Country Report – Vietnam

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Foreword

Recognising the importance of intelligence and analyses for the development of international strategies for higher education and research at various levels of the knowledge system, STINT has compiled a series of brief country reports focused on their academic profiles and performance.

Released as a pilot series covering 16 countries, these country reports aim to provide national overviews using current and reliable data. The selection of countries is based on STINT's existing collaborations and other criteria, not least that the selected portfolio provides an interesting illustration of developments in the academic world.

- Brazil
- Canada
- Chile
- China
- India
- Indonesia
- Japan
- Malaysia
- Kenya, Rwanda, Tanzania and Uganda
- South Africa
- South Korea
- United States of America
- Vietnam

The reports give insight into each country's knowledge system as well as its demographic and economic context. The intention is that both policy and decision makers, as well as practitioners within the Swedish higher education system, primarily, will utilise these reports in furthering international strategic collaboration at various levels.

A specific effort has been made to include the latest available data. Data were collected in July 2020; for further details about the data and methods, see the Appendix. Several persons at STINT have been involved in the production of these reports: Erik Forsberg, Andreas Göthenberg, Niklas Kviselius, Tommy Shih and Hans Pohl, who was the project leader and developed the tables and figures.

Introduction

Following decades of turmoil that culminated in the Vietnam War (the 'Resistance War Against America' as it is referred to in Vietnam) that left the country devastated, the Socialist Republic of Việt Nam was established in 1976. Vietnam originally operated a Soviet-style planned economy but launched a set of reforms in 1986 transforming the economy into a market-based such (the Đổi mới reforms). Economic growth accelerated quickly as a result of the reforms, transforming Vietnam into one of the world's fastest growing economies. Growth have remained high in the 6-7% range the past 20 years. The economic development has led to significant reduction in poverty rates and a diversification of the economy. Important exports include, textiles and garments, agricultural products and electronics. Vietnam became an ASEAN member in 1995 and joined the WTO in 2007.

Vietnam's population remains quite rural with close to two thirds of the population being rural, making it markedly less urban than most of its Asian peers.

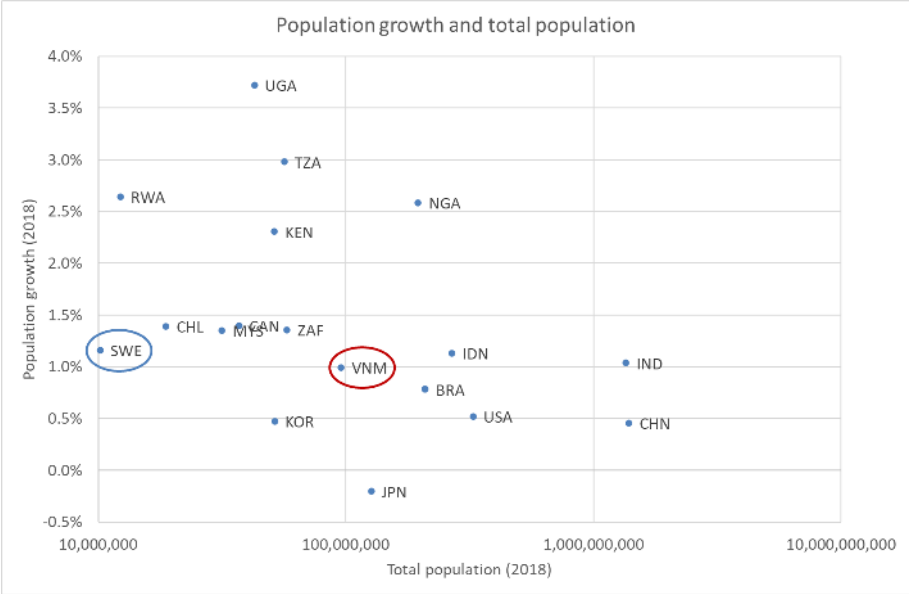
Economic reforms and strong growth have in Vietnam has not gone hand in hand with substantial expansion of science and technology as it has in Vietnam's large neighbor to the north, China. In recognition of lagging behind other South-East Asian nations in this development Vietnam launched the *Strategy for Science and Technology Development for 2011–2020* with the aim to develop Vietnam into a modern industrial nation. R&D expenditure as a percentage of GDP in Vietnam has risen steadily since 2011. This however from a very low level, the result of which is that the current level is slightly above 0.5% of GDP. The number of scientific publications has also started to rise significantly in recent years, though again from a low level.

While significant challenges remain, Vietnam is generally considered to be on a strongly positive development trajectory and is expected to be one of the 20 largest economies in the world by 2030.

Population and economic development

Vietnam's population in 2020 is estimated at 97 million (up from about 60 million in 1986) and is expected to expand to 120 million by 2050. During the 1990s Vietnam experienced a sharp decline in its population growth rate: from nearly 2 % at that beginning of the decade to 1.4 % by 2000 and 1.0% in 2018. This reduction can be traced to the rapidly growing desire of many couples to limit their family size to two children.

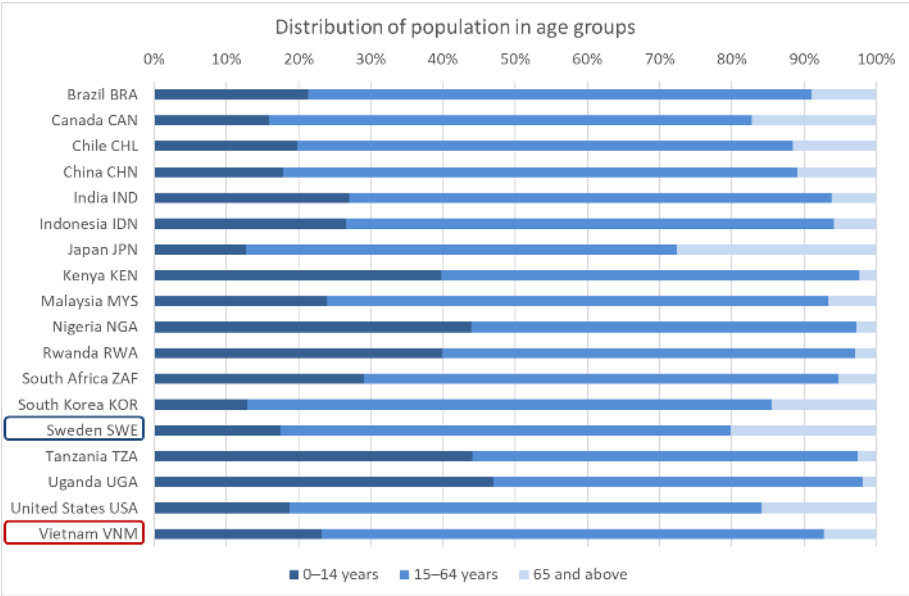
Figure 1: **Total population (logarithmic scale) and population growth**



The decline in fertility has been one of the most important demographic changes in recent years. Given the steady and continuing decline in the country's birth rate, a continued decrease in the rate of population growth in the coming years is highly likely. Between 2015 and 2020, there have been more emigrants than immigrants at a net migration rate of minus 0.8 in Vietnam. The Vietnamese government has relaxed the strict controls on immigrant workers and many of the recent immigrants are Vietnamese who had left the country in the 1970s and are returning to Vietnam due to more favorable political and economic conditions. The official number of the

Vietnamese diaspora is about 4.5 million, with a majority living in the United States.

Figure 2: **The percentage of the population in each age group**



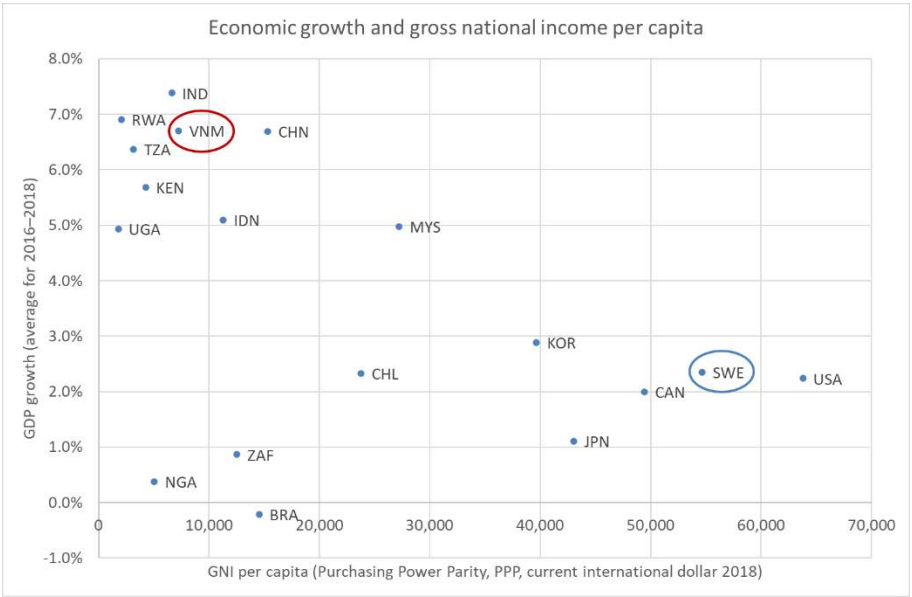
The Vietnamese population is quite young – roughly 2/3 of the people are under the age of 35. In 1979 the youngest age groups of 0-14 years accounted for 43 percent of the population, a very young age distribution. About 20 years later, that proportion had dropped to 32 percent, still a comparatively young population but the population is rapidly aging.

Partially as a result of higher life expectancy, the number of people older than 65 years has risen remarkably. Respect for the elderly is a fundamental, traditional value in Vietnam, and the government has paid considerable attention to care for the elderly. The health status of the elderly has greatly improved in the past few decades, but it remains one of their most significant concerns.

One characteristic of the Vietnamese population is its predominantly rural nature. Currently just under 2/3 of the Vietnamese population is rural and while this is forecasted to fall in coming in years, the Vietnamese population

is less urban than that of the South-East Asia region as a whole and is expected to remain so in the near future.

Figure 3: **Gross national income (GNI) and gross domestic product (GDP) growth**



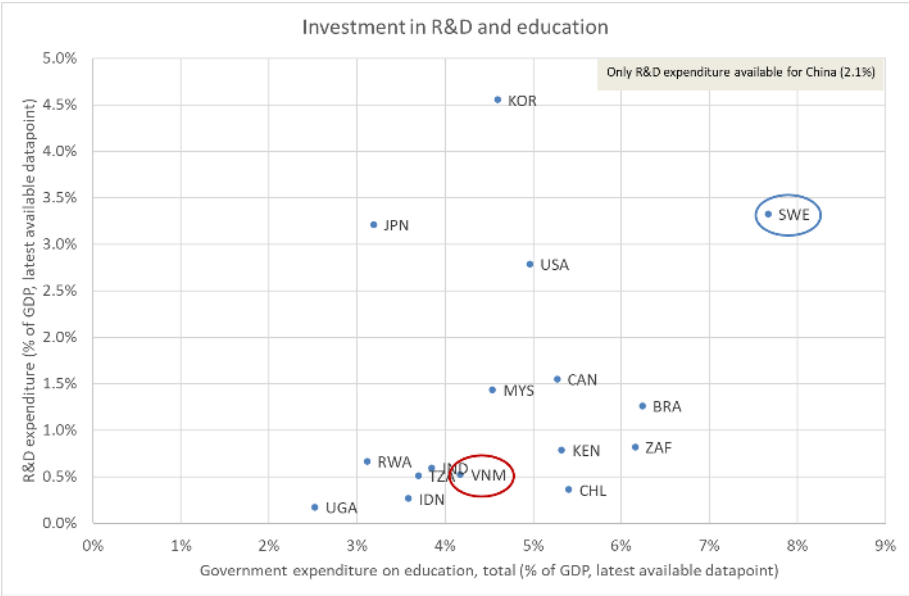
GDP has more or less consistently grown at over 5% per year since economic reforms were introduced in the mid-1980s, leading to a 10-fold increase in GDP per capita over the period. The reforms spurred rapid economic growth, transforming what was then one of the world's poorest nations into a lower middle-income country. GDP is forecast to continue to grow steadily in the coming years with one of the fastest growth rates in the region at between 6 and 7%.

The structure of the economy has changed greatly over the same period, and Vietnam has become a net exporter in the last years, boosted by the exports of manufactured electronic, computer and textile goods. Robust domestic demand and export-oriented manufacturing are two key factors of strength.

Vietnam's rapid industrialization has come with a price. Electricity consumption has tripled over the past decade, growing faster than output. Given the increasing reliance of fossil fuels, the power sector itself accounts

for nearly two-thirds of the country's greenhouse gas emissions and thus there is an urgent need to accelerate the clean energy transition.

Figure 4: **Expenditure on education and research and development (R&D), both as a percentage of GDP, data predominantly for 2017 or 2018**



The Vietnamese government expenditure on education is slightly more than 4% of GDP and the expenditure on research and development (R&D) is less than 0.5% of GDP. Vietnamese government expenditures on education and R&D are similar to India in terms of percent of GDP. In comparison, Swedish expenditure is more than 7% of GDP for education and more than 3% of GDP for R&D, see figure 4.

Higher education institutions in Vietnam

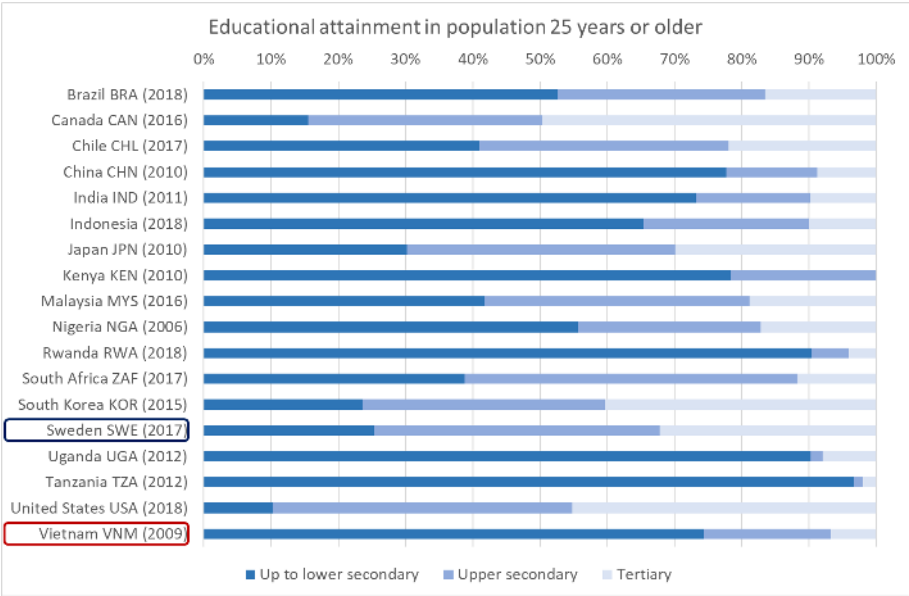
Vietnam has a broad mix of HEIs consisting of public universities, colleges, academies, and private universities. At the onset of the Đổi mới reforms, Vietnam only had 101 public HEIs, which by 2015 had grown to 357 public and private such (non-state HEIs were allowed from 1988, though full private for-profit universities only from 2005) and the student body grew almost 20-fold during the same period. Vietnam has since 2005 engaged in a comprehensive reform and of its HEI system as part of its strategy to achieve further economic growth. The reforms aim to ensure and increase the quality of the education system that strains from rapid growth through development of various measures on quality assurance, accreditation etc., as well as continue the growth of higher education enrollments. Vietnam has a large amount of unskilled labor compared to neighboring countries and for this reason there is also a strong focus on developing vocational education and training. Internationalization is further in the focus with the aim to increase international collaborations of Vietnamese HEIs.

The dominating HEIs and research institutions in Vietnam are the two national universities, the Vietnam National University Hanoi and Vietnam National University Ho Chi Minh City (founded in 1993 and 1995, respectively), the Hanoi University of Science and Technology (founded in 1956), which is the largest technical university in Vietnam and the Tôn Đức Thắng University (founded in 1997), all of which are public universities. These universities are, together with the Vietnam Academy of Science and Technology (founded in 1975), the largest institutions by publication volume in Vietnam. The largest private research university in Vietnam is Duy Tan University (founded in 1994), which ranks number six in Vietnam by publication volume.

Vietnam is host to a growing number of international universities and international branch campuses, such as RMIT Vietnam, British University Vietnam, Vietnamese-German University and the Fulbright University Vietnam.

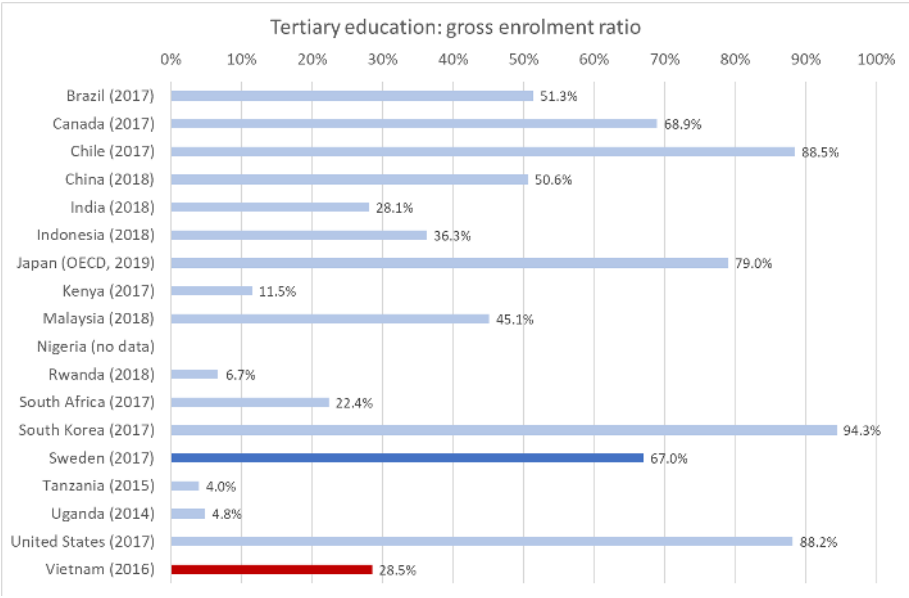
Educational attainment and student mobility

Figure 5: **Educational attainment**



There is no recent data on educational attainment for the population in Vietnam. Data from 2009 indicates that the vast majority, close to 75%, of the population (25 years and older) had not attained upper secondary education or higher, which was rather like the situation in China and India. Less than 10% had attained tertiary education in Vietnam, as seen in Fig. 5. In comparison, in Sweden about 40% of the population had attained upper secondary school and more than 30% had attained tertiary education (2017).

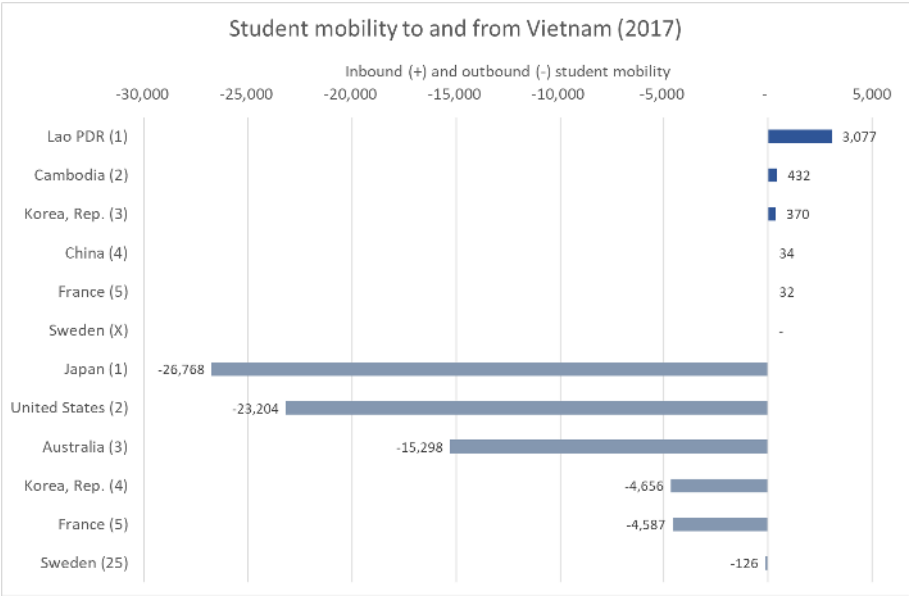
Figure 6: **Gross enrolment ratio to tertiary education**



The gross enrolment ratio (GER) for tertiary education is indicated in figure 6. It is the ratio of students enrolled in tertiary education divided by the 5-year age group starting from the official secondary school graduation age. It indicates the capacity of the education system to enrol students of a particular age group.

In Vietnam, the GER for tertiary education is 28.5%, which is similar to India, 28,1%. The corresponding GER for Sweden is 67%.

Figure 7: **Inbound and outbound students, origins and destinations**



There is a large asymmetry in the number of inbound and outbound students in Vietnam. A large group of students from Vietnam attend higher education at in institutions in Japan, United States and Australia. The foreign students that study in Vietnam come almost exclusively from Laos, Cambodia, and South Korea.

Figure 8: **Inbound and outbound students to and from Sweden per year**

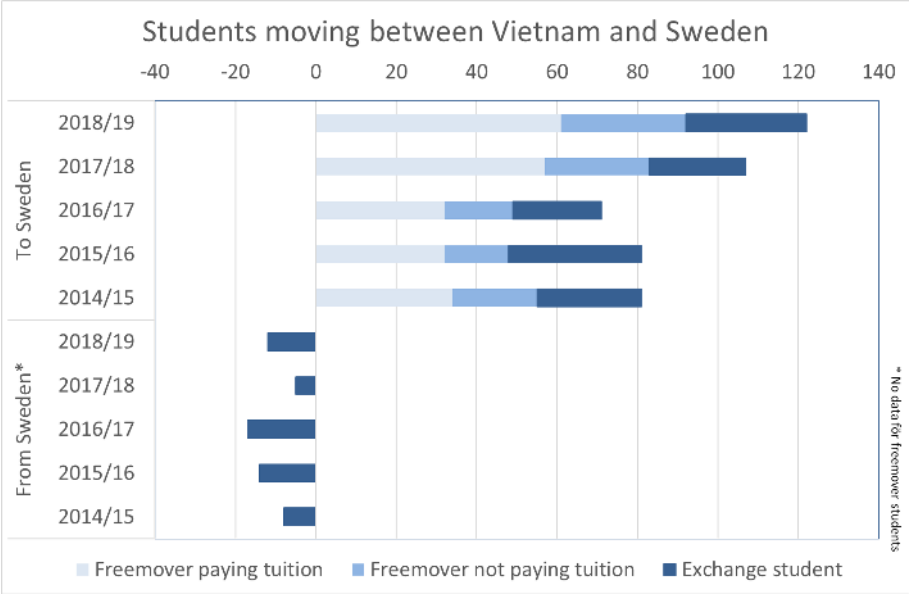


Fig. 8 illustrates the inbound and outbound students from and to Sweden. The data from the Swedish side shows the number of outgoing exchange students fluctuating for the past few years, but the numbers are very small. A more stable pattern is seen on the Vietnamese side for exchange students. The number of free-mover students from Vietnam has increased in the last two years.

Figure 9: **Inbound and outbound students to Sweden 2018/19, per higher education institution**

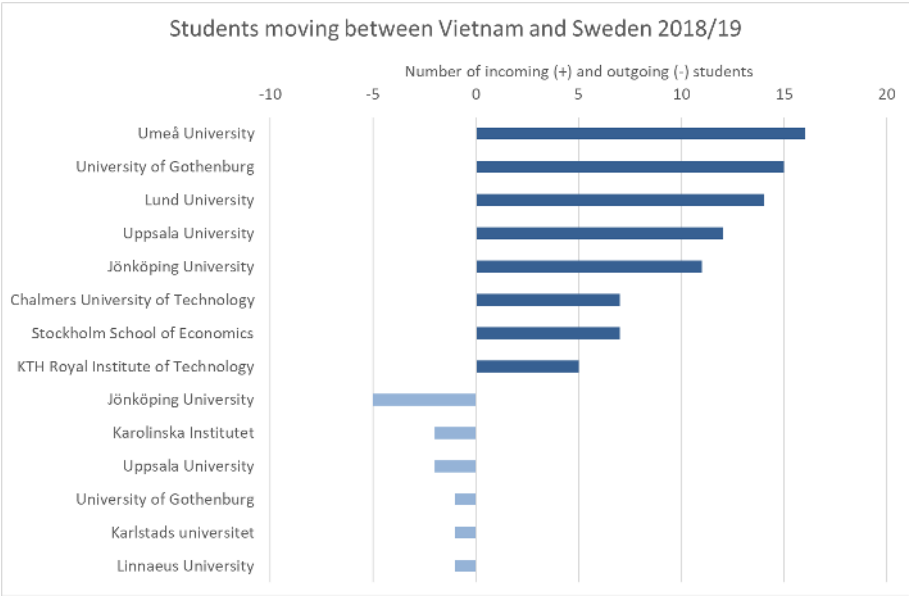


Fig. 9 illustrates the incoming and outgoing students between Sweden and Vietnam. The largest number of students from Vietnam go to Umeå University, University of Gothenburg and Lund University. The outgoing students from Sweden are relatively few, with the largest number of students coming from Jönköping University.

Research and collaboration with Sweden

Vietnam has a very small scientific production contributing to only 0.25 % of the world total publication volume. In terms of annual growth of publications (2015-2019) publications grew by almost 25 % per annum. The FWCI is high at 1.49 for a developing country. The country's share of international co-publications, as measured by the FWIS, is 1.67%. This is also unproportionally high, which may in parts explain the high FWCI.

Table 1: **Selected publication indicators**

Based on publications 2015–2019							
Country	Annual publication volume (average)	Share of world	Annual volume growth 2015–2019	Citation impact	Share of int'l co-publ	Share of ac.-corp. co-publ.	Collabo-ration intensity with Sweden
		%	%	FWCI	FWIS	%	$NCII_{100}$
Brazil	79,128	2.54%	4.4%	0.90	0.79	2.1%	72%
Canada	110,493	3.55%	2.0%	1.51	1.31	4.2%	75%
Chile	13,929	0.45%	5.9%	1.22	1.42	2.0%	70%
China	559,913	17.98%	8.7%	1.02	0.55	2.4%	47%
India	164,707	5.29%	6.5%	0.82	0.43	1.2%	55%
Indonesia	24,572	0.79%	54.3%	0.92	0.58	0.7%	31%
Japan	133,011	4.27%	1.0%	0.95	0.69	5.4%	70%
Kenya	3,082	0.10%	7.2%	1.73	1.92	4.5%	124%
Malaysia	32,636	1.05%	5.8%	1.01	1.06	1.5%	30%
Nigeria	8,476	0.27%	14.0%	0.98	1.17	1.3%	36%
Rwanda	427	0.01%	11.2%	3.30	2.40	5.2%	203%
South Africa	24,423	0.78%	6.2%	1.26	1.29	2.9%	111%
South Korea	85,265	2.74%	2.0%	1.05	0.69	4.5%	35%
Sweden	42,975	1.38%	2.2%	1.68	1.55	8.3%	n/a
Tanzania	1,660	0.05%	7.8%	1.81	1.98	3.4%	178%
Uganda	1,741	0.06%	7.1%	1.76	2.04	4.8%	170%
United States	685,704	22.02%	0.9%	1.42	0.86	4.7%	74%
Viet Nam	7,649	0.25%	24.9%	1.43	1.67	2.2%	40%
World	3,113,580	100.00%	2.8%	1.00	1.00	2.6%	n/a

See appendix for detailed explanations some of the indicators in Table 1.

Figure 10: **Annual co-publications per number of co-authors**

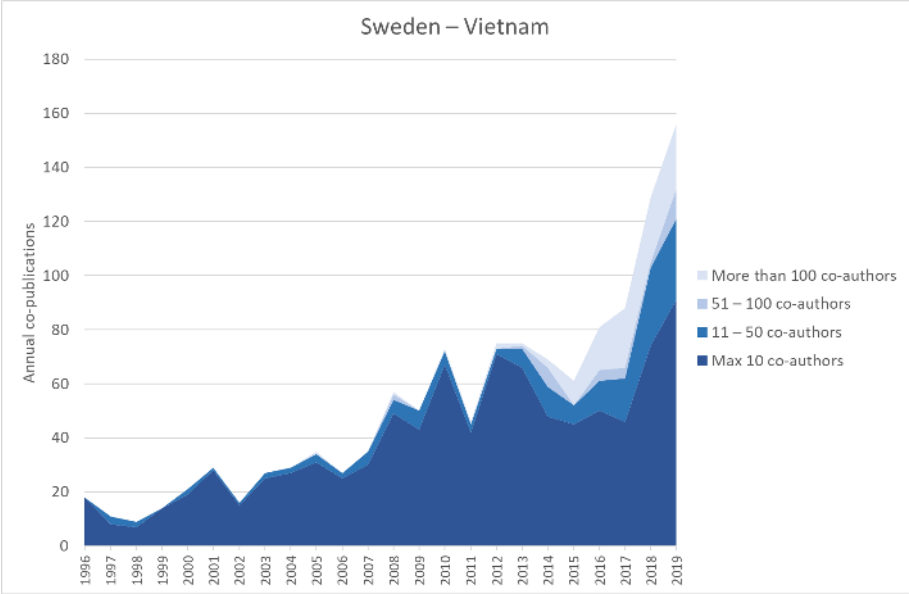
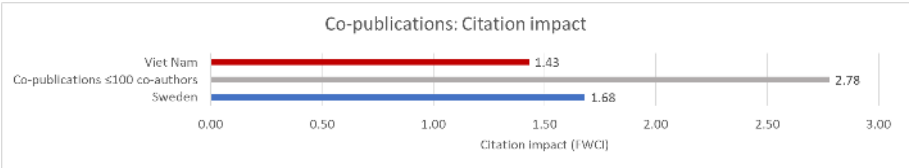
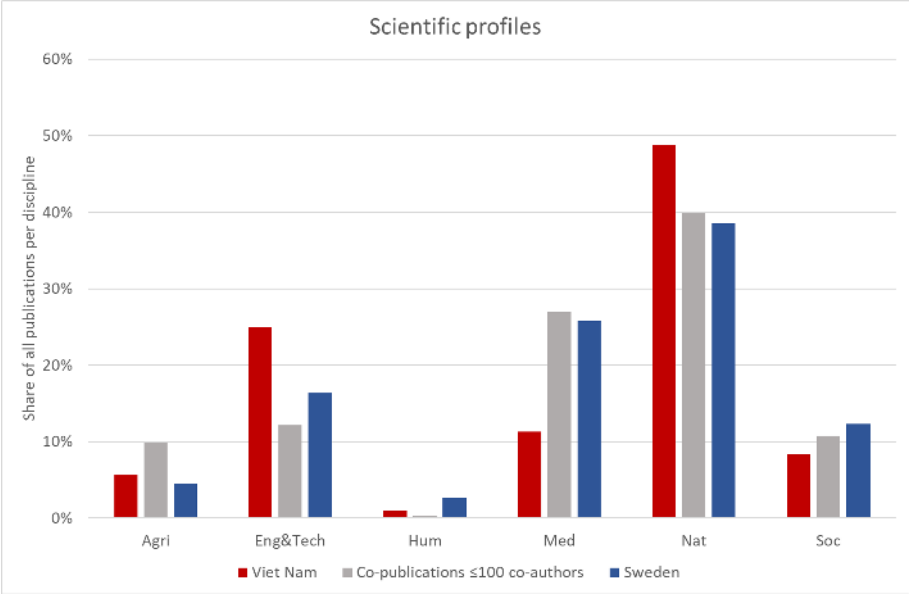


Figure 11: **Field-weighted citation impact for each country and their co-publications with ≤100 co-authors (2015–2019)**



There are rather few co-publications between Sweden and Vietnam, though during the last 5 years there has been a drastic increase in the number of co-publications. Co-publications between Sweden and Vietnam are dominated by such with 10 or less co-authors, as indicated in Fig. 10. Both Sweden and Vietnam benefit when researchers work together. As can be seen in Fig. 11, co-publications (100 co-authors or less) have significantly higher FWCI than what it is for each country, i.e., scientific quality increase for both the Swedish and Vietnamese side when researchers work together.

Figure 12: **Distribution of publications per scientific discipline (2015–2019)**



In Figure 12, the scientific profile of the research collaboration between Sweden and Vietnam is compared with the overall profiles of the countries. For example, approximately 25% of the publications with Vietnamese participation are within engineering and technology. In Sweden, the share is clearly lower at 16%. If all scientific disciplines collaborated internationally to the same extent, the shares of co-publications involving both countries would typically be between the national shares, as is the case for the natural and social sciences. The agricultural sciences and medicine are over-represented in the collaboration, whereas engineering and technology and humanities are under-represented.

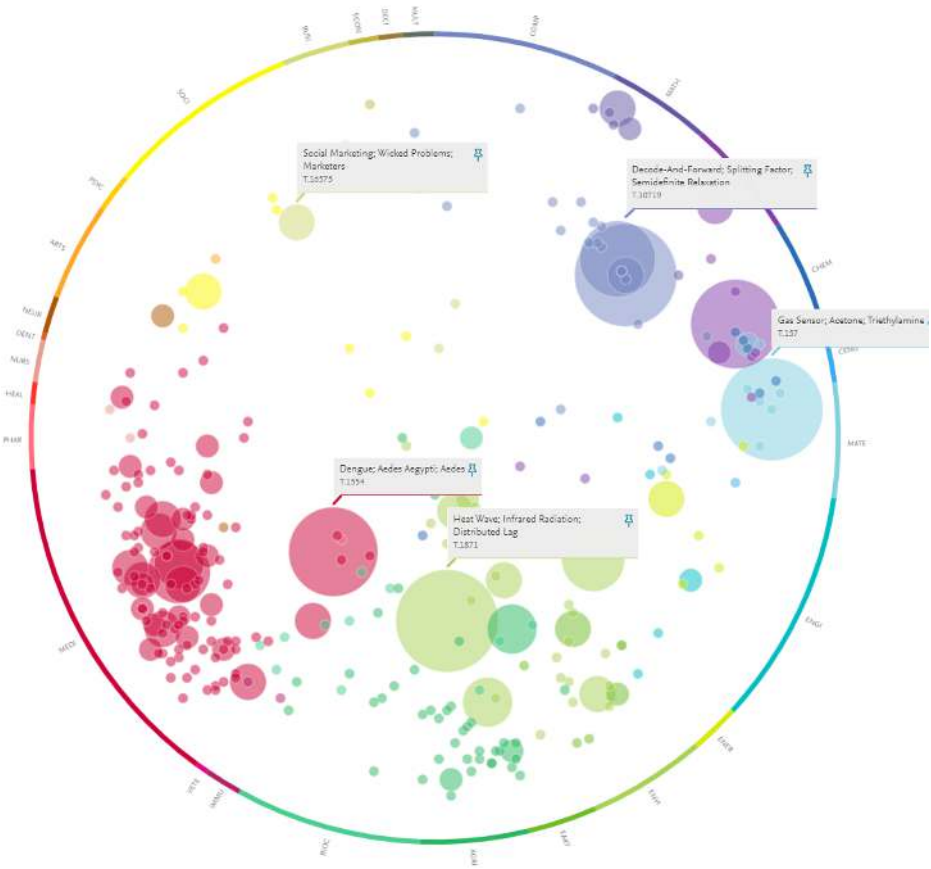
The large difference in the share of publications in medicine with only 11% in Vietnam against 26% in Sweden and an even higher share in the co-publications, is interesting to note.

Figure 13: **Word cloud based on co-publications with ≤100 co-authors (2015–2019)**

The word cloud in Figure 13 is produced using Elsevier's Fingerprint Engine. It shows the most prominent key phrases based on the titles, abstracts, and keywords in the co-publications with Swedish and Vietnamese co-authors. Green and large texts signal highly relevant and growing key phrases.

Several of the key phrases relate to health and medicine. 'Vietnam' is the largest key phrase whereas 'Sweden' is not mentioned, which indicates that the collaborative efforts have a stronger focus on issues that are related to the Vietnamese context. The relatively high share of co-publications within the natural sciences does not influence the word cloud very much.

Figure 14: **Wheel of science based on co-publications with ≤100 co-authors (2015–2019)**



Publications involving Swedish and Vietnamese researchers are predominantly in the fields of medicine (red) and environmental sciences (green), see Figure 14. The largest dot relates to communication technologies. The size relates to the topic's share of all included co-publications and given the relatively low total number, a large circle in this wheel requires a handful publications only.

Table 2: **The 20 institutions in Sweden with the highest share of co-publications with ≤100 co-authors (2015–2019). Only institutions with at least 300 publications during the period are included**

Institution	Co-publications with Vietnam (≤100 co-authors)	Share of all publications at the Swedish institution	FWCI
Mälardalen University	18	0.7%	1.55
Blekinge Institute of Technology	8	0.6%	0.87
Dalarna University	6	0.6%	0.81
Swedish University of Agricultural Sciences	50	0.5%	2.03
Royal Swedish Academy of Sciences	2	0.5%	1.22
Luleå University of Technology	26	0.5%	2.29
Södertörn University	4	0.4%	1.58
Umeå University	42	0.3%	3.10
Vattenfall	1	0.3%	0.47
Stockholm Environment Institute	2	0.3%	0.64
Karolinska Institutet	97	0.3%	2.31
Jönköping University	5	0.2%	0.63
Uppsala University	58	0.2%	6.89
Linnaeus University	6	0.2%	2.57
University of Skövde	2	0.2%	0.72
Swedish Meteorological and Hydrological I	1	0.2%	1.17
University of Gävle	2	0.2%	0.84
Stockholm University	29	0.2%	1.36
Swedish Museum of Natural History	2	0.2%	0.80
Linköping University	20	0.1%	2.91

Table 2 lists the HEIs and research institutes in Sweden that have the largest number of co-publications (with less than 100 co-authors) with Vietnam as a share of their total publication output. Most HEIs and research institutes in the table have co-publication rates above or on par with Vietnam's share of the total global publication volume (0.25%), however, as Vietnam's total publication volume is very small, the net result is that the number of co-publications is overall very low. The Swedish HEIs and research institutes that have the largest number of co-publications in the table predominantly collaborates with Vietnam in the fields of medicine and agriculture, which explains that these two disciplines are over-represented in the Viet-Swedish scientific collaboration as seen in Fig. 12.

Figure 15: **Top ten Swedish institutions with the highest number of co-publications with ≤100 co-authors (2015–2019)**

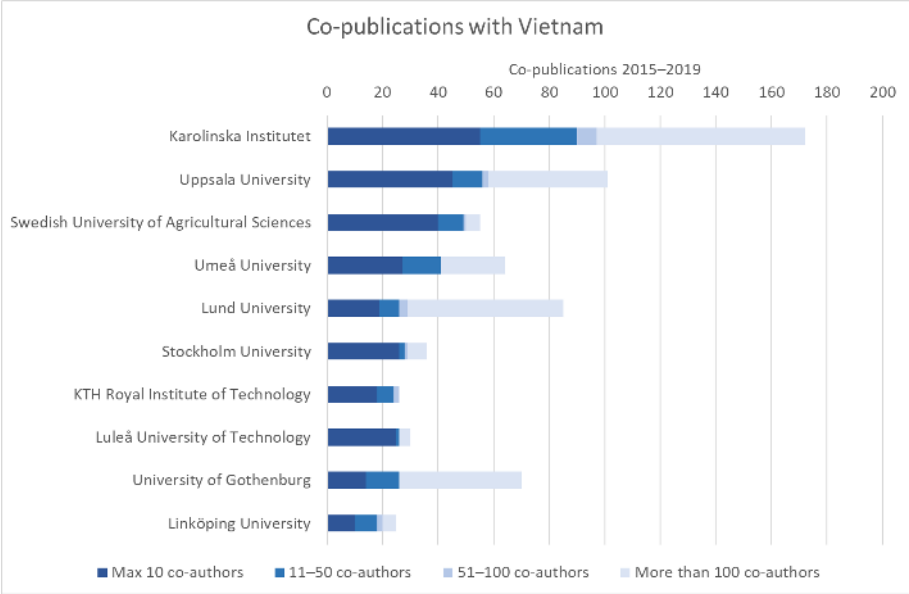


Fig. 15 lists the ten Swedish universities with the highest numbers of co-publications with Vietnam, ranked according to the number of co-publications with less than 100 co-authors. These are almost all the same as the top ten Swedish universities by publication volume overall, with the exception that Chalmers University of Technology is missing, and Luleå Technical University is found among the top ten instead. The order of the ranking differs from the ranking for Swedish institutions overall, in parts reflecting that medicine and agriculture are key disciplines for Viet-Swedish scientific collaborations, however, given the overall small volumes of co-publications care should be taken to overinterpret this data. The larger amounts of co-publications with more than 100 co-authors of Karolinska Institute, Uppsala University, Lund University and University of Gothenburg are predominantly due to participation in large joint international health studies.

Figure 16: **Top ten Vietnamese institutions with the highest number of co-publications with ≤100 co-authors (2015–2019)**

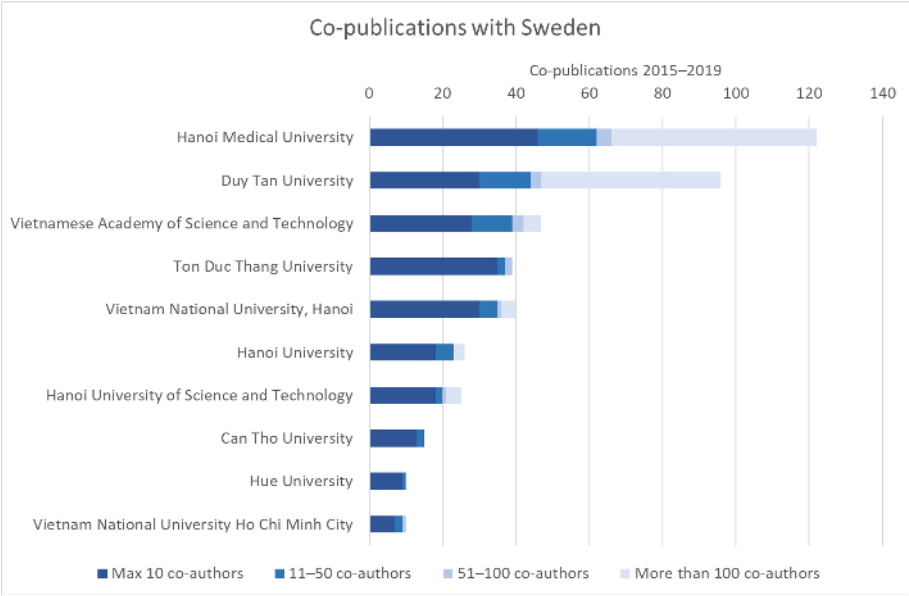


Fig. 16 lists the ten Vietnamese universities with the highest numbers of co-publications with Sweden, ranked according to the number of co-publications with less than 100 co-authors. Seven of these[1] are among the top ten Vietnamese universities by publication volume overall. Of note is that, for Hanoi Medical University topping the list, Sweden is the fourth most important collaboration nation by co-publication volume. The larger amounts of co-publications with more than 100 co-authors of Hanoi Medical University and Duy Tan University are predominantly due to participation in large joint international health studies.

[1]Duy Tan University, Vietnam Academy of Science and Technology, Ton Duc Tang University, Vietnam National University Hanoi, Can Tho University, Hue University and Vietnam National University Ho Chi Minh City.

Table 3: **Co-publication matrix for the top ten in both countries showing the number co-publications with ≤100 co-authors (2015–2019)**

Publications 2015–2019 with up to 100 co-authors	Hanoi Medical University	Duy Tan University	Vietnamese Academy of Science and Technology	Ton Duc Thang University	Vietnam National University, Hanoi	Hanoi University	Hanoi University of Science and Technology	Can Tho University	Hue University	Vietnam National University Ho Chi Minh City	With Vietnam
Karolinska Institutet	47	14	7	-	9	5	-	-	3	-	97
Uppsala University	3	2	7	1	1	7	12	2	1	-	58
Swedish University of Agricultural Sciences	-	-	5	3	-	3	2	1	4	1	50
Umeå University	16	6	2	-	2	3	-	2	-	-	41
Lund University	2	2	2	4	4	4	-	1	-	-	29
Stockholm University	-	2	3	5	-	-	-	6	-	1	29
KTH Royal Institute of Technology	-	-	9	-	3	2	1	1	-	3	26
Luleå University of Technology	-	10	2	21	4	-	1	-	-	-	26
University of Gothenburg	5	-	8	-	-	1	-	-	1	3	26
Linköping University	-	-	2	3	3	1	2	-	1	1	20
With Sweden	66	47	42	39	36	23	21	15	10	10	419

The co-publication matrix in Table 3 shows the co-publications (with less than 100 authors) between the top ten collaborating institutions in Sweden and Vietnam and thus gives an indication of the distribution of the collaborations between Swedish and Vietnamese HEIs and research institutes. The blue/green bars in the squares visualizes the ratio of the number of co-publications between two HEIs/research institutes to the total number of co-publications (for the Swedish institution). What can be seen is that the scientific collaboration between Vietnam and Sweden is rather concentrated both in the sense that the collaborations between the top ten collaborating institutions on both sides constitutes a bulk of the Vietnamese-Swedish scientific collaboration as well as that each institution collaborate predominantly with handful institutions while not much at all with others.

Appendix: data and methods

Data

The report is based on data from the following organisations, accessed in June/July 2020:

- Population and economic data: World Bank, see https://databank.worldbank.org/home.aspx
- Educational attainment and student mobility: UNSCO, see http://data.uis.unesco.org, and the Swedish Higher Education Authority (UKÄ), see https://www.uka.se/statistik--analys/statistikdatabas-hogskolan-i-siffror.html (with one data point from the OECD for Japan)
- Research: Publication data from Scopus, the broadest available publication database, see https://www.elsevier.com/solutions/scopus?dgcid=RN_AGCM_Sourced_300005030

Methods

According to the UNESCO Institute for Statistics (UIS), an internationally mobile student is an individual who has physically crossed an international border between two countries with the objective to participate in educational activities in a destination country, where the destination country is different from his/her country of origin. For measuring international mobility in education, UNESCO, OECD and Eurostat have agreed that the preferred definition of the country of origin should be based on students' educational careers prior to entering tertiary education. See http://uis.unesco.org/en/methodology#Q5

The research section includes several indicators and figures that might require further explanation.

Table **Selected publication indicators**. The annual growth is calculated by using linear regression to approximate the volume development during the period 2015–2019. The field-weighted citation impact (FWCI) is a normalised indicator comparing the citations a publication receives with other pub-

lications in the same scientific field, from the same year, and in the same type of publication. If the FWCI is above one, the publication is more cited than the world average, and vice versa. The field-weighted internationalisation score (FWIS) is normalised in a similar manner. A FWIS above one means that the publications are more international (include more international co-authorships) than the world average, and vice versa.[2] Academic–corporate co-publications include at least one academic and one corporate affiliation and at least two co-authors. Finally, the normalised collaboration intensity index (NCII) illustrates how the collaboration differs from a situation when Sweden (or another entity) collaborates with all countries in proportion to their share of all international co-publications globally. For example, authors with an affiliation in the United States participate in 16% of all international co-publications globally. In Sweden's international co-publications, the share of US co-authors is 11%. The NCII is calculated as the actual share divided by the 'expected' share, i.e. 11/16 = 67%, which indicates that US collaboration is underrepresented in Sweden's portfolio of international co-publications.[3]

Figure **Distribution of publications per scientific discipline (2015–2019).** The scientific profile is calculated using the OECD categorisation of publications in six scientific disciplines: agricultural sciences, engineering and technology, humanities, medical sciences, natural sciences, and social sciences. For each discipline, the share of publications is calculated using the number of publications within the discipline and the total number of publications in the dataset.

The **word cloud** is a feature in SciVal, which uses the Elsevier Fingerprint Engine to extract distinctive keyphrases within the publication set. For more

[2] For more details, see Pohl, H., Warnan, G. and Baas, J. (2014), 'Level the playing field in scientific collaboration with the use of a new indicator: Field-weighted internationalization score', *Research Trends* 39, 3–8.

[3] For a more detailed description, see Pohl, H. (2020), 'Collaboration with countries with rapidly growing research: supporting proactive development of international research collaboration', *Scientometrics* 122(1), 287–307. https://doi.org/10.1007%2Fs11192-019-03287-6

information, see https://www.elsevier.com/solutions/elsevier-fingerprint-engine

The **wheel of science** is another feature directly available in SciVal. Each bubble represents a topic. The size of the bubble indicates the output of the entity on that topic. The position of the bubble is based upon the all science journal classification (ASJC) categories of the journals in which the scholarly output is published. The position is related to the topic as a whole and is not affected by the entity examined. The greater influence an ASJC has over a topic, the closer the topic is dragged to its side of the wheel of science. As a result, the topics closer to the centre of the wheel are more likely to be multidisciplinary, compared to the topics along the edge of the wheel.

Note that a topic may be placed at the edge of the wheel, but still be considered multidisciplinary because it is equally influenced by a number of ASJCs that are located on the same side of the wheel.

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

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