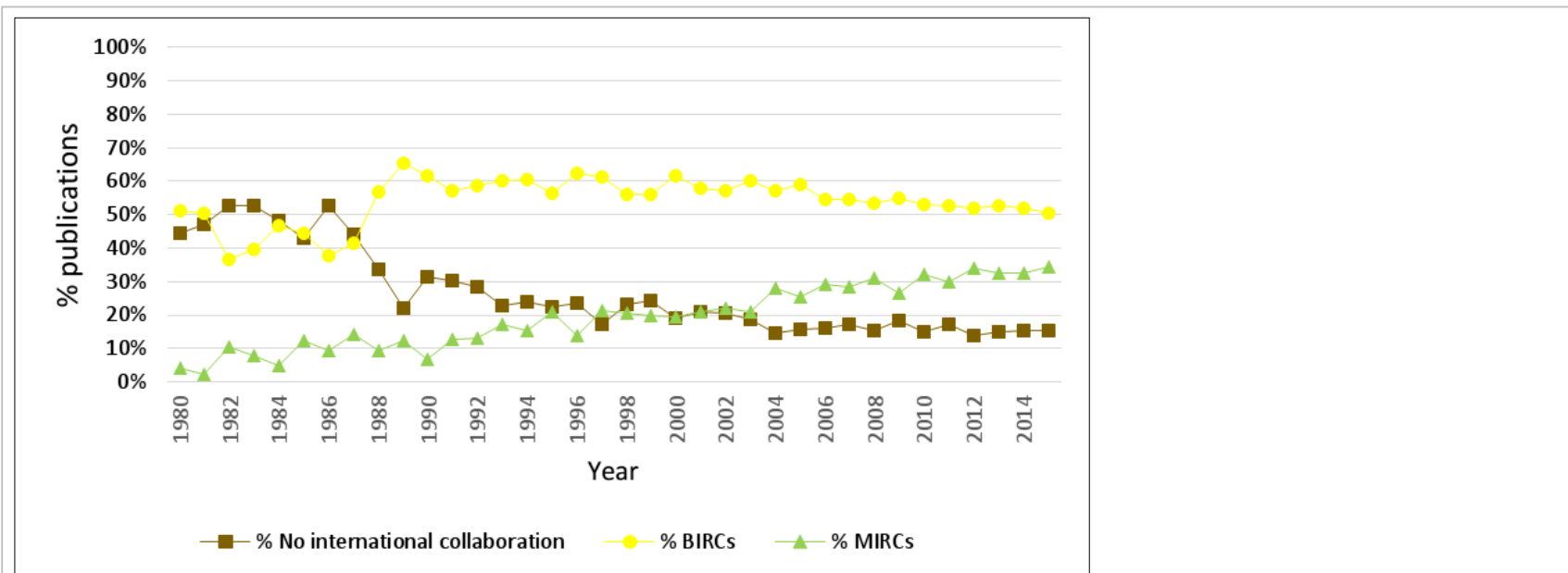


## ASEAN 6: MAJOR COLLABORATORS

Malaysia			Indonesia			Vietnam		
Country	Pubs	% all pubs	Country	Pubs	% all pubs	Country	Pubs	% all pubs
UK	6236	7,56%	JAPAN	3936	20,67%	USA	2660	12,75%
USA	4764	5,78%	USA	3224	16,93%	JAPAN	2506	12,01%
AUSTRALIA	4456	5,40%	AUSTRALIA	2690	14,13%	FRANCE	2237	10,72%
INDIA	4181	5,07%	NETHERLANDS	1890	9,93%	SOUTH KOREA	2010	9,63%
JAPAN	3942	4,78%	UK	1604	8,43%	UK	1719	8,24%
CHINA	3532	4,28%	<i>MALAYSIA</i>	<i>1458</i>	<i>7,66%</i>	GERMANY	1593	7,64%
IRAN	3459	4,20%	GERMANY	1251	6,57%	AUSTRALIA	1473	7,06%
SAUDI ARABIA	2057	2,49%	FRANCE	1006	5,28%	CHINA	1239	5,94%
<i>SINGAPORE</i>	<i>1971</i>	<i>2,39%</i>	<i>THAILAND</i>	<i>784</i>	<i>4,12%</i>	NETHERLANDS	1098	5,26%
<i>THAILAND</i>	<i>1735</i>	<i>2,10%</i>	CHINA	700	3,68%	<i>THAILAND</i>	<i>861</i>	<i>4,13%</i>
The Philippines			Singapore			Thailand		
Country	Pubs	% all pubs	Country	Pubs	% all pubs	Country	Pubs	% all pubs
USA	3616	21,56%	USA	22484	15,02%	USA	13803	17,84%
JAPAN	2304	13,74%	CHINA	22047	14,73%	JAPAN	8257	10,67%
AUSTRALIA	1363	8,13%	UK	8719	5,83%	UK	5895	7,62%
CHINA	1125	6,71%	AUSTRALIA	8425	5,63%	AUSTRALIA	4206	5,44%
UK	989	5,90%	JAPAN	4071	2,72%	CHINA	3132	4,05%
INDIA	831	4,96%	CANADA	3794	2,54%	FRANCE	2622	3,39%
GERMANY	767	4,57%	GERMANY	3726	2,49%	GERMANY	2521	3,26%
<i>THAILAND</i>	<i>751</i>	<i>4,48%</i>	INDIA	2982	1,99%	CANADA	1790	2,31%
SOUTH KOREA	681	4,06%	FRANCE	2731	1,82%	<i>MALAYSIA</i>	<i>1735</i>	<i>2,24%</i>
TAIWAN	669	3,99%	SOUTH KOREA	2588	1,73%	SOUTH KOREA	1615	2,09%

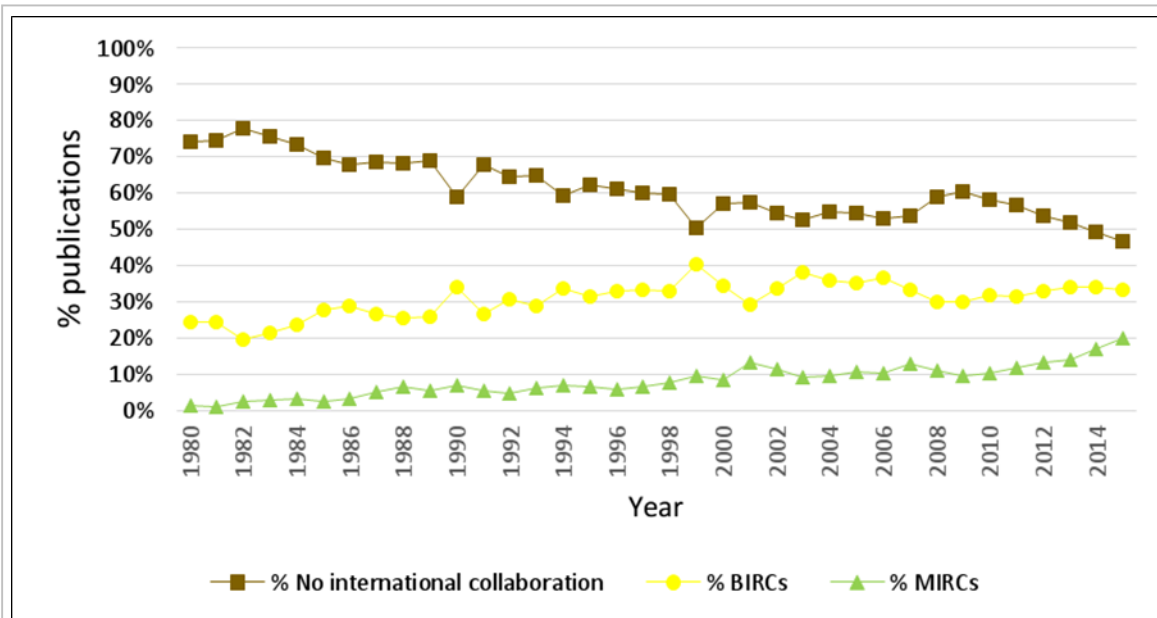


# INDONESIA: CO-AUTHORSHIP RATES, PARTNERS, TYPES



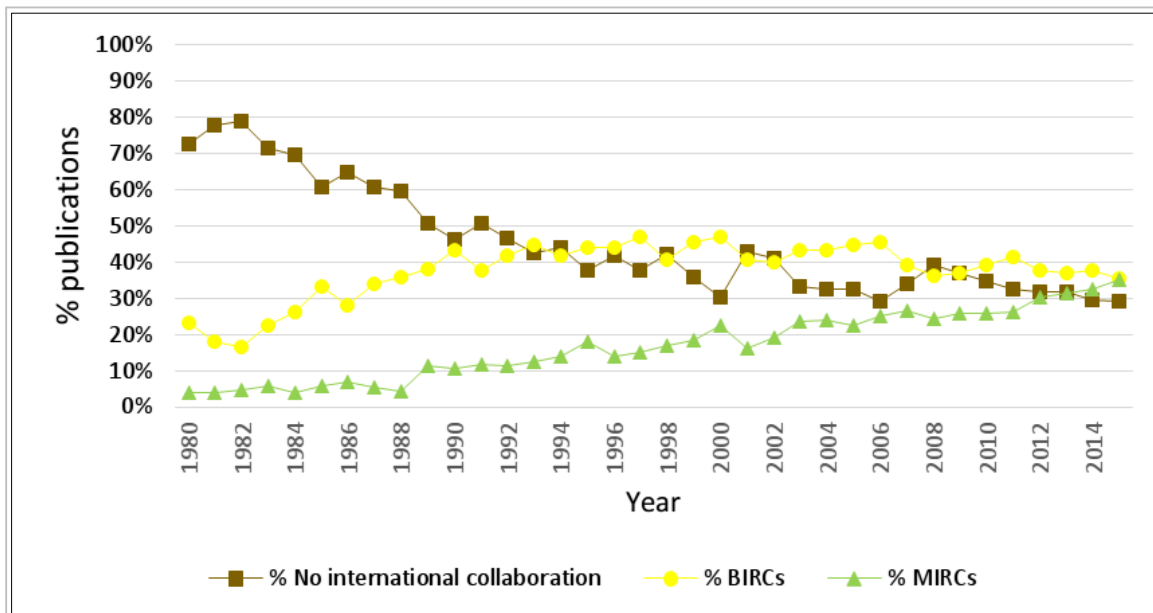
INDONESIA			
BIRCs		MIRCs	
Country	pubs	country	pubs
JAPAN	2764	USA	1816
USA	1360	AUSTRALIA	1296
AUSTRALIA	1344	UK	1099
NETHERLANDS	1096	JAPAN	1095
MALAYSIA	717	NETHERLANDS	778
GERMANY	584	MALAYSIA	739
UK	486	THAILAND	677
FRANCE	418	GERMANY	645
SOUTH KOREA	229	PR CHINA	640
TAIWAN	195	FRANCE	582

# MALAYSIA: CO-AUTHORSHIP RATES, PARTNERS, TYPES



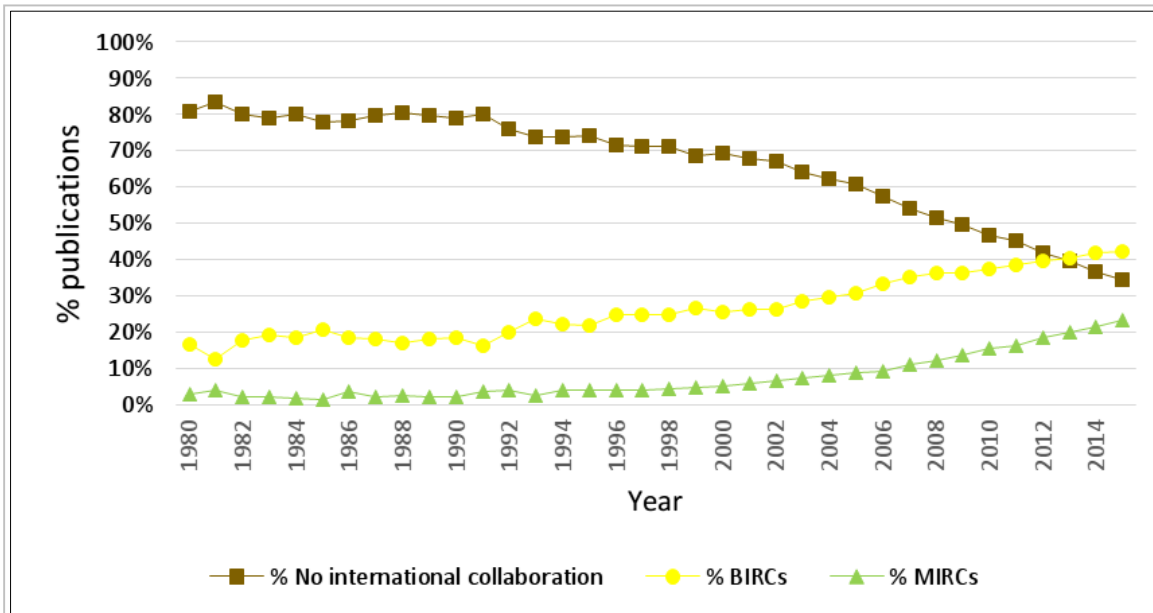
MALAYSIA			
BIRCs		MIRCs	
country	pubs	country	pubs
UK	3196	UK	2906
IRAN	2461	USA	2863
INDIA	2353	AUSTRALIA	2101
AUSTRALIA	2266	PR CHINA	1839
JAPAN	2181	INDIA	1764
USA	1858	JAPAN	1716
PR CHINA	1681	SAUDI ARABIA	1250
SINGAPORE	822	THAILAND	1222
SAUDI ARABIA	797	GERMANY	1166
PAKISTAN	768	SINGAPORE	1126

# PHILIPPINES: CO-AUTHORSHIP RATES, PARTNERS, TYPES



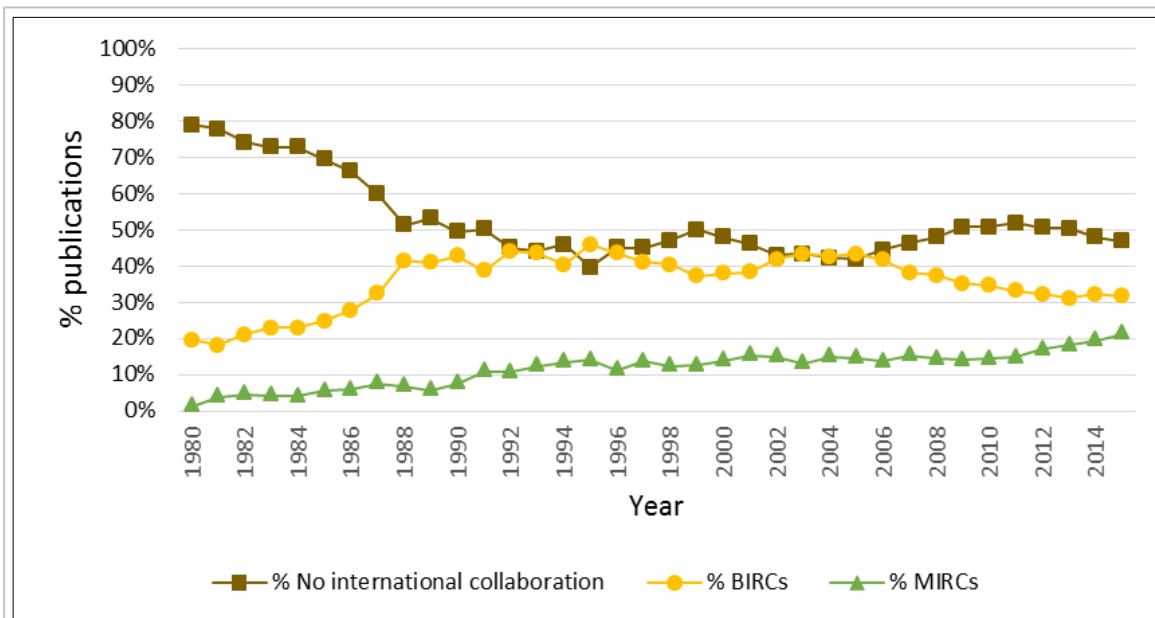
PHILIPPINES			
BIRCs		MIRCs	
country	pubs	country	pubs
USA	1761	USA	1759
JAPAN	1421	JAPAN	831
AUSTRALIA	529	PR CHINA	825
PEOPLES R CHINA	293	AUSTRALIA	800
GERMANY	271	UK	719
UK	261	THAILAND	671
TAIWAN	254	INDIA	670
SOUTH KOREA	230	GERMANY	487
NETHERLANDS	163	MALAYSIA	458
INDIA	149	SOUTH KOREA	449

# SINGAPORE: CO-AUTHORSHIP RATES, PARTNERS, TYPES



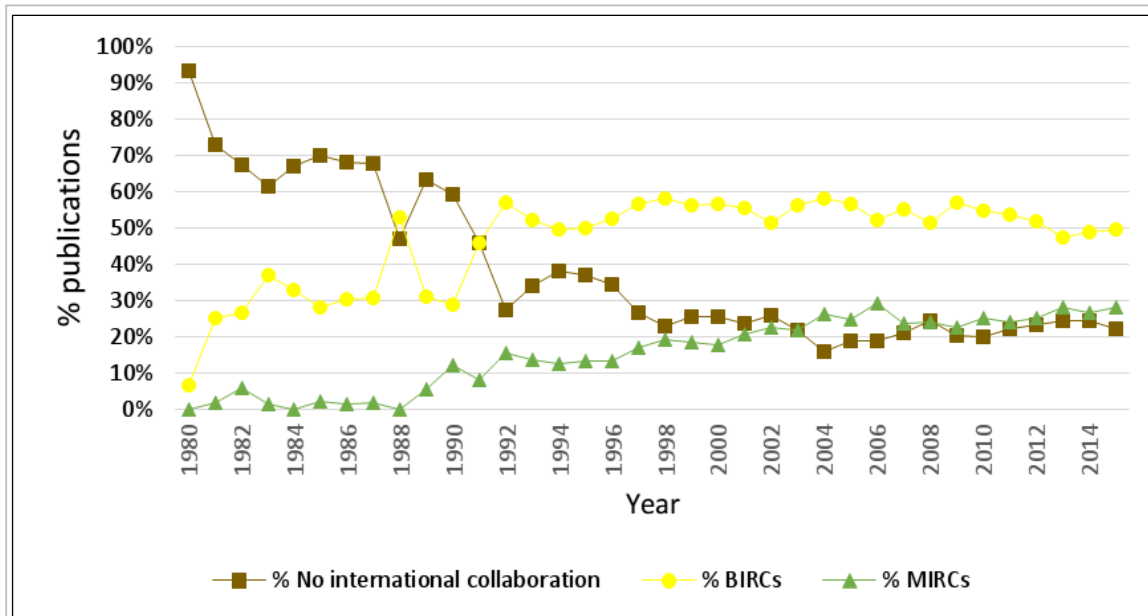
SINGAPORE			
BIRCs		MIRCs	
country	pubs	country	pubs
PR CHINA	15363	USA	9820
USA	12149	PR CHINA	6433
AUSTRALIA	4012	UK	4696
UK	3764	AUSTRALIA	4182
JAPAN	1810	GERMANY	2552
INDIA	1541	JAPAN	2194
CANADA	1518	CANADA	2163
GERMANY	1095	FRANCE	1855
SOUTH KOREA	1078	SOUTH KOREA	1488
TAIWAN	981	TAIWAN	1367

# THAILAND: CO-AUTHORSHIP RATES, PARTNERS, TYPES



THAILAND			
BIRCs		MIRCs	
Country	pubs	country	pubs
USA	8312	USA	5252
JAPAN	5996	UK	3394
UK	2417	PR CHINA	2405
AUSTRALIA	1884	AUSTRALIA	2243
GERMANY	971	JAPAN	2215
CANADA	833	FRANCE	1778
FRANCE	830	GERMANY	1536
PR CHINA	721	INDIA	1333
MALAYSIA	508	SOUTH KOREA	1247
AUSTRIA	432	MALAYSIA	1222

# VIETNAM: CO-AUTHORSHIP RATES, PARTNERS, TYPES



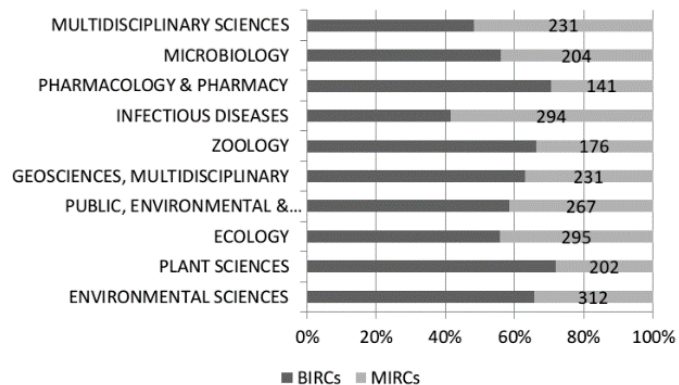
VIETNAM			
BIRCs		MIRCs	
country	pubs	country	pubs
JAPAN	1567	USA	1715
SOUTH KOREA	1320	UK	1325
FRANCE	1137	FRANCE	1088
USA	917	PR CHINA	922
AUSTRALIA	764	GERMANY	897
GERMANY	684	JAPAN	889
BELGIUM	501	THAILAND	710
NETHERLANDS	430	AUSTRALIA	681
SWEDEN	391	SOUTH KOREA	674
UK	380	NETHERLANDS	651

## SUMMARY OF ASEAN 6 CO-AUTHORSHIPS

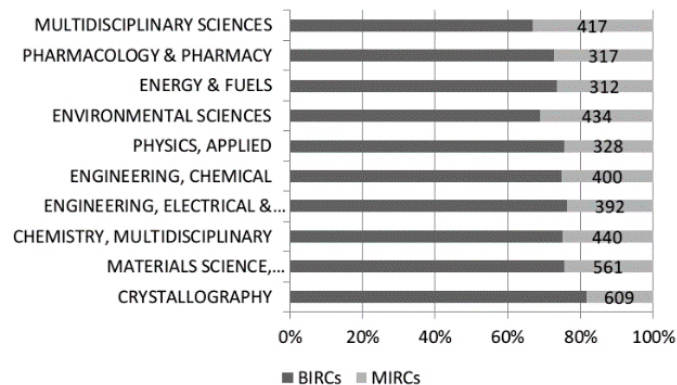
- Variation in
  - Rate of international co-authorship
  - Shares of partnership (BIRCs) and network (MIRCs) modes among international co-authorships
  - Major partners
- Consistency in
  - Major collaborator modes (BIRCs or MIRCs), with few exceptions
  - There being unique features in every case

# ASEAN 6: SCIENTIFIC SPECIALISATION BY COLLABORATION TYPE

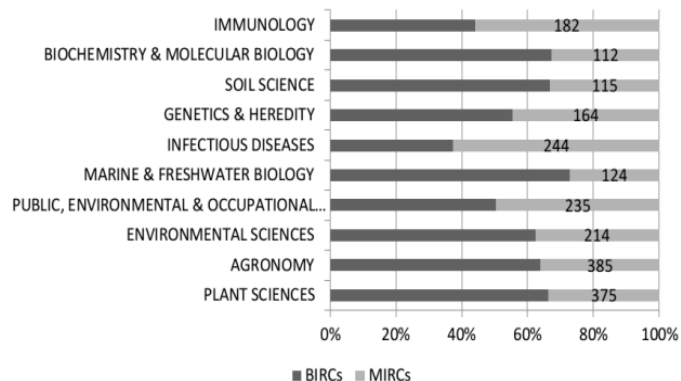
## Indonesia



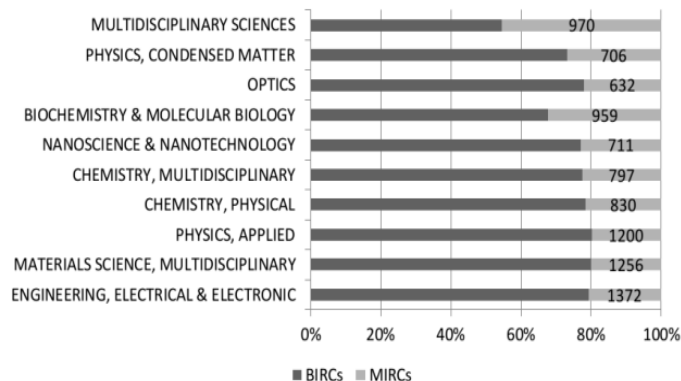
## Malaysia



## Philippines



## Singapore





## RESULTS 1

- Bi-lateral (BIRCs) and multi-lateral (MIRCs) collaborations contribute differently to the structure of the global science system and the ASEAN sub-system
- MIRCs have been growing faster than BIRCs globally & even more so in the ASEAN sub-system
- Malaysia, Singapore and Thailand have now produced more papers through MIRCs than BIRCs
- In the ASEAN sub-system, shift toward MIRCs has been inclusive of additional partner countries
- There is evidence that the number of author countries can boost citations (Wagner et al. 2017) – the ASEAN6 shift toward MIRCs may be accompanied by a quality dividend

## RESULTS 2

- Different major partners are more strongly associated with particular collaboration styles – USA with network (MIRCs), Japan with partnership (BIRCs)
- But this association is not entirely uniform, there is variation by ASEAN6 partner
- Field differences also seem to be important – some fields seem to have similar balance of BIRCs and MIRCs across different countries (e.g. public health)
- Some ASEAN countries appear to rely consistently on the partnership style across all their top output Fields (Malaysia, Singapore)
- Other countries rely on a mix (Indonesia, Philippines)

## DISCUSSION

- Have arguments about the benefits of global scientific networks been premature? **Our evidence suggests that a network mode of co-authorship is promoting inclusivity and accelerating in its growth toward being a dominant model only now...**
- What explains the different styles of major collaborators? **Bibliometrics provides no insights, we might speculate that research training and post-docs in the USA have built networks, as has migration...or that funding schemes and conditions in leading countries have different foci and effects...**
- What can we say about field effects? **At this stage very little, the limits of bibliometric analyses are quickly reached, but more can be done using some basic clustering of specialisations...**

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# TITLE

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