



國立中興大學
National Chung Hsing University

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Bibliometric analyses of research published by National Chung Hsing University (NCHU)

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1 Executive summary

Outline

This Report analyzes the bibliometric performance of National Chung Hsing University (NCHU) between 2003 and 2012 using Thomson Reuters *Web of Knowledge*SM data extracted from *InCites*TM. Data and analyses are provided for selected *Essential Science Indicators* fields and *Web of Science*SM journal categories in research areas mapping broadly to Agricultural, Plant & Animal Sciences. NCHU performance is examined within each subject area, overall (2003-12) and over time (2003-07 and 2008-12). NCHU performance is also examined relative to selected international and Taiwanese comparators.

Overall findings

- NCHU performance in the *Essential Science Indicators* field of Agricultural Sciences is strong, paralleling Taiwanese research performance and due to the Agriculture, Multidisciplinary *Web of Science* journal category. Taiwanese research collaboration in the *Journal of Agricultural and Food Chemistry* lies behind these research strengths.
- NCHU impact relative to subject area in Agricultural Sciences, has increased from just under world average (1.0), to one and a half times greater than world average (1.50) by 2008-12. Taiwanese research performance in this field is also strong.
- NCHU research performance in the *Web of Science* journal category of Agriculture, Multidisciplinary is excellent. Impact relative to subject area has risen to 1.71 by 2008-12. This is due to Taiwanese research collaboration in the *Journal of Agricultural and Food Chemistry*.
- NCHU research performance in the *Web of Science* journal category of Food Science & Technology is also excellent, with impact relative to subject area rising to 1.35 by 2008-12, well above world and Taiwanese averages. NCHU has a high specialization in this *Web of Science* journal category, accounting for 7.4% of research output (2003-12). It has the highest impact relative to subject amongst Taiwanese comparators in this *Web of Science* journal category.
- NCHU research performance in the *Web of Science* journal category of Nutrition & Dietetics is also good, rising from just over half to over world average by 2008-12. Whilst impact relative to subject is slightly lower than world average overall (0.94), it has the highest impact relative to subject area amongst Taiwanese comparators in this *Web of Science* journal category.
- NCHU research in Zoology is over world average overall (1.11) though there was a spike in impact relative to subject area (1.42, 2007-11). It is the highest ranked by citation impact relative to Taiwanese comparators, but recently impact relative to subject area is below world average (0.86, 2008-12).

2 Introduction

This Report analyzes the bibliometric performance of the National Chung Hsing University (NCHU) between 2003 and 2012 using Thomson Reuters *Web of Knowledge* data extracted from *InCites* for the Agricultural Sciences *Essential Science Indicators* field and related *Web of Science* journal categories.

These analyses will be used by NCHU to inform the strategic development of NCHU's academic and research capabilities. This Report will demonstrate NCHU's performance relative to Taiwanese and international comparators in selected research areas. It also examines the drivers of NCHU's excellent performance in Agricultural, Plant & Animal Sciences and related fields.

3 Methodology

This Section contains an overview of the bibliometric methodology used in this Report. Further information about bibliometrics and citation analyses is available in this Thomson Reuters [WHITE PAPER](#).¹

3.1 Bibliometrics and citation analyses

Research evaluation is increasingly making wider use of bibliometric data and analyses. Bibliometrics is the analysis of data derived from publications and their citations. Publication of research outcomes is an integral part of the research process and is a universal activity. Consequently, bibliometric data have a currency across subjects, time and location that is found in few other sources of research-relevant data. The use of bibliometric analysis, allied to informed review by experts, increases the objectivity of and confidence in evaluation.

Research publications accumulate citation counts when they are referred to by more recent publications. Citations to prior work are a normal part of publication, and reflect the value placed on a work by later researchers. Some papers get cited frequently and many remain uncited. Highly-cited work is recognized as having a greater impact and Thomson Reuters (*Evidence*) has shown that high citation rates are correlated with other qualitative evaluations of research performance, such as peer review.² This relationship holds across most science and technology areas and, to a limited extent, in social sciences and even in some humanities subjects.

Indicators derived from publication and citation data should always be used with caution. Some fields publish at faster rates than others and citation rates also vary. Citation counts must be carefully normalized to account for such variations by field. Because citation counts naturally grow over time it is essential to account for growth by year. Normalization is usually done by reference to the relevant global average for the field and for the year of publication.

Bibliometric indicators have been found to be more informative for core natural sciences, especially for basic science, than they are for applied and professional areas and for social sciences. In professional areas the range of publication modes used by leading researchers is likely to be diverse as they target a diverse, non-academic audience. In social sciences there is also a diversity of publication modes and citation rates are typically much lower than in natural sciences.

Bibliometrics work best with large data samples. As the data are disaggregated, so the relationship weakens. Average indicator values (e.g. of citation impact) for small numbers of publications can be skewed by single outlier values. At a finer scale, when analyzing the specific outcome for individual departments, the statistical relationship is rarely a sufficient guide by itself. For this reason, bibliometrics are best used in support of, but not as a substitute for, expert decision processes. Well-founded analyses can enable conclusions to be reached more rapidly and with greater certainty, and are therefore an aid to management and to increased confidence among stakeholders, but they cannot substitute for review by well-informed and experienced peers.

¹ David A. Pendlebury (2008), 'White Paper: Using bibliometrics in evaluating research'

² *Evidence* Ltd. (2002) Maintaining Research Excellence and Volume: A report by Evidence Ltd to the Higher Education Funding Councils for England, Scotland and Wales and to Universities UK. (Adams J, et al.) 48pp .

3.2 Data sources

3.2.1 InCites

For this Report, bibliometric data has been sourced from *InCites*. *InCites* is a customized, citation-based online research evaluation tool that allows academic and government administrators to conduct analyses on their productivity and benchmark their output against peers worldwide.

InCites includes additional data and functionality and can be customized to suit needs: for further information on the full capabilities of *InCites* please visit this [WEBPAGE](#).

3.2.2 Web of Knowledge

InCites derives its data from the databases underlying the *Web of Knowledge*, which gives access to conference proceedings, patents, websites, and chemical structures, compounds and reactions in addition to journals. It has a unified structure that integrates all data and search terms together and therefore provides a level of comparability not found in other databases. It is widely acknowledged to be the world's leading source of citation and bibliometric data. The *Web of Science* is part of the *Web of Knowledge*, and focuses on research published in journals and conferences in science, medicine, arts, humanities and social sciences. The authoritative, multidisciplinary content covers over 12,000 of the highest impact journals worldwide, including Open Access journals and over 150,000 conference proceedings. Coverage is both current and retrospective in the sciences, social sciences, arts and humanities, in some cases back to 1900. Within the research community these data are often still referred to by the acronym 'ISI'. Further information about the journals included in the citation databases and how they are selected is available on this [WEBPAGE](#).

3.3 Subject categorization

In this Report, the following schemes have been used to associate published research with research areas:

- *Essential Science Indicators* fields
- *Web of Science* journal categories

In brief, the *Essential Science Indicators* fields aggregate data at a higher level than the *Web of Science* journal categories. There are only 22 *Essential Science Indicator* fields compared to 254 journal *Web of Science* journal categories. The analyses using *Essential Science Indicator* fields are useful to distinguish between those institutions with a strong research focus in wider research areas. The analyses using *Web of Science* journal categories are useful to identify strengths and weaknesses in more specific research areas.

In this Report, NCHU have selected Agricultural, Plant & Animal Sciences *Web of Science* journal categories which they wish to explore further. These are:

Agricultural, Plant & Animal Sciences	Code
Agriculture, Multidisciplinary	MLT-A
Food Science & Technology	FOOD
Nutrition & Dietetics	NUT
Zoology	ZOO

3.4 Citation data definitions

Web of Science documents: the number of documents from the *Web of Science* (as of the last *InCites* update).

Impact relative to subject area: An institution's impact in a particular subject area relative to the impact for the subject area overall (a value greater than 1 indicates a better than average impact in the subject area).

% Documents in Institution/Country: The percentage of documents that an institution/country has published in a particular subject in relation to the total number of documents that the institution/country has published.

Percentage of highly-cited papers: Articles, reviews and some peer-reviewed proceedings papers that are classed in the top 1 percent (top percentile), top 5 percent (top quintile) and top 10 percent (top decile) relative to field and year of publication at end-2012.

3.4.1 Highly-cited papers

These data have been extracted from a custom *National Citation Report* for Taiwan 2003-12. **These data are not extracted from InCites and are therefore not directly comparable.** In particular, estimates for *Essential Science Indicator* fields have been calculated using a customized mapping of *Web of Science* journal categories to *Essential Science Indicators* fields and should be regarded as indicative. Furthermore, calculations are based on a subset of *Web of Science* documents termed 'papers': articles, reviews and some peer-reviewed proceedings papers.

A bibliography of NCHU highly-cited papers have been provided in an Excel spreadsheet accompanying this Report.

3.5 Time period

3.5.1 2003-12, cumulative

Data have been extracted from *InCites* for the time period 2003 to 2012 (cumulative). Metrics are calculated from *Web of Science* documents in the specified time period.

3.5.2 2003-12, in 5-year groupings

Data have been provided in overlapping five-year periods. This produces cleaner or smoother trend lines because the performance of any one year is smoothed in favor of average performance in a five-year period. Source data metrics are calculated from *Web of Science* documents in the five-year period.

3.6 Interpretation of data and analyses

Web of Science documents: the minimum number of *Web of Science* documents suitable as a sample for quantitative research evaluation is a subject of widespread discussion. Larger samples are always more reliable, but a very high minimum may defeat the scope and specificity of analysis. Experience has indicated that a threshold between 20 and 50 *Web of Science* documents can generally be deemed appropriate. For work that is likely to be published with little contextual information, the upper boundary (≥ 50) is a desirable starting point. For work that will be used primarily by an expert, in-house group then the lower boundary (≥ 20) may be approached. Because comparisons for in-house evaluation often involve smaller, more specific research groups (compared to broad institutional comparisons) a high volume threshold is self-defeating. Smaller samples may be used but outcomes must be interpreted with caution and expert review should draw on multiple information sources before reaching any conclusions. For this reason, data are displayed either overall (2003-12) or in 5-year groupings and data for impact relative to subject area are suppressed where based on less than 20 *Web of Science* documents.

Impact relative to subject area: when considering such data points, care must be taken to understand that these data are highly skewed and the average can be driven by a single, highly-cited paper. The world average is 1.0, so any value higher than this indicates a *Web of Science* document, or set of *Web of Science* documents, which are cited more than average for similar research worldwide. For research management purposes, experience suggests that values between 1.0 and 2.0 should be considered to be indicative of research which is influential at a national level whilst that cited more than twice world average has international recognition. Furthermore, regional or country-level benchmarks are often more informative than world benchmarks for emerging research economies such as Taiwan over long-established research economies such as the USA. For this reason, Taiwanese benchmarks are provided throughout the Report.

Research field: A problem frequently encountered in the analysis of data about the research process is that of 'mapping'. For example, a funding body allocates money for chemistry but this goes to researchers in biology and engineering as well as to chemistry departments. Clinicians publish in mathematics and education journals. Publications in environmental journals come from a diversity of disciplines. This creates a problem when we try to define, for example, 'Agricultural research'. Is this the work funded under Agricultural programs, the work of researchers in Agricultural units or the work published in Agricultural journals? For the first two options we need to track individual grants and researchers to their outputs, which is feasible but not within the scope of this study nor for every comparator institution. Therefore, to create a simple and transparent dataset of equal validity across time and geography, we rely on the set of journals associated with Agriculture as a proxy for the body of research reflecting the field.

Indicator	Threshold
Number of <i>Web of Science</i> documents	Citation analyses based on fewer than 20 <i>Web of Science</i> documents at any particular aggregation, e.g. year or field are not reliable.
Impact relative to subject area (an indication of research quality within the field)	A value of more than 1.0 indicates better than world average. However, the benchmark will be different for different countries and Taiwanese benchmarks are provided.
Percentage of highly-cited papers (those ranked in the top percentile/quintile/decile of world papers relative to field/journal category and year)	A value of more than 1/5/10 percent indicates better than world average. However, the benchmark will be different for different countries and Taiwanese benchmarks are provided.

3.7 Comparators

NCHU have selected institutions with which they wish to compare their research performance (in addition to National Taiwan University, NTU, which is always shown in Tables and Figures). These are:

Institution	Code	Country	Region
University of Tokyo	TOK	Japan	Asia-Pacific
Kyoto University	KYO	Japan	Asia-Pacific
University of Sydney	SYD	Australia	Oceania
Massey University	MAS	New Zealand	Oceania
University of Sevilla	SEV	Spain	Europe
University of California Berkeley	UCB	USA	North America
University of California Davis	UCD	USA	North America
University of California Riverside	UCR	USA	North America
Texas A&M University College Station	TEX	USA	North America

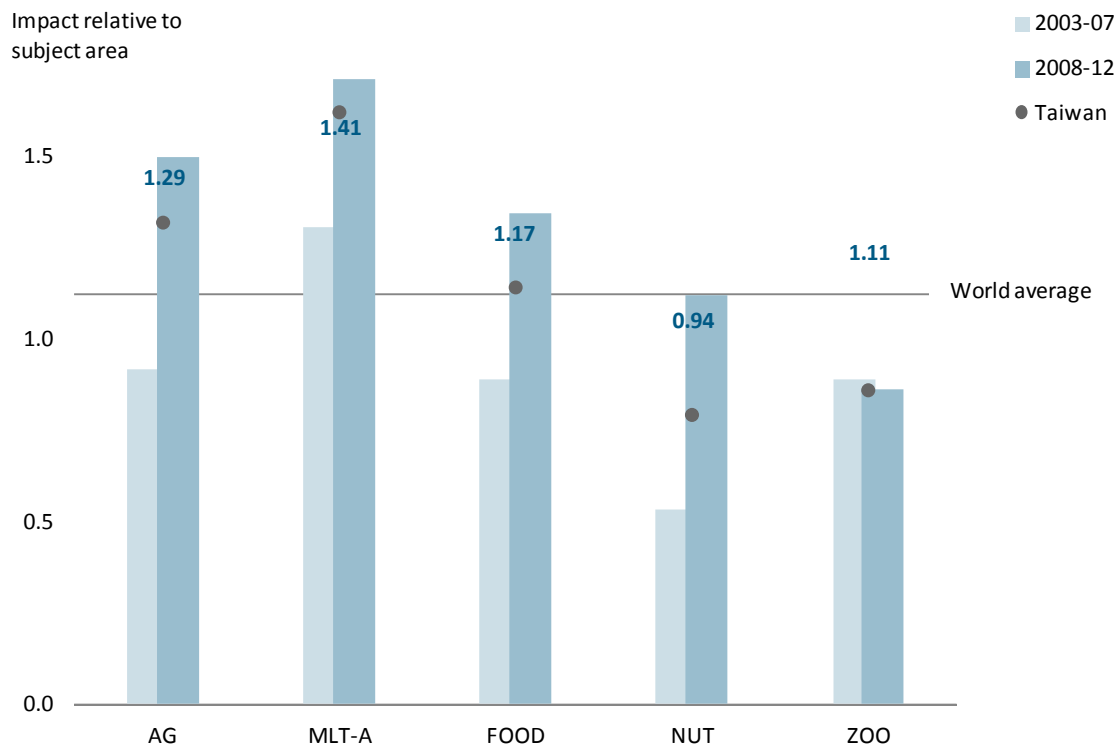
4 Agricultural, Plant & Animal Sciences

This Section of the Report analyzes NCHU research performance in the Agricultural Sciences *Essential Science Indicators* field and in selected *Web of Science* journal categories relating to Agricultural, Plant & Animal Sciences research between 2003 and 2012, overall and in 5-year groupings using data extracted from *InCites*. These *Web of Science* journal categories are:

- Agriculture, Multidisciplinary
- Food Science & Technology
- Nutrition & Dietetics
- Zoology

4.1 High-level research trends

Figure 4.1 NCHU impact relative to subject area, change over time from 2003-07 to 2008-12 (bars) and NCHU (data labels) compared to Taiwan (dots) 2003-12, Agricultural, Plant & Animal Sciences



		Impact relative to subject area			
		03-07	08-12	03-12	TAI
AG	Agricultural Sciences	0.92	1.50	1.29	1.18
MLT-A	Agriculture, Multidisciplinary	1.31	1.71	1.41	1.45
FOOD	Food Science & Technology	0.89	1.35	1.17	1.02
NUT	Nutrition & Dietetics	0.53	1.12	0.94	0.71
ZOO	Zoology	0.89	0.86	1.11	0.77

4.2 Summary

NCHU impact relative to subject area in Agricultural Sciences is now one and a half times greater than world average (1.50, 2008-12) and has increased substantially since 2003-07. However, Agricultural Sciences has fallen as a share of NCHU research output. NCHU impact relative to subject area parallels, but is now higher than Taiwan. The top five Taiwanese comparators in this field by *Web of Science* documents also perform well with impact relative to subject area greater than or equal to world average. NCHU has a higher percentage of papers in the world's top 10 percent of research compared to global and Taiwanese benchmarks. NCHU impact relative to subject area is exceptionally high in Agriculture, Multidisciplinary (1.71, 2008-12) and Food Science & Technology (1.35, 2008-12) relating to research published in the *Journal of Agricultural and Food Chemistry*. It has also increased in Nutrition & Dietetics from just over half world average to 1.12 (2008-12).

Agriculture, Multidisciplinary (1.41)

Agriculture, Multidisciplinary contains journals having a general or interdisciplinary approach to the Agricultural Sciences. Regional and multi-subject journals are also covered.

NCHU research output has doubled and impact relative to subject area increased to nearly twice world average by 2007-11. This has paralleled Taiwan trends and Taiwanese comparators have impact relative to subject area greater than world average. NCHU highly-cited papers include Taiwanese research collaboration in the *Journal of Agricultural and Food Chemistry*, ranked the highest in the top quartile of journals by journal impact factor in this *Web of Science* journal category.

Food Science & Technology (1.17)

Food Science & Technology includes journals concerned with various aspects of food research and production, including food additives and contaminants; food chemistry and biochemistry; meat science; food microbiology and technology; dairy science; food engineering and processing; cereal science; brewing, and food quality and safety.

NCHU impact relative to subject area in Food Science & Technology has increased from below world average to well above world average (1.35, 2008-12), and is now higher than Taiwan. NCHU has the highest impact relative to subject area relative to the top five Taiwanese comparators. NCHU has more research in this *Web of Science* journal category compared to globally and Taiwan, though share has fallen over time (7.0% by 2008-12). This is also related to research published in the *Journal of Agricultural and Food Chemistry*, ranked in the top quartile of journals by journal impact factor in this *Web of Science* journal category.

Nutrition & Dietetics (0.94)

Nutrition & Dietetics covers journals concerning many aspects of nutrition, including general nutrition, nutrition and metabolism, nutrition science, clinical nutrition, vitamin research and nutritional biochemistry. Dietetics, the application of nutritional principles, is also included in this category.

Impact relative to subject area has increased to over world average (1.12, 2008-12) from just over half world average (2003-07). Its overall impact relative to subject area is the highest amongst the Taiwanese comparators and higher than Taiwan.

Zoology (1.11)

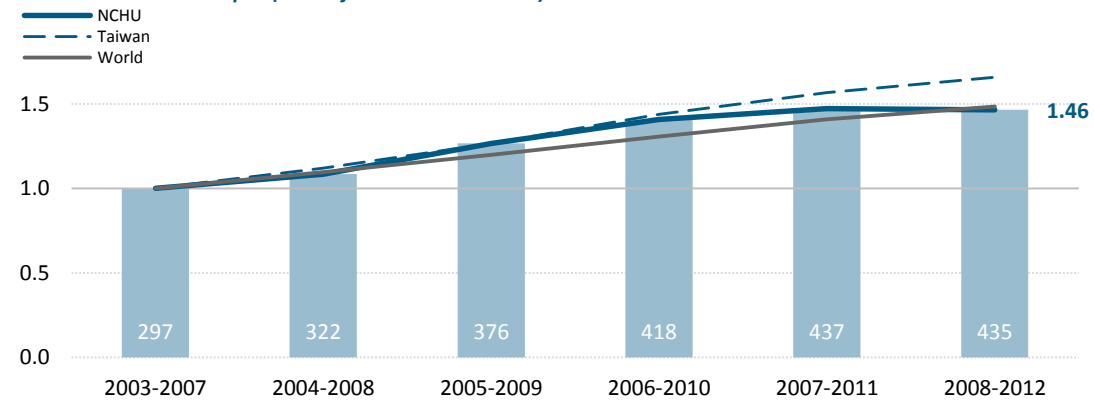
Zoology covers journals concerning a broad range of topics on the study of animals. This category ranges from animal behavior and animal physiology to some aspects of animal ecology. The category does not include veterinary medicine, ornithology, or most aspects of entomology.

Impact relative to subject area in this *Web of Science* journal category is over world average and NCHU has the highest impact relative to subject area of the Taiwanese comparators. This performance may be due to 2007-11 *Web of Science* documents when impact relative to subject area rose to 1.42. This is due to the very highly-cited paper Hwang, PP et al. (2007), *New insights into fish ion regulation and mitochondrion-rich cells, Comparative Biochemistry & Physiology A – Molecular & Integrative Physiology*, 148(3), pp. 479-497. However, impact relative to subject area has subsequently fallen to 0.86 (2008-12).

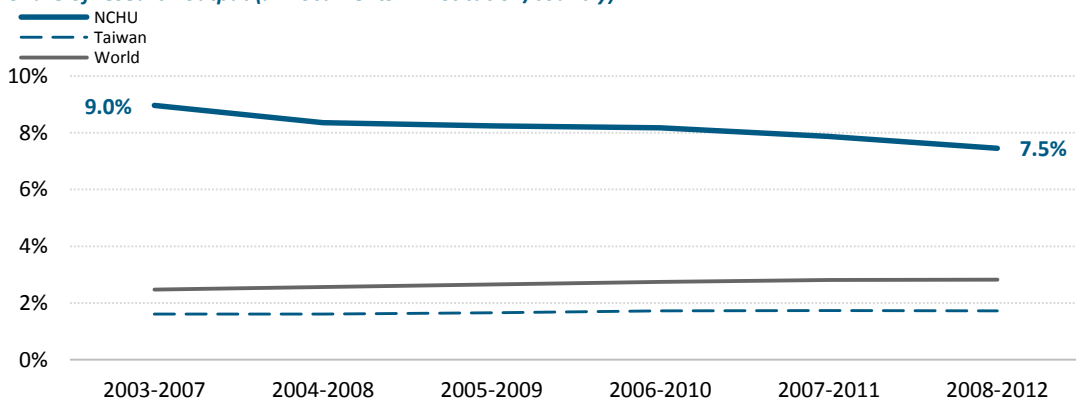
Agricultural Sciences

NCHU research output in this field has increased, but has fallen in terms of share to 7.5% (higher than Taiwan and globally). Impact relative to subject area is above world average and has increased to 1.50 (2008-12).

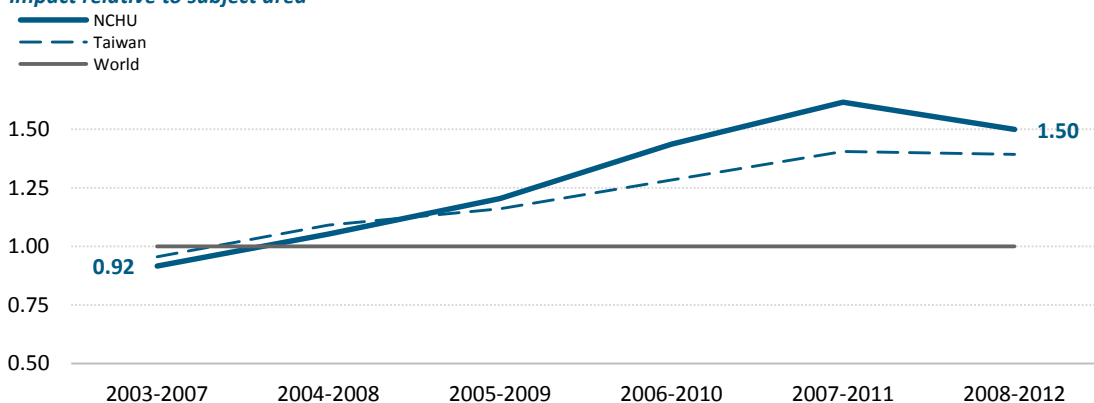
Growth in research output (Web of Science documents)



Share of research output (% Documents in institution/country)



Impact relative to subject area

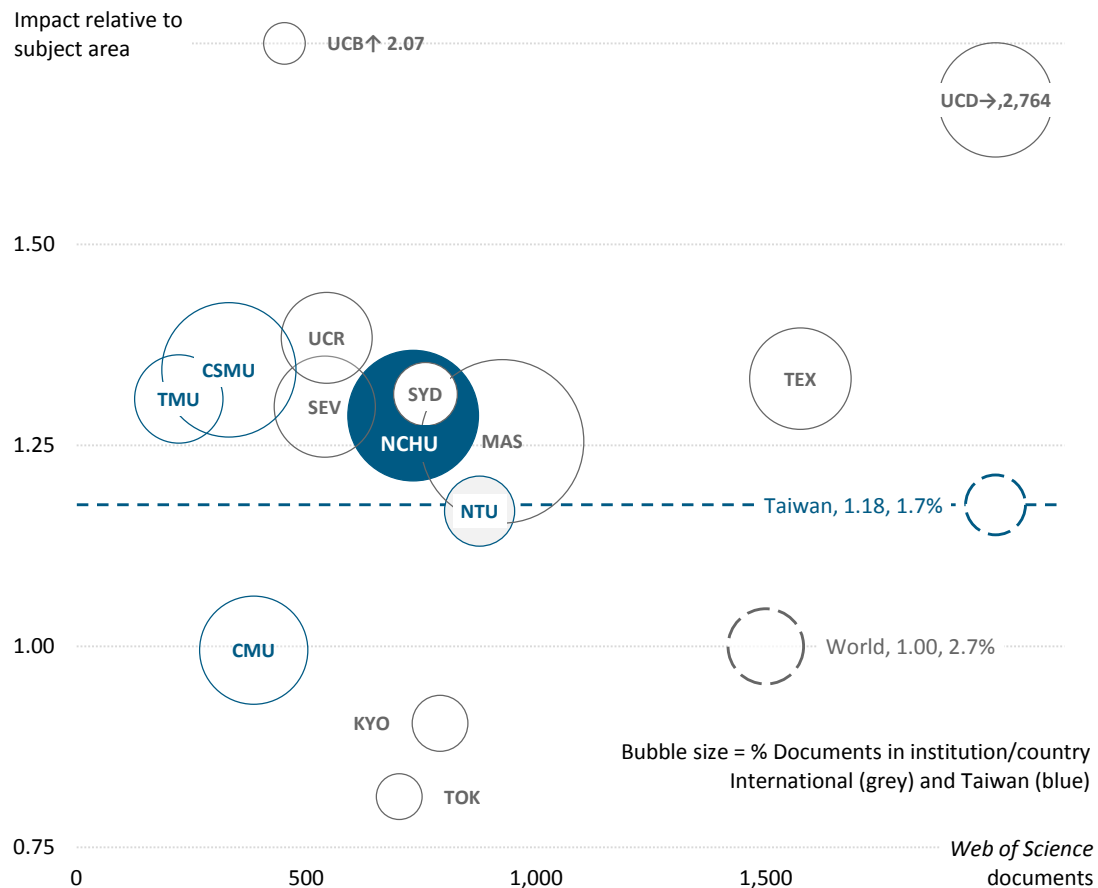


NCHU has a higher percentage of papers in the world's top 10 percent compared to Taiwan and globally.

Percentage of highly-cited papers, NCHU compared to Taiwan and world, 2003-12

	Top 1 percent		Top 5 percent		Top 10 percent	
	#	%	#	%	#	%
NCHU	11	1.2%	56	6.1%	109	11.8%
Taiwan	-	0.7%	-	5.1%	-	10.2%
World	-	1.0%	-	5.0%	-	10.0%

Comparative research performance, 2003-12



NCHU compares well internationally, though US comparators have high impact relative to subject area (notably UCB and UCD); whereas Japanese comparators (KYO and TOK) are below world average.

Comparative international research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
University of California Davis	UCD	2,764	1.68	6.1%
Texas A&M College Station	TEX	1,575	1.33	4.8%
Massey University	MAS	926	1.25	12.6%
National Taiwan University	NTU	877	1.17	2.3%
Kyoto University	KYO	791	0.90	1.5%
University of Sydney	SYD	759	1.31	1.9%
National Chung Hsing University	NCHU	732	1.29	8.0%
University of Tokyo	TOK	702	0.81	1.0%
University California Riverside	UCR	544	1.38	3.9%
University of Seville	SEV	540	1.30	4.8%
University of California Berkeley	UCB	452	2.07	0.8%

Impact relative to subject area is world average or above for all Taiwanese comparators.

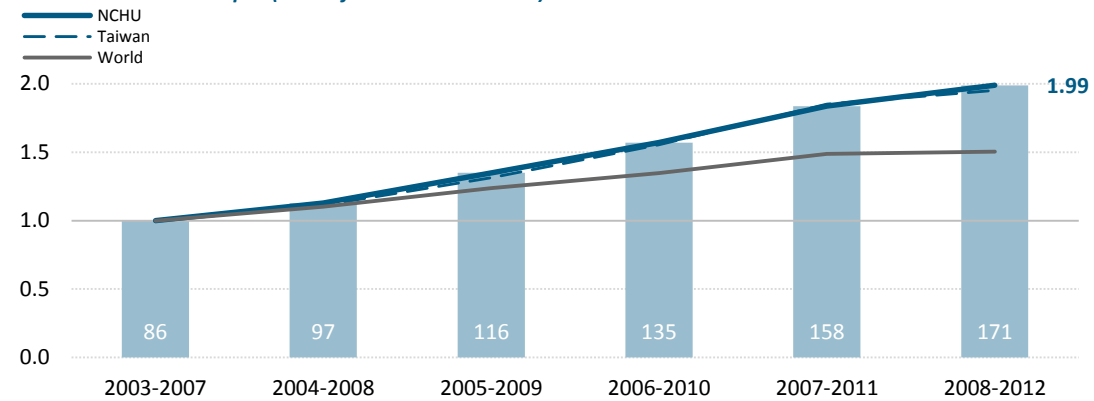
Comparative Taiwanese research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
National Taiwan University	NTU	877	1.17	2.3%
National Chung Hsing University	NCHU	732	1.29	8.0%
China Medical University	CMU	385	1.00	5.5%
Chung Shan Medical University	CSMU	331	1.34	8.5%
Taipei Medical University	TMU	222	1.31	3.7%

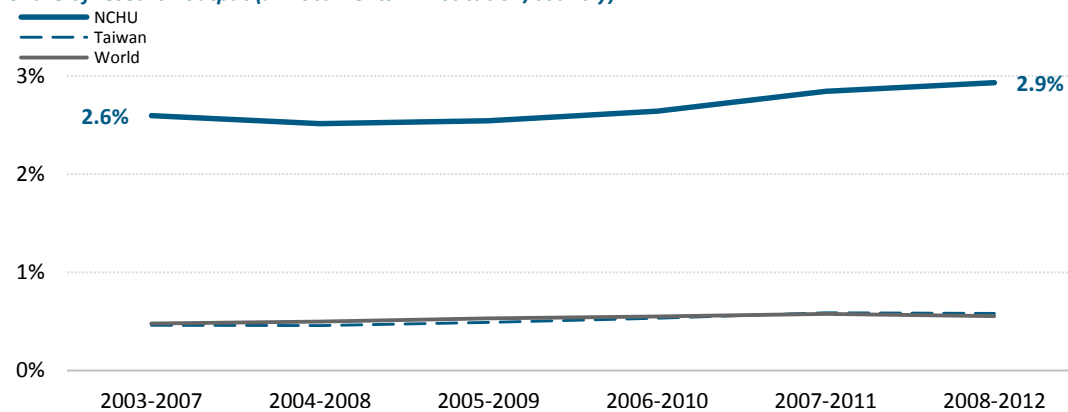
Agriculture, Multidisciplinary

NCHU research output has doubled and has increased in share. Impact relative to subject increased to nearly twice world average, overtaking Taiwan, but falling back in 2008-12.

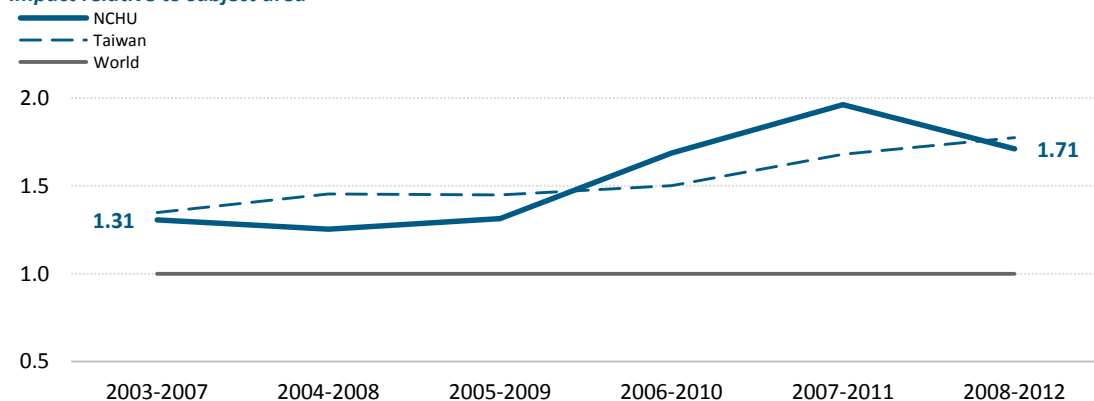
Growth in research output (Web of Science documents)



Share of research output (% Documents in institution/country)



Impact relative to subject area



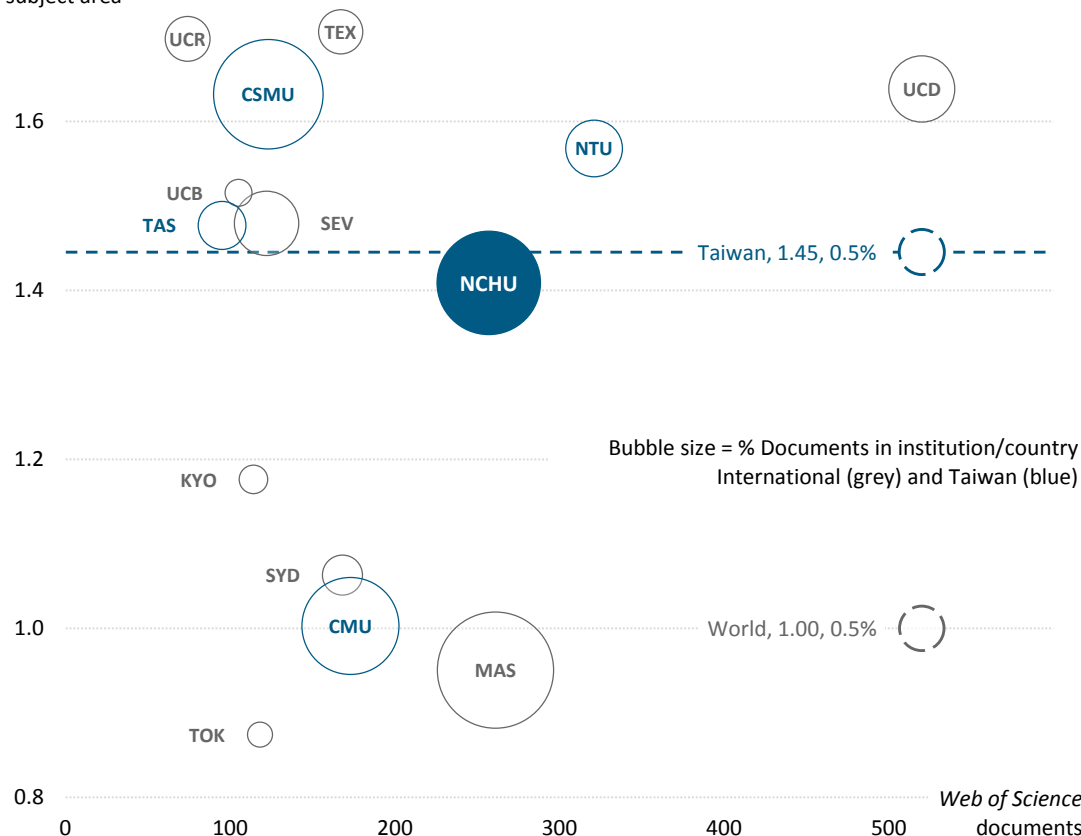
18% of NCHU research is highly-cited, nearly twice world average. This is higher than, though similar to Taiwan.

Percentage of highly-cited papers, NCHU compared to Taiwan and world, 2003-12

	Top 1 percent		Top 5 percent		Top 10 percent	
	#	%	#	%	#	%
NCHU	3	1.2%	29	11.3%	46	18.0%
Taiwan	-	1.2%	-	10.3%	-	17.8%
World	-	1.0%	-	5.0%	-	10.0%

Comparative research performance, 2003-12

Impact relative to subject area



NCHU impact relative to subject area is high but slightly lower than Taiwan, comparing well internationally. The impact relative to subject area of US comparators is high; CSMU and NTU also perform well internationally.

Comparative international research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
University of California Davis	UCD	520	1.64	1.2%
National Taiwan University	NTU	321	1.57	0.8%
Massey University	MAS	261	0.95	3.5%
National Chung Hsing University	NCHU	257	1.41	2.8%
University of Sydney	SYD	168	1.06	0.4%
Texas A&M College Station	TEX	167	1.71	0.5%
University of Seville	SEV	122	1.48	1.1%
University of Tokyo	TOK	118	0.87	0.2%
Kyoto University	KYO	114	1.18	0.2%
University of California Berkeley	UCB	105	1.52	0.2%
University California Riverside	UCR	74	1.70	0.5%

Taiwanese comparators have impact relative to subject area above world average due to Taiwanese research collaboration in the Journal of Agricultural and Food Chemistry.

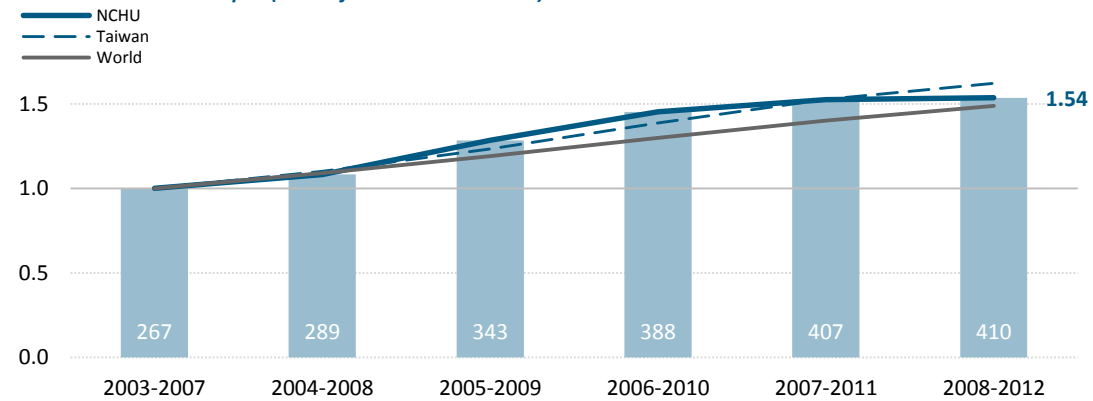
Comparative Taiwanese research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
National Taiwan University	NTU	321	1.57	0.8%
National Chung Hsing University	NCHU	257	1.41	2.8%
China Medical University	CMU	173	1.00	2.5%
Chung Shan Medical University	CSMU	123	1.63	3.1%
Academy of Sciences, Taiwan	TAS	95	1.48	0.6%

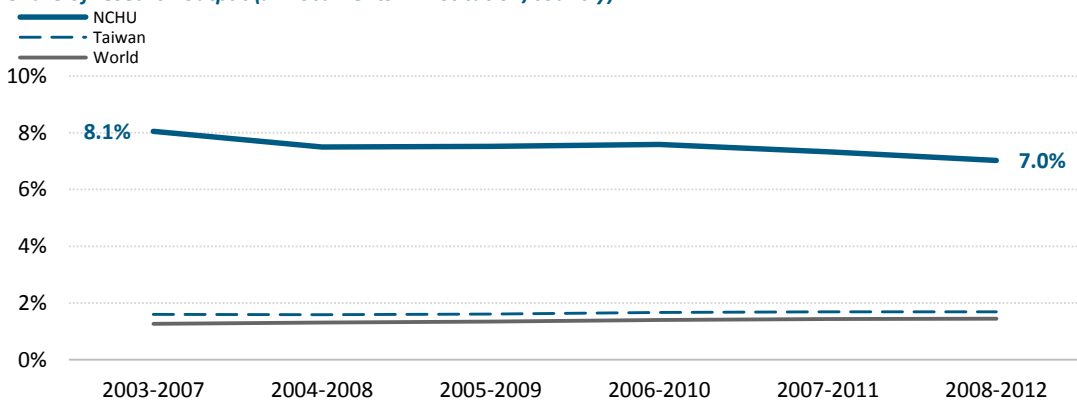
Food Science & Technology

NCHU research output has increased but fallen in terms of share to 7.0% (higher than globally or Taiwan). Impact relative to subject area has increased to 1.35 (2008-12) over the world and Taiwanese averages.

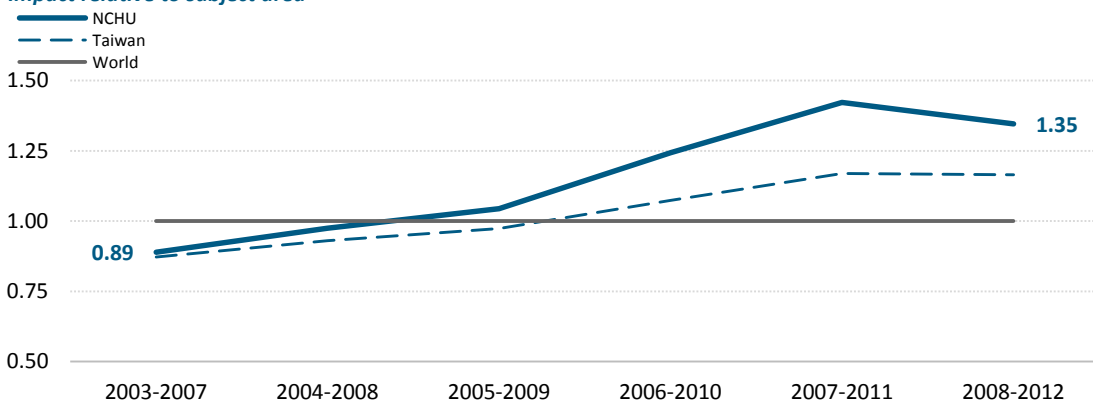
Growth in research output (Web of Science documents)



Share of research output (% Documents in institution/country)



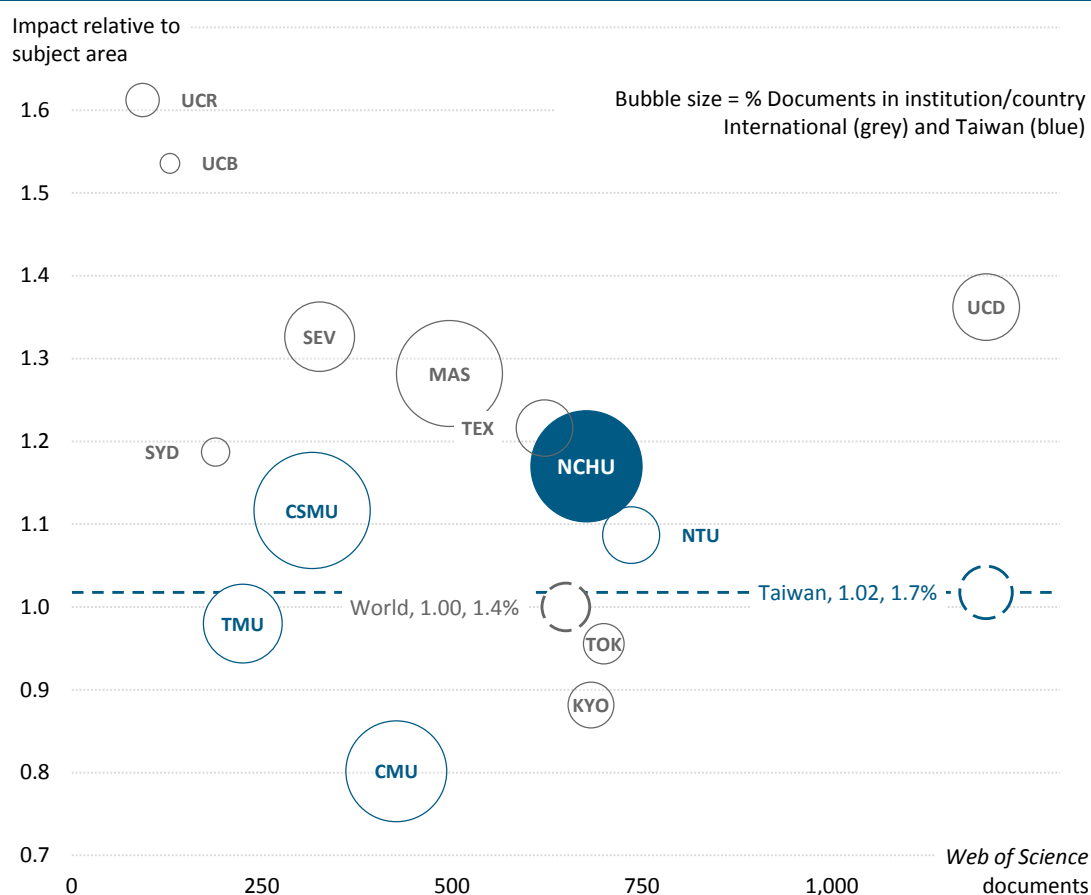
Impact relative to subject area



NCHU has 88 highly-cited papers, 13.1% of research output - higher than globally and in Taiwan.

Percentage of highly-cited papers, NCHU compared to Taiwan and world, 2003-12

	Top 1 percent		Top 5 percent		Top 10 percent	
	#	%	#	%	#	%
NCHU	10	1.5%	45	6.7%	88	13.1%
Taiwan	-	1.0%	-	5.2%	-	11.0%
World	-	1.0%	-	5.0%	-	10.0%



NCHU impact relative to subject area (1.17) and share of research output (reflecting its specialization) compares well internationally.

Comparative international research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
University of California Davis	UCD	1,203	1.36	2.7%
National Taiwan University	NTU	736	1.09	1.9%
University of Tokyo	TOK	700	0.96	1.0%
Kyoto University	KYO	683	0.88	1.3%
National Chung Hsing University	NCHU	677	1.17	7.4%
Texas A&M College Station	TEX	622	1.22	1.9%
Massey University	MAS	497	1.28	6.7%
University of Seville	SEV	326	1.33	2.9%
University of Sydney	SYD	189	1.19	0.5%
University of California Berkeley	UCB	129	1.54	0.2%
University California Riverside	UCR	93	1.61	0.7%

NCHU has the highest impact relative to subject area of the Taiwanese comparators, suggesting that Food Science & Technology is an area of comparative national research strength for NCHU.

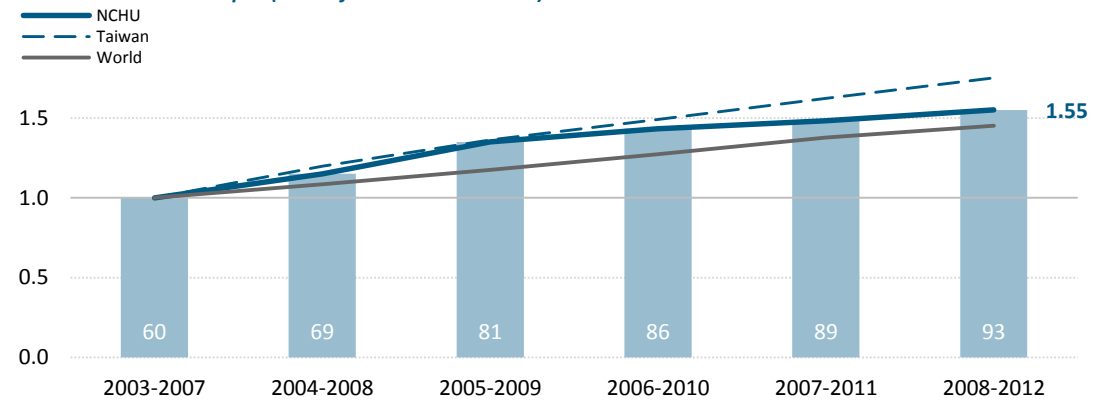
Comparative Taiwanese research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
National Taiwan University	NTU	736	1.09	1.9%
National Chung Hsing University	NCHU	677	1.17	7.4%
China Medical University	CMU	427	0.80	6.1%
Chung Shan Medical University	CSMU	316	1.12	8.1%
Taipei Medical University	TMU	225	0.98	3.7%

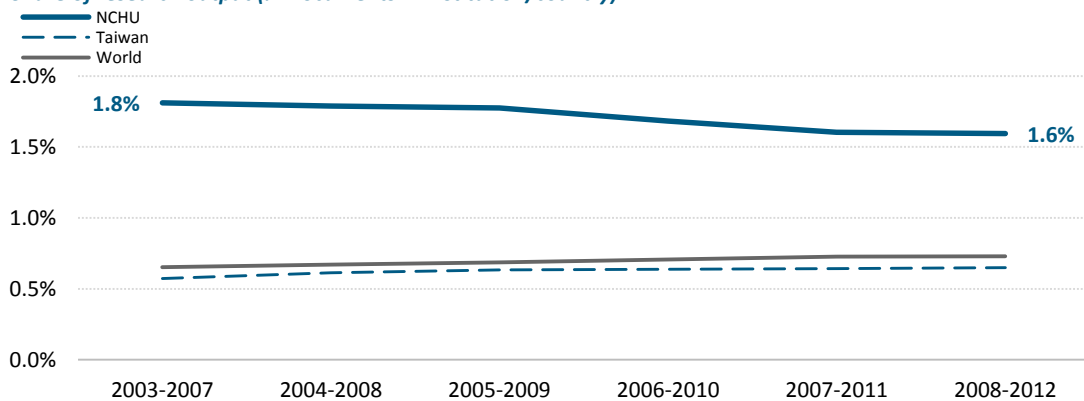
Nutrition & Dietetics

Impact relative to subject area has increased from less than half to over world average, after a high of 1.31 (2007-11). Research output has grown but share has fallen.

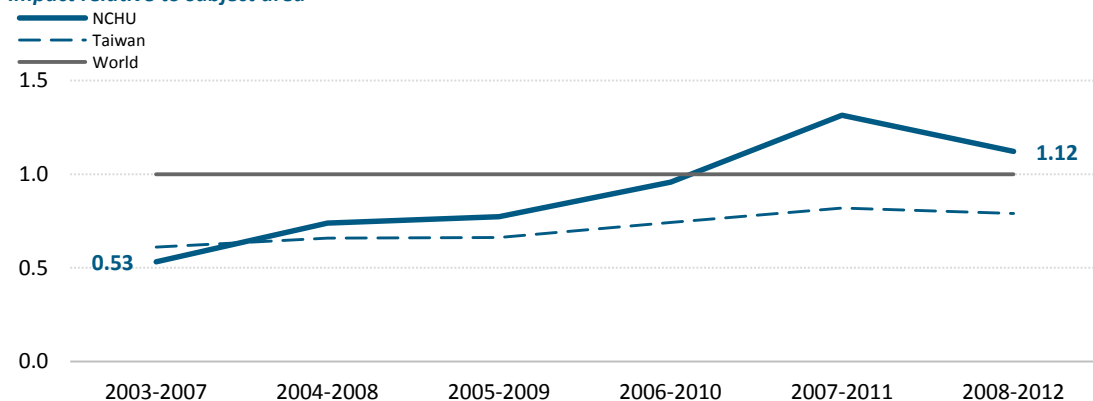
Growth in research output (Web of Science documents)



Share of research output (% Documents in institution/country)



Impact relative to subject area

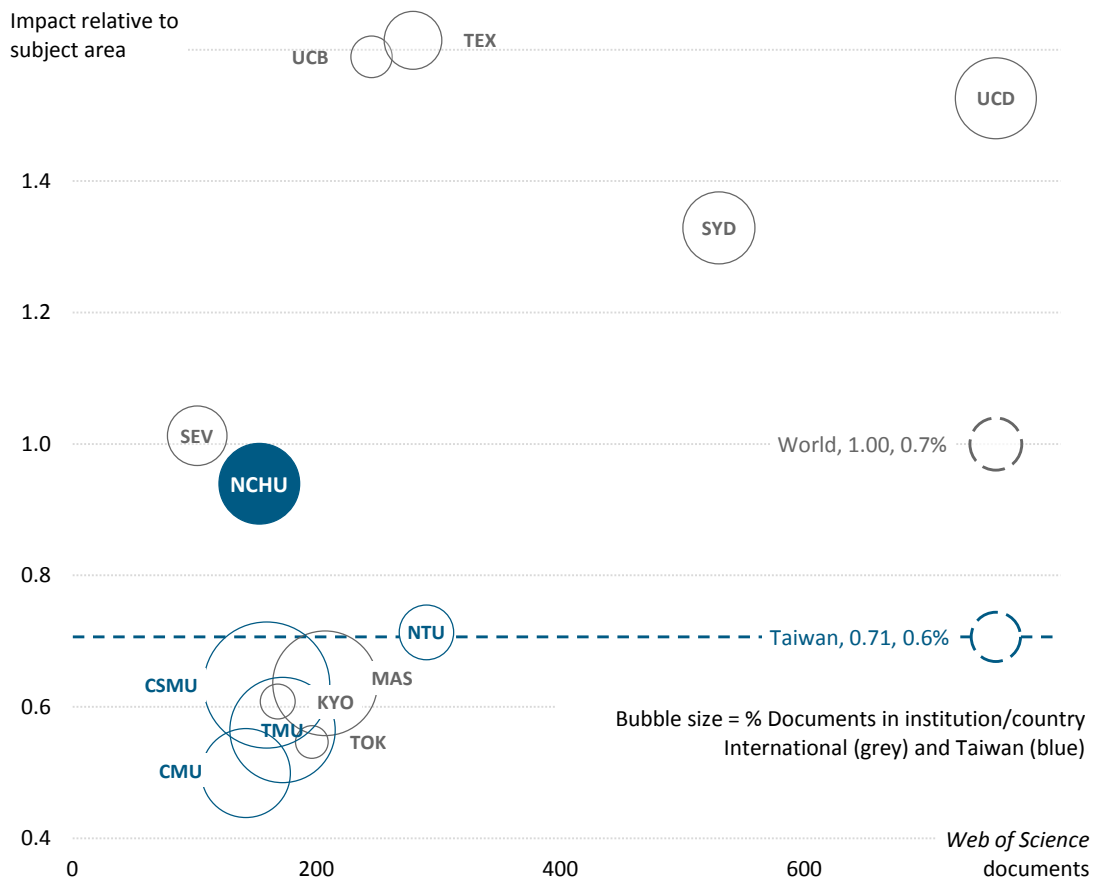


NCHU has 12 highly-cited papers, 7.8% of research output - higher than Taiwan though less than globally.

Percentage of highly-cited papers, NCHU compared to Taiwan and world, 2003-12

	Top 1 percent		Top 5 percent		Top 10 percent	
	#	%	#	%	#	%
NCHU	0	0.0%	5	3.2%	12	7.8%
Taiwan	-	0.0%	-	1.9%	-	4.4%
World	-	1.0%	-	5.0%	-	10.0%

Comparative research performance, 2003-12



NCHU impact relative to subject area is 0.94 (2003-12) – close to world average, and greater than for Taiwan (0.71). Impact relative to subject area of US institutions (excluding UCR) is ≥ 1.50 .

Comparative international research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
University of California Davis	UCD	757	1.53	1.7%
University of Sydney	SYD	530	1.33	1.3%
National Taiwan University	NTU	290	0.71	0.8%
Texas A&M College Station	TEX	279	1.61	0.9%
University of California Berkeley	UCB	245	1.59	0.4%
Massey University	MAS	207	0.64	2.8%
University of Tokyo	TOK	196	0.55	0.3%
Kyoto University	KYO	168	0.61	0.3%
National Chung Hsing University	NCHU	153	0.94	1.7%
University of Seville	SEV	102	1.01	0.9%
University California Riverside	UCR	11		0.1%

NCHU has the highest impact relative to subject area compared to other Taiwanese comparators.

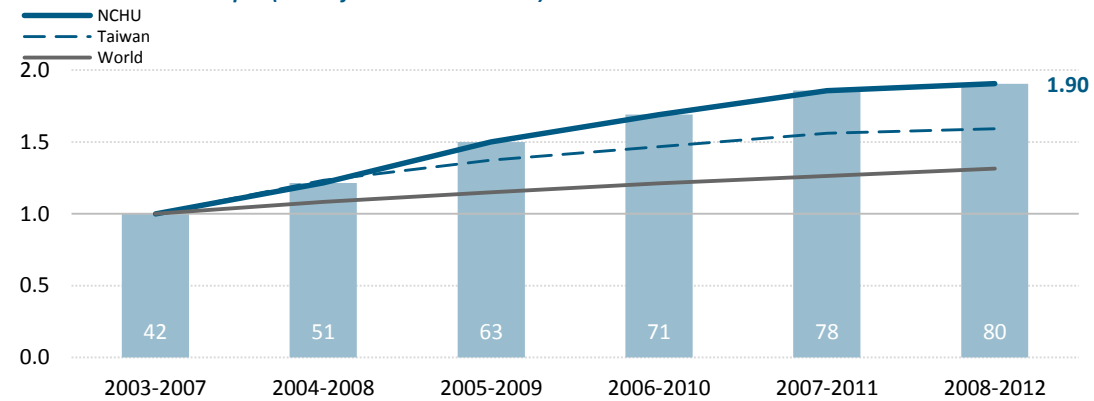
Comparative Taiwanese research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
National Taiwan University	NTU	290	0.71	0.8%
Taipei Medical University	TMU	172	0.56	2.8%
Chung Shan Medical University	CSMU	159	0.63	4.1%
National Chung Hsing University	NCHU	153	0.94	1.7%
China Medical University	CMU	142	0.50	2.0%

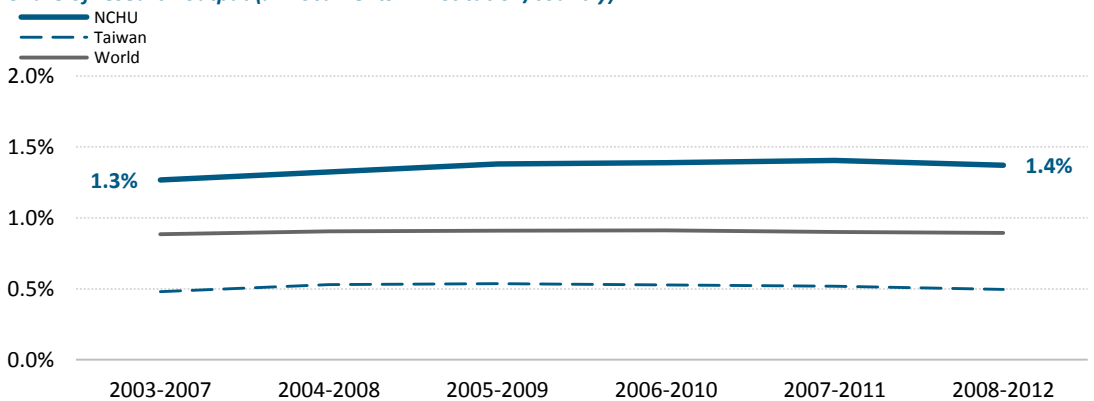
Zoology

NCHU research output has nearly doubled, though volume is small, and has increased as a share of research output. Impact relative to subject area has fallen from a high of 1.42 (2007-11) to 0.86 (2008-12).

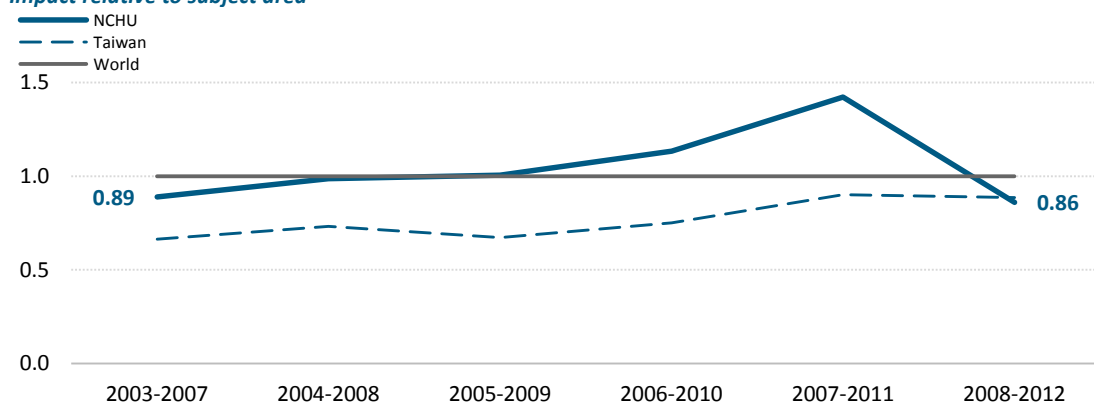
Growth in research output (Web of Science documents)



Share of research output (% Documents in institution/country)



Impact relative to subject area



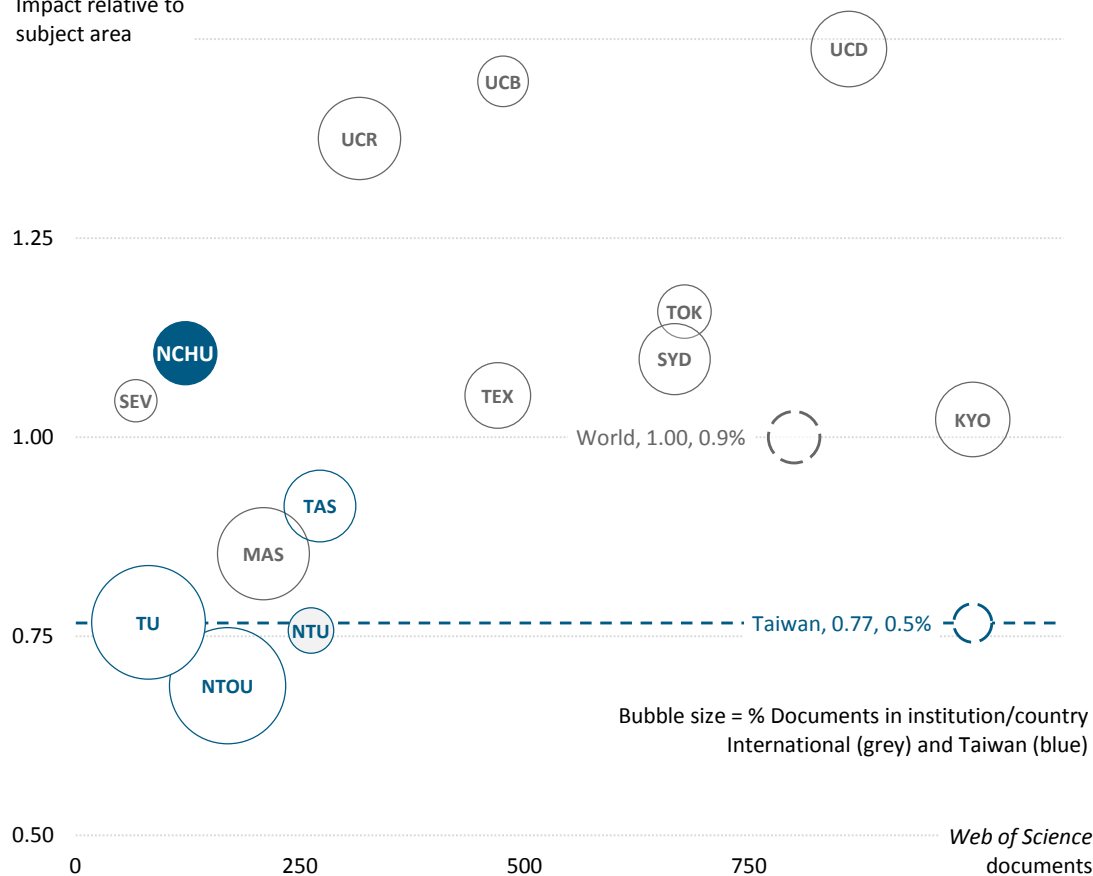
NCHU has around the world average percentage of highly-cited papers (10.1%).

Percentage of highly-cited papers, NCHU compared to Taiwan and world, 2003-12

	Top 1 percent		Top 5 percent		Top 10 percent	
	#	%	#	%	#	%
NCHU	1	0.8%	4	3.4%	12	10.1%
Taiwan	-	0.7%	-	2.5%	-	5.9%
World	-	1.0%	-	5.0%	-	10.0%

Comparative research performance, 2003-12

Impact relative to
subject area



NCHU performs well compared to Taiwanese comparators. UCD, UCB and UCR have the highest impact relative to subject area. NCHU performance is comparable to SYD (though not in volume terms).

Comparative international research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
Kyoto University	KYO	999	1.02	1.8%
University of California Davis	UCD	861	1.49	1.9%
University of Tokyo	TOK	678	1.16	1.0%
University of Sydney	SYD	667	1.10	1.7%
University of California Berkeley	UCB	476	1.45	0.9%
Texas A&M College Station	TEX	470	1.05	1.4%
University California Riverside	UCR	316	1.38	2.3%
National Taiwan University	NTU	262	0.76	0.7%
Massey University	MAS	209	0.85	2.8%
National Chung Hsing University	NCHU	122	1.11	1.3%
University of Seville	SEV	67	1.05	0.6%

NCHU is the highest ranked Taiwanese institution by impact relative to subject area.

Comparative Taiwanese research performance, 2003-12

Institution		Web of Science documents	Impact relative to subject area	% Documents in institution
Academy of Sciences, Taiwan	TAS	272	0.91	1.7%
National Taiwan University	NTU	262	0.76	0.7%
National Taiwan Ocean University	NTOU	169	0.69	4.5%
National Chung Hsing University	NCHU	122	1.11	1.3%
Tunghai University	TU	81	0.77	4.3%