Xi'an Jiaotong-Liverpool University

A Metrics-Based Assessment of XJTLU's Research Landscape 2006-2019

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JUNE 2020

PREFACE

> *Not everything that counts can be counted,*
> *and not everything that can be counted counts.*

This quote comes from a paper published by the sociologist William Bruce Cameron in 1963, and is often mis-attributed to the great Albert Einstein[1]. In academia, there is much that can be counted. University rankings are one example. There is no one standardised university ranking mechanism. However, in every university ranking, research is an important part to be considered.

Research metrics can provide a balanced, multi-dimensional view for assessing published research. This report uses the data based on Scopus and metrics used in SciVal to present a better view of the research outcomes (in terms of published papers) of Xi'an Jiaotong-Liverpool University (XJTLU), who has been ranked in the QS World University Rankings 2020. It aims to offer valuable perspectives to the university community on XJTLU's relative research performance and impact.

Bibliometric assessment is a major method to evaluate research, but there are factors that may affect the value of the metrics discussed in this paper, including discipline, size of an entity, database coverage, time, etc. If any inaccuracy or missing of data are found, please contact the XJTLU Library. The Library sincerely hopes that staff and students could provide comments and suggestions on the report so that it can be further improved.

1. Cullis, J.O. (2017) 'Not everything that can be counted counts', *British Journal of Haematology*, 177(4), pp.505-506.

CONTENTS

Note:

** The report is for INTERNAL reference only and shall not be distributed outside the University.*

Sources of Data

Data on the publication output are retrieved from ***Scopus***, a source-neutral abstract and citation database. In May/June 2020, the publication completeness in Scopus for the year of 2019 is at around 95%.

With over 25,100 titles and over 77.8 million records, Scopus delivers the most comprehensive overview of the world's research output in diverse subject fields.

Scopus data have been used in university rankings since 2014, including the famous Times Higher Education's World University Rankings and QS World University Rankings, providing information on areas of research, citations and even international outlook.

Metrics presented in this report come from ***SciVal***, an Elsevier's Research Intelligence solution. SciVal uses Scopus content from 1996 onwards and can reflect the most current trends. The data in SciVal are updated every week while the data in Scopus are updated daily. SciVal takes a copy of the Scopus database that is then structured to optimally support its metrics and functionality, which means that SciVal may be slightly behind Scopus in its data currency.

Data used in the report were collected on ***June 8th, 2020***[2].

2. Due to frequent update of Scopus and SciVal, the data presented in the report may be slightly different from the most current data in the databases.

METHODOLOGY

Metrics

Research metrics used in this report measure XJTLU's ***volume of output*** and ***influence of research***, and provide insights into its research partnerships and spread of topics. The range of metrics and their short descriptions are listed below. The reader can find more extensive information about these metrics from the Elsevier Support Center at https://service.elsevier.com.

Some metrics may be ***Snowball Metrics***, and will be indicated with a snowflake symbol. Snowball Metrics are defined and endorsed by research-intensive universities (including University of Oxford and University of Cambridge), and aim to become global standards for the higher education sector. For more information about Snowball Metrics and Snowball Metrics Recipe Book, visit www.snowballmetrics.com.

Scholarly Output

The number of publications of a selected entity.

Field-Weighted Views Impact (FWCI)

The ratio of views relative to the expected world average (1.00) for the subject field, publication type and publication year. FWCI is used throughout the report as an indicator of research impact.

Outputs in Top Citation Percentiles

The number of publications of a selected entity that are highly cited, having reached a threshold of citations received.

Citation Count

Total citations received by publications of the selected entities.

Citations per Publication

The average number of citations received per publication.

CiteScore

The average number of citations received in a calendar year for a journal, by all items published in that journal in the preceding three years.

h-indices

A measure of both the productivity and citation impact of an entity, based on the number of publications as well as the number of citations they have received.

Publications in Journal Quartiles

The number of publications of a selected entity that have been published in the selected journal quartiles (Q1-Q4).

Publications in Top Journal Quartiles

The number of publications of a selected entity that have been published in the world's top journals.

Collaboration

The extent of international, national, and institutional co-authorship.

Collaboration Impact

The average number of citations received by publications that have international, national or institutional co-authorship.

Academic-Corporate Collaboration

Publications with both academic and corporate affiliations.

Academic-Corporate Collaboration Impact

Citations per publication received by those publications with and without academic-corporate collaboration.

Views Count

Total views received by publications of the selected entities.

Outputs in Top Views Percentiles

The number of publications of a selected entity that are highly viewed, having reached a threshold of views received.

Views per Publication

The average number of views per publication.

Mass Media

Total of mentions in the media received by publications of the selected entities. The data is delivered via the LexisNexis Metabase portal.

Field-Weighted Mass Media

The ratio of Mass Media relative to the expected world average for the subject field, publication type and publication year.

Subject Classification

Subject classification schemes available in SciVal include ***ASJC (All Science Journal Classification)***, QS (Quacquarelli Symonds Classification), THE (Times Higher Education Classification) and other 4 schemes. ASJC is used in Scopus and is the default scheme in SciVal, covering 27 subject areas. QS is used in QS World University Rankings and covers 5 subject areas and 48 sub-categories. THE is used in the THE World University Rankings and covers 11 subject areas. QS and THE subjects are all mapped to ASJC subjects.

Considering the ***subject coverage*** and ***degree of subject classification***, ***ASJC*** is selected as the classification scheme in the current analysis.

Factors that may Affect Metric Value

Some factors may affect the value of the metrics mentioned above, including discipline, database coverage, time, etc. It is important to account for those differences when evaluating research performance.

* The value of some metrics can be influenced by the size of an entity. For example, Citations per Publication and Field-Weighted Citation Impact can be affected by a single high-impact publication if the number of Scholarly Output is small.

* Some papers published by XJTLU researchers are not indexed in Scopus, and so cannot be part of the metrics calculations in SciVal.

* Some metrics are time-dependent, for example, Citation Impact metrics, since time is needed for published work to receive citations.

* Researchers in different disciplines display distinct characteristics in their approach to research and communication about research. In fields where journal articles provide a less comprehensive view of the outputs (e.g. arts and humanities), the results must be interpreted with caution. Citations per Publication tend to be much higher in Life Science than in Social Sciences, but it is not the case that researches in Life Science perform “better” than those in Social Sciences. Therefore, field-normalised metrics such as Field-Weighted Citation Impact can be used.

OVERALL PERFORMANCE

2006-2019

3,215
Scholarly Output

1.32
Field-Weighted Citation Impact

13.2%
Outputs (Publications) in Top 10% Citation Percentiles (Most Cited)

25,234
Total Citation Count

7.8
Citation per Publication

57
h-index

71,977
Scopus Views Count

22.4
Scopus Views per Publication

Productivity

XJTLU researchers have published 3,215 Scopus-indexed papers from 2006 to 2019, among which there are 1,823 articles and 1,065 conference papers. In 2019, the number of scholarly output was 659. XJTLU's scholalry output is steadily increasing but at a slower rate in the recent years.

Impact

XJTLU's publications has an FWCI value of 1.32, staying ahead of the global average of 1.00 and China average of 0.87. It means that XJTLU's citations were on average 32% more cited than the global average and 45% more cited than the China's average. 13.2% of the publications were among the top 10% most cited publications worldwide, and there is an upward trend for the number as well as the percentage of highly cited outputs over these years.

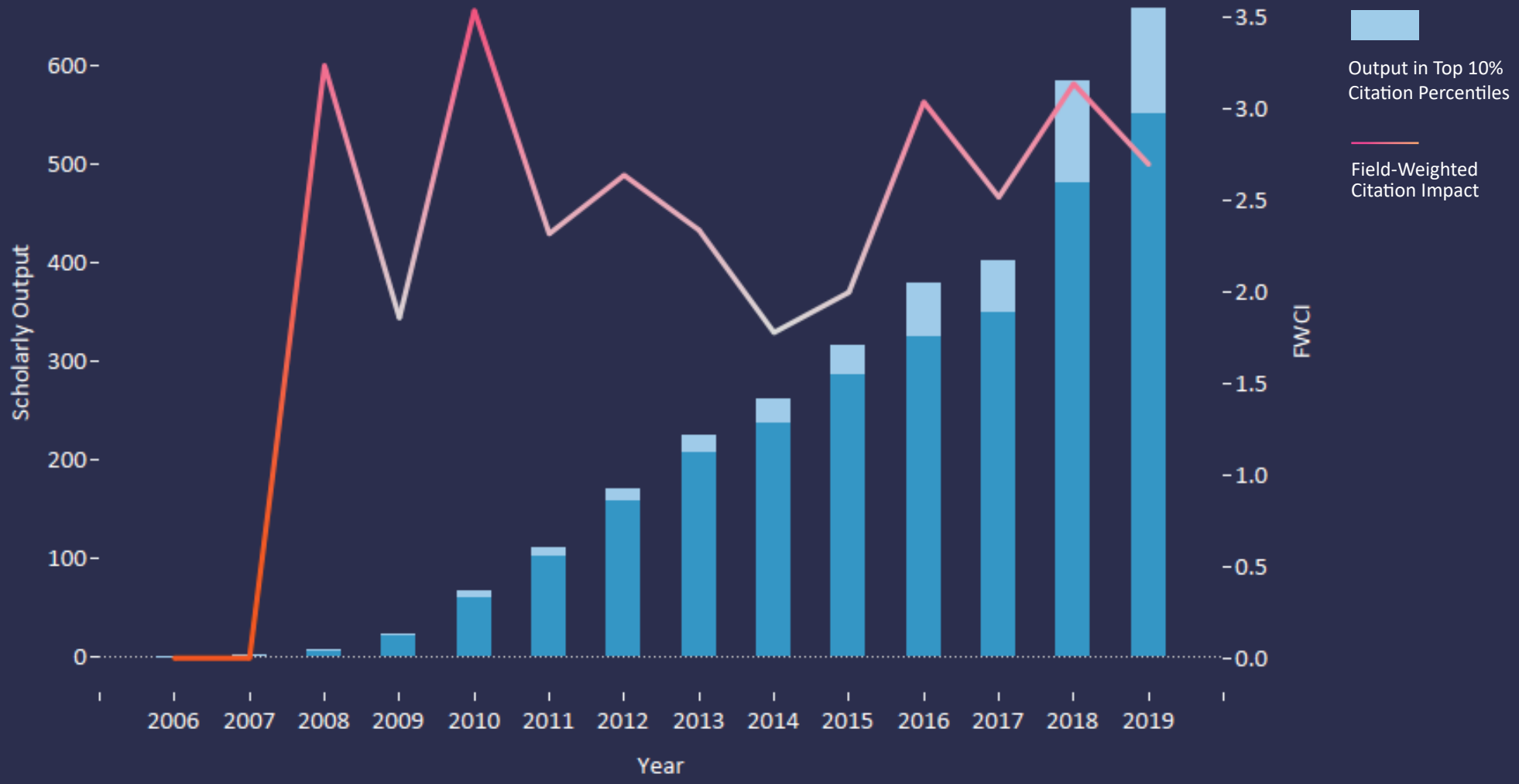


Fig.1 Total Scopus-indexed Publications for XJTLU and FWCI Values[3], 2006-2019

3. FWCI values may fluctuate significantly and appear unstable over time when the entities are small (for example, in this case, Scholarly Output from 2007 to 2009) .

By ASJC Subject Area

Subject Area	Scholarly Output 2006-2019	Scholarly Output 2019	FWCI	Outputs in Top 10% Citation Percentiles
Computer Science	1404	261	1.48	12.3%
Engineering	990	219	1.37	12.6%
Mathematics	580	102	1.4	10.9%
Social Sciences	392	66	1.47	13%
Materials Science	281	82	1.15	21.4%
Business, Management and Accounting	250	67	1.55	16.8%
Physics and Astronomy	223	58	1.09	10.8%
Economics, Econometrics and Finance	206	46	1.1	8.7%
Energy	204	61	1.53	23%
Environmental Science	184	52	1.45	25%
Biochemistry, Genetics and Molecular Biology	157	36	1.04	18.5%
Decision Sciences	155	60	1.19	11%
Medicine	155	42	1.12	12.9%
Chemistry	153	32	1.23	22.9%
Arts and Humanities	98	11	2.01	5.1%
Agricultural and Biological Sciences	89	32	1.17	14.6%
Chemical Engineering	85	14	1.01	18.8%
Earth and Planetary Sciences	60	20	1.42	15%
Neuroscience	48	13	1.7	20.8%
Multidisciplinary	40	8	0.78	15%
Immunology and Microbiology	37	7	1.06	18.9%
Psychology	33	10	1.59	15.2%
Pharmacology, Toxicology and Pharmaceutics	30	7	0.66	16.7%
Health Professions	11	1	1.23	27.3%
Nursing	7	3	0.67	14.3%
Veterinary	3	--	0.51	--
Dentistry	1	--	0.74	--

Table 1 XJTLU Outputs & Impact by ASJC Subject Area

PUBLICATIONS

* By ASJC Subject Area
* By Scopus Source
* By Journal Quartile
* Highly Cited Outputs

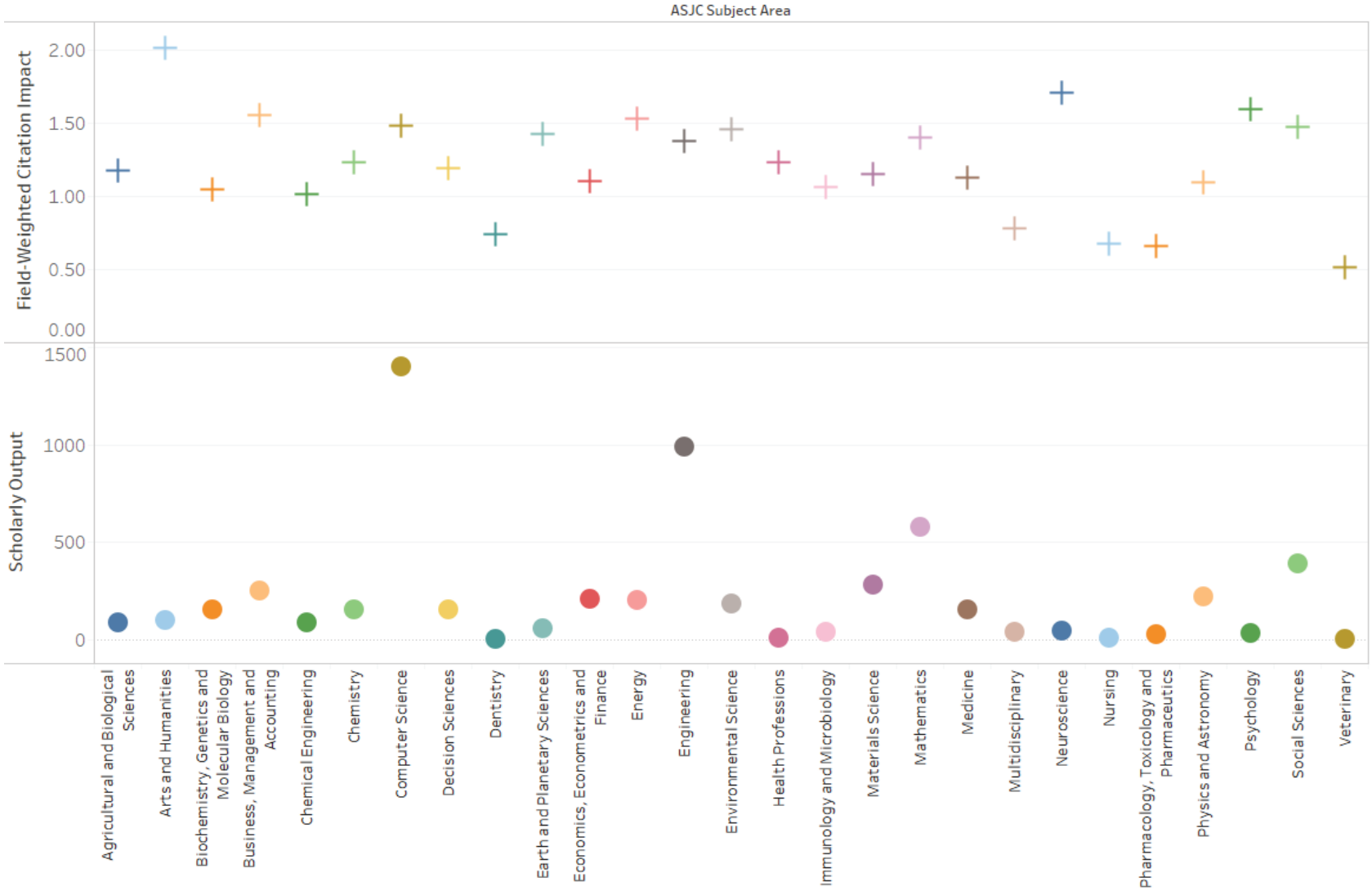


Fig. 2 XJTLU ASJC Subject Areas & FWCI

Based on the ASJC subject classification scheme (note that an output may be assigned to more than one subject area in Scopus), the three largest subject fields by publication share in XJTLU are Computer Science, Engineering and Mathematics. There was an increase of the publications in the field of Decision Sciences, Energy, Agricultural and Biological Sciences and Earth and Planetary Sciences in recent years. Top subjects by the share of Output in Top 10% Citation Percentiles include Health Professions, Environmental Science, Energy, Chemistry and Material Science.

The FWCI values of the outputs in different disciplines are generally above the global average.

By Scopus Source

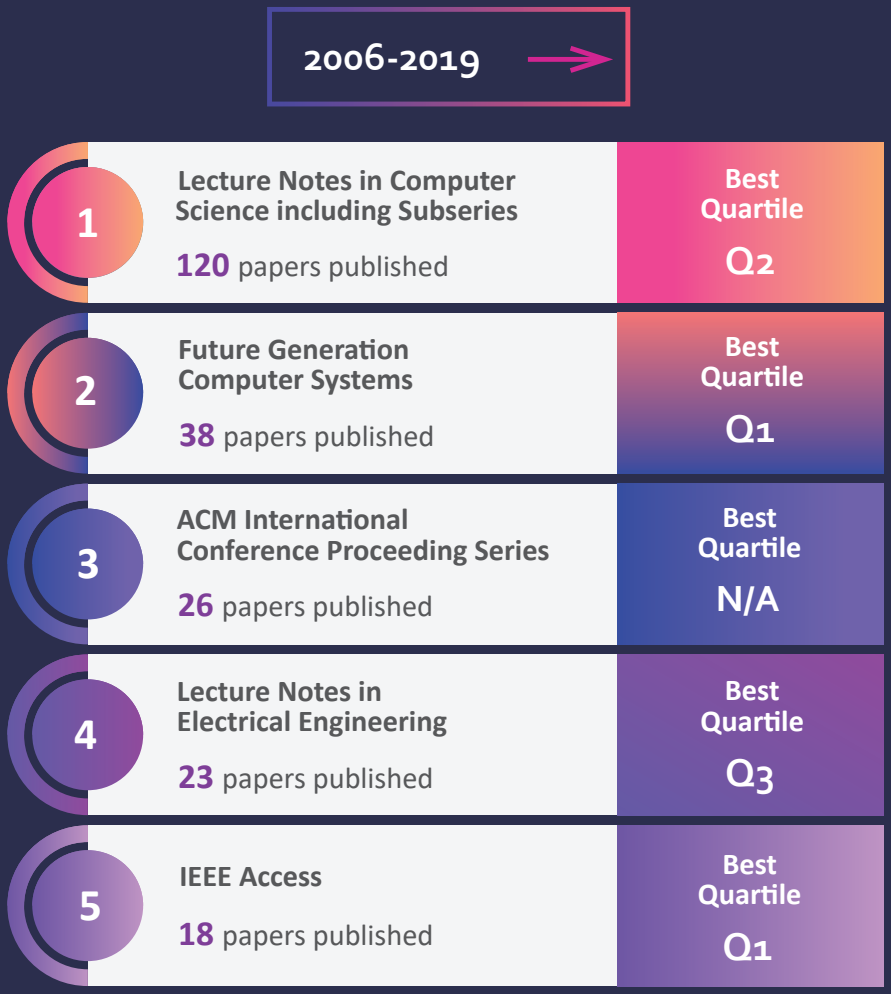


Fig. 3 Top 5 Source Titles for XJTLU Outputs, 2006-2019

Fig. 4 Top 5 Source Titles for XJTLU Outputs, 2019

XJTLU's scholarly outputs spread over in **1,653** source titles indexed in Scopus. Some of the most popular sources in the recent two years include *IEEE Access* (Open Access) and *Future Generation Computer Systems* which are high-ranking journals in their fields.

1,234

Publications in **Q1 (Top 25%)** Journal Quartile by CiteScore

55.8%

Publications in **Q1 (Top 25%)** Journal Quartile by CiteScore Percentile

32.5%

Publications in **Top 10%** Journal Percentiles by CiteScore Percentile

19.6%

Publications in **Top 5%** Journal Percentiles by CiteScore Percentile

3.3%

Publications in **Top 1%** Journal Percentiles by CiteScore Percentile

By Journal Quartile

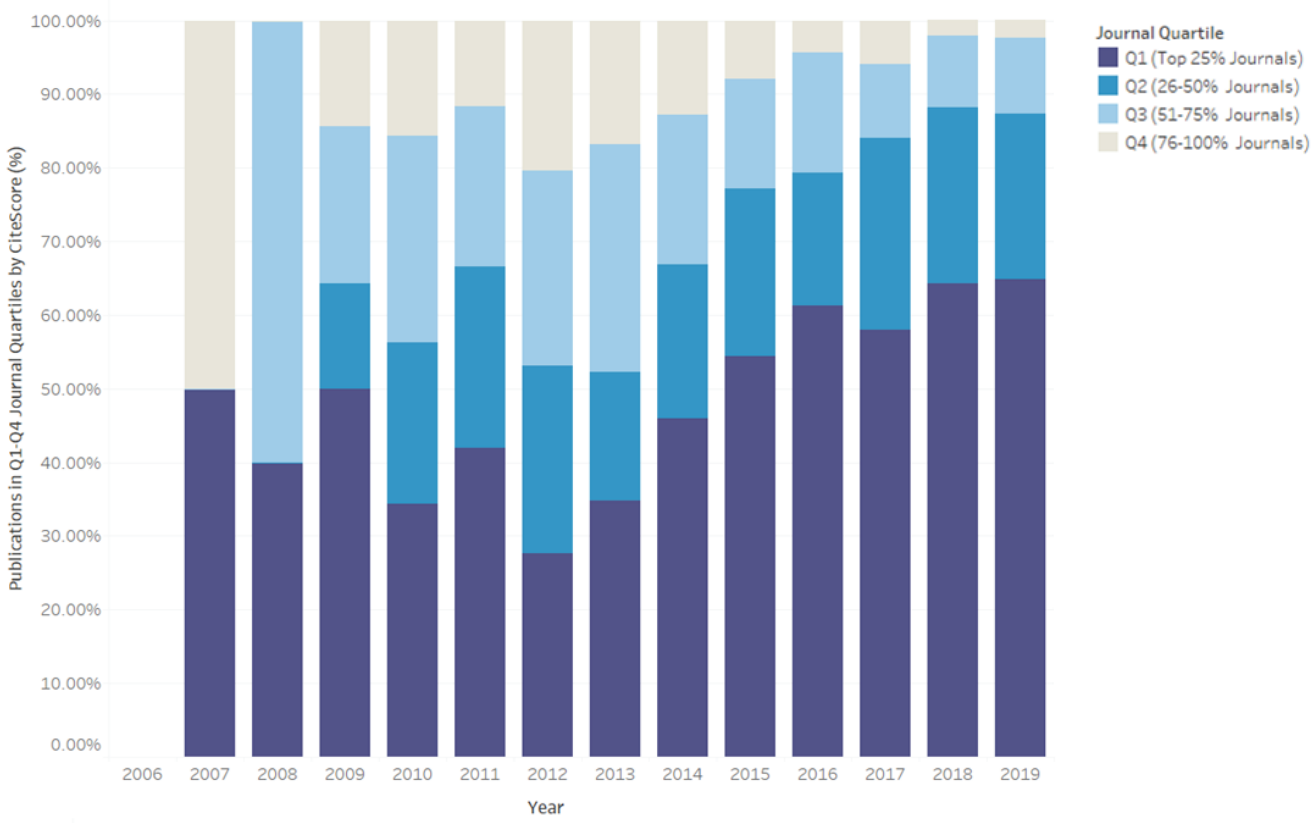


Fig. 5 XJTLU Publications in Different Journal Percentiles by CiteScore Percentile

There are 1,653 source titles for XJTLU's scholarly outputs. Over half of the outputs were published in Q1 publications. The overall quality of the source titles has increased with a higher percentage of outputs published in Q1 and Q2 publications in recent years. Around 1/3 of the outputs were published in the publications in Top 10% journal percentiles.

Highly Cited Publications

1.3%

XJTLU Publications in **Top 1%** Citation Percentiles (Most Cited)

7.5%

XJTLU Publications in **Top 5%** Citation Percentiles (Most Cited)

13.2%

XJTLU Publications in **Top 10%** Citation Percentiles (Most Cited)

29.9%

XJTLU Publications in **Top 25%** Citation Percentiles (Most Cited)

Fig. 6 Top 5 Highly Cited Outputs (in Scopus) of XJTLU, 2006-2019

RESEARCHERS

Researchers from Department of Electrical and Electronic Engineering and Department of Computer Science and Software Engineering have contributed a lot to the University's total research output. 16 out of 20 XJTLU-affiliated authors who has the most publications in 2019 came from these two departments. Over half of their publications are conference papers. There are also very active researchers from Department of Chemistry, Department of Health and Environmental Sciences, International Business School Suzhou and Department of Biological Sciences. Among the top authors, there are also two PhD students from Department of Electrical and Electronic Engineering and Department of Computer Science and Software Engineering.

The most productive XJTLU author in 2019 is Dr. Huiqing Wen from Department of Electrical and Electronic Engineering, considering the total publications. Dr. Wen also has the largest number of publications in the world's Top 10%. Prof. Ka Lok Man from Department of Computer Science and Software Engineering is the most prolific XJTLU author since the University's establishment.

Researcher[4]	Department	Scholarly Output 2019	Outputs in Top 10% Citation Percentile	Total Scholarly Output[5]
Wen, Huiqing	EEE	39	24 *(1 in Top1%)*	123
Zhao, Cezhou	EEE	31	8 *(1 in Top1%)*	91
Liang, Haining	CSSE	26	2	77
Huang, Kaizhu	EEE	19	13 *(1 in Top1%)*	75
Lim, Eng Gee	EEE	18	8	123
Yang, Li	CHEM	18	4	38
Zhao, Chun	EEE	18	4 *(1 in Top1%)*	53
Man, Ka Lok	CSSE	15	12 *(1 in Top1%)*	235
Li, Gangmin	CSSE	14	1	18
Ma, Zheng Feei	HES	13	4	32
Liu, Wen	EEE	11	0	13
Ma, Jieming	CSSE	11	7 *(1 in Top1%)*	46
Yue, Yong	CSSE	11	5	49
Alam, Muhammad	CSSE	9	3	20
Bu, Qinglei (PhD)	EEE	9	0	11
Chen, Lujie	IBSS	9	0	9
Huang, Xin	CSSE	9	4 *(1 in Top1%)*	58
Lu, Shaofeng	EEE	9	4	32
Sekar, Raju	BS	9	5 *(1 in Top1%)*	21
Yu, Difeng (PhD)	CSSE	9	0	11

Table 2 Most Prolific XJTLU Researchers by Scholarly Output

4. Some authors may no longer affiliated with XJTLU.

5. Total scholarly output affiliated with XJTLU by 2019

RESEARCH COLLABORATION

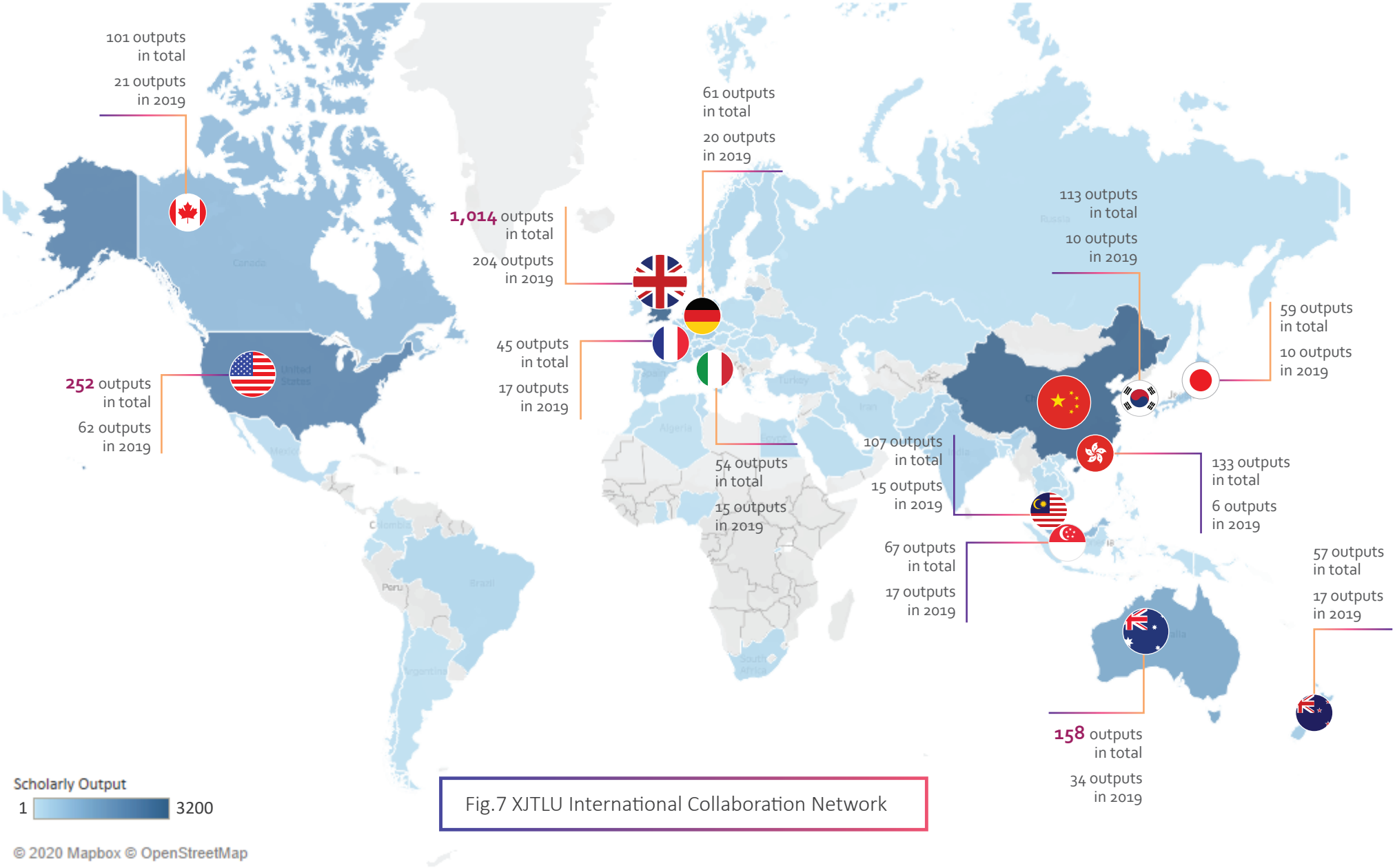


Fig.7 XJTLU International Collaboration Network

According to Scopus, XJTLU has collaborated with 90 countries or regions and over 150 institutions and organisations from 2006 to 2019.

At the country/regional level, for international collaboration, XJTLU's most frequent collaborators are the United Kingdom, United States and Australia. The number of joint publications between XJTLU and UK institutions have reached 1,014.

At the institutional level, XJTLU has collaborated most with University of Liverpool and Chinese Academy of Sciences and its affiliated research institutes and laboratories. In recent years, XJTLU has increasingly frequent collaboration with institutions in China. In 2019, 7 of the top 10 collaborators of the University are based in China.

Fig. 8 XJTLU's Top Collaborative Institutions, 2006-2019

Fig. 9 XJTLU's Top Collaborative Institutions, 2019

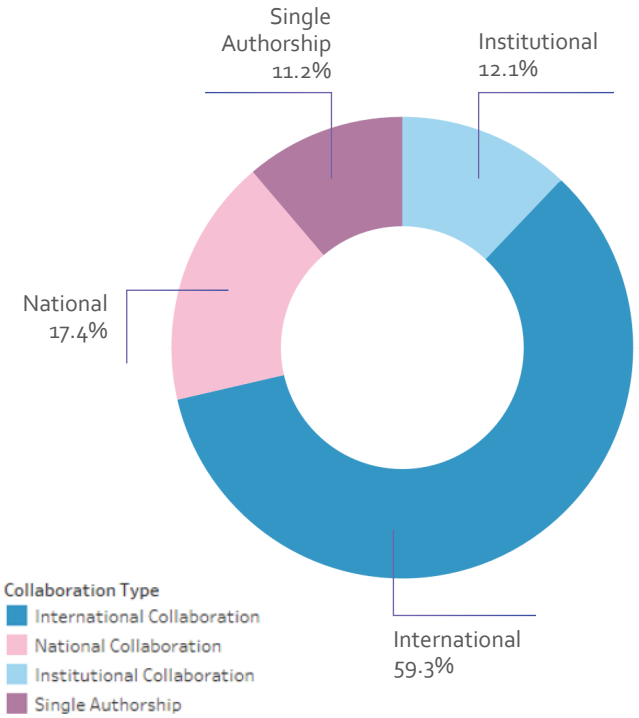


Fig. 10 XJTLU's Collaboration Types, 2006-2019

	Scholarly Output 2006-2019	Collaboration Impact	Scholarly Output 2019
International Collaboration	1,906	8.8	388
National Collaboration	561	9.9	135
Institutional Collaboration	388	2.8	83
Single Authorship	360	4.9	53

Table 3 XJTLU's Collaboration Types, 2006-2019

As a Sino-foreign university, XJTLU has extensive collaboration internationally. The share of publications involving international collaboration stayed above 50% since 2007 and the overall share is 59.3%. The share of national collaboration rose from 9.9% in 2011 to 20.5% in 2019, indicating a closer collaboration between XJTLU and institutions in Mainland China.

Publications with international collaboration and national collaboration have consistently higher citation impact on average than other types of publications. It proves that **collaboration with other institutions or organisations could increase the impact of the research**. Therefore, more international and national collaboration should be encouraged in future.

The share of international collaboration is the highest in some science disciplines, including Earth and Planetary Sciences (75%), Agricultural and Biological Sciences (74.2%), Biochemistry, Genetics and Molecular Biology (70.1%), Neuroscience (68.8%) and Environmental Science (65.8%). There is a similar picture in the business fields and the trend is towards a higher share of international publications. In general social science and humanities fields, the international collaboration share is the lowest, which is a common trend elsewhere.

Academic-Corporate Collaboration

88

XJTLU's Academic-Corporate Collaboration (Count)

2.7%

XJTLU's Academic-Corporate Collaboration Share

7·9

XJTLU's Academic-Corporate Collaboration (Citation) Impact

Establishing and maintaining **university-industry collaboration** may be helpful in increasing the impact and value of an academic institutions's scholalry output. The co-publications can also be considered as indicators of knowledge exchange between the academic and corporate sectors.

XJTLU's absolute number of academic-corporate joint publications is **88**, and the share of these publications within the total publications of XJTLU is **2.7%**. Over these years, there is no obvious increase in XJTLU's corporate collaboration share, and in the recent three years, the share even experienced an decline, with only 2.2%, 1% and 2% of the total publications in 2017, 2018 and 2019 respectively have collaboration with the industrial/corporate sector. **The academic-corporate collaboration share of the top 10 universities in the QS World University Rankings 2020 are all above 5%.** In terms of citation impact, the average citations for XJTLU's academic-corporate joint publications are 7.9.

Immunology and Microbiology is the top subject by academic-corporate collaboration share for XJTLU. 5.4% of the publications are with corporate collaboration in this field. But if the absolute number of joint corporate publications is taken into account as well, **Chemistry (5.2%)** is considered as the top subject, followed by **Materials Science (4.6%)**, **Physics and Astronomy (4.5%)** and **Energy (4.4%)**. In social science subject areas such as Economics, Econometrics and Finance, Business, Management and Accounting and general social sciences, the corporate collaboration percentiles are all below 2%.

The largest number of joint corporate publications has been with **State Grid Corporation of China**, followed by **LS Industrial Systems Company Ltd**.

TOPICS & TOPIC CLUSTERS

2014-2019[6]

SciVal has taken into consideration 95% of the articles available in Scopus and clustered them into **95,777** global, unique research **topics** based on citation patterns. These topics are aggregated to **1,494 topic clusters**. Topics are ranked by **Prominence**, an indicator of the **"momentum"** of a particular field and does not make a judgement call whether a topic or a topic cluster is important or not.

Topic/Topic Cluster of Prominence methodology offers unique insight into identifying new, emerging research trends. It helps provide a view of the topics and topic cluters that XJTLU is currently active in. **For example, the research fields where XJTLU publishes most can be identified. If these most-published fields are also highly prominent, then it will indicate that XJTLU is aligned with the global topics or topic clusters gaining momentum.** In addition, according to SciVal's calculation, there is a correlation between the prominence of a particular topic/topic cluster and **the amount of funding per author** within that topic/topic cluster. On average, the higher the momentum, the more money per author is available for research on that topic/topic cluster.

1,387
Topics

98
Key Topics

191
Topics in Top 1% by Prominence Percentile

479
Topic Clusters

XJTLU has contributed to **1,387 topics** in **479 topic clusters**. **191 topics** are in the **Top 1% by Prominence Percentile**, which have high momentum in the recent years. Among the 1,387 topics, **98** are **key topics** where XJTLU has at least 1/3 as many papers as the top publishing entity and/or 1/3 as many citations as the top cited entity in the topic, thus is considered as a key contributor.

In terms of topics, XJTLU is most active in the research of ***Photovoltaic Cells; DC-DC Converters; Incremental Conductance*** (50 Outputs, Prominence Percentile 99.734) and ***RNA; Methylation; Internal Modification*** (29 Outputs, Prominence Percentile 99.771). The most popular key topics where XJTLU is considered to have a higher potential influence are ***DC-DC Converters; Electric Inverters; Isolated Bidirectional*** (22 Outputs, Prominence Percentile 98.380) and ***Cybernetics; Design; Second-order Cybernetics*** (17 Outputs, Prominence Percentile 60.315). XJTLU has a large publication share worldwide in the fields of ***Neural networks; Pattern recognition; Attribute learning*** (Publication Share 46.67%, Prominence Percentile 54.888) and ***Fuzzy sets; Entropy; Similarity measure*** (Publication Share 15.79%, Prominence Percentile 65.069), but the FWCI values are relatively low (0.63 and 0.13 respectively).

6. Scopus Topic and Topic Clusters are based on the data from 2014 to 2019.

Topic Cluster	XJTLU Output	XJTLU World Publication Share	XJTLU FWCI	China World Publication Share	China FWCI	Rank in China's Top Topic Clusters	Prominence Percentile
Electric Potential; Electric Inverters; DC-DC Converters	123	0.12%	1.84	27.19%	0.93	8	98.461
Algorithms; Computer Vision; Models	108	0.05%	1.63	38.4%	1.24	1	99.465
Models; Risks; Finance	57	0.12%	0.88	16.71%	0.71	74	90.027
Industry; Innovation; Entrepreneurship	51	0.07%	1.81	8.46%	0.90	105	97.256
Wireless Sensor Networks; Sensor Nodes; Routing Protocols	45	0.06%	2.94	24.96%	1.17	17	96.519
Photocatalysis; Photocatalysts; Solar Cells	43	0.04%	1.94	41.07%	2.07	3	99.933
Semantics; Models; Recommender Systems	42	0.05%	1.06	21.15%	1.17	21	96.319
Cryptography; Authentication; Data Privacy	41	0.07%	3.15	25.33%	1.18	31	93.240
Corporate Social Responsibility; Corporate Governance; Firms	39	0.08%	1.55	8.76%	0.95	186	92.905
Fiber Optic Networks; Quality Of Service; Network Architecture	37	0.10%	1.71	25.27%	1.05	59	87.216

Table 4 Top 10 Topic Clusters for XJTLU by Scholarly Output

The table above lists the top 10 topic clusters by output to help understand whether these topic clusters are also fields that are popular in China and that have high momentum. Most of the topic clusters where XJTLU has the largest number of publications are among the top 10% most prominent topic clusters, but only 15 of the 479 topic clusters are in the top 1%. Some topic clusters are also the most popular topic clusters in China and are with very high prominence percentile, for example, ***Algorithms; Computer Vision; Models***, and ***Photocatalysis; Photocatalysts; Solar Cells***. XJTLU's publications in these topic clusters generally have a higher FWCI which is over China average.

Currently, XJTLU's research hasn't touched upon some of the world's most prominent topic clusters such as ***Metal Ions; Electric Batteries; Batteries SIBs*** and *Carbon Nitride; Photocatalysts; Photocatalysis* (no papers have been published in these topic clusters).

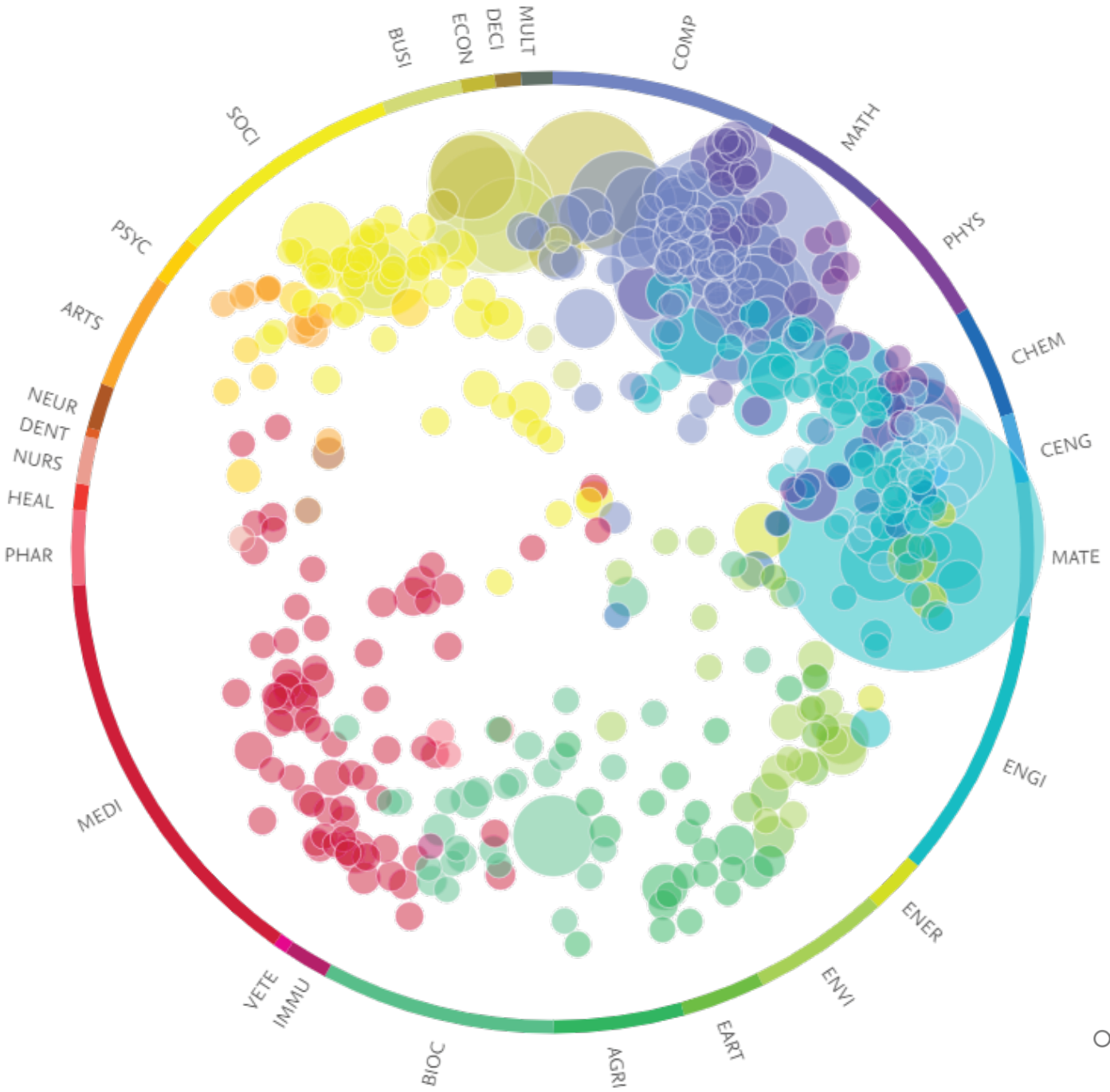


Fig. 11 XJTLU's Wheel of Science by Topic Clusters, 2014-2019

In the Wheel of Science, each bubble represents a topic cluster. The size of the bubble indicates the output of the entity in the topic cluster, while the position of the bubble is based upon the ASJC categories of the journals in which the scholarly output is published. The more influence an ASJC has over a topic cluster, the closer it will bring the topic cluster to its side of the Wheel of Science. As a result, the topic clusters closer to the centre of the Wheel or placed at the edge of the Wheel but with a different colour of that subject are more likely to be multi-disciplinary.

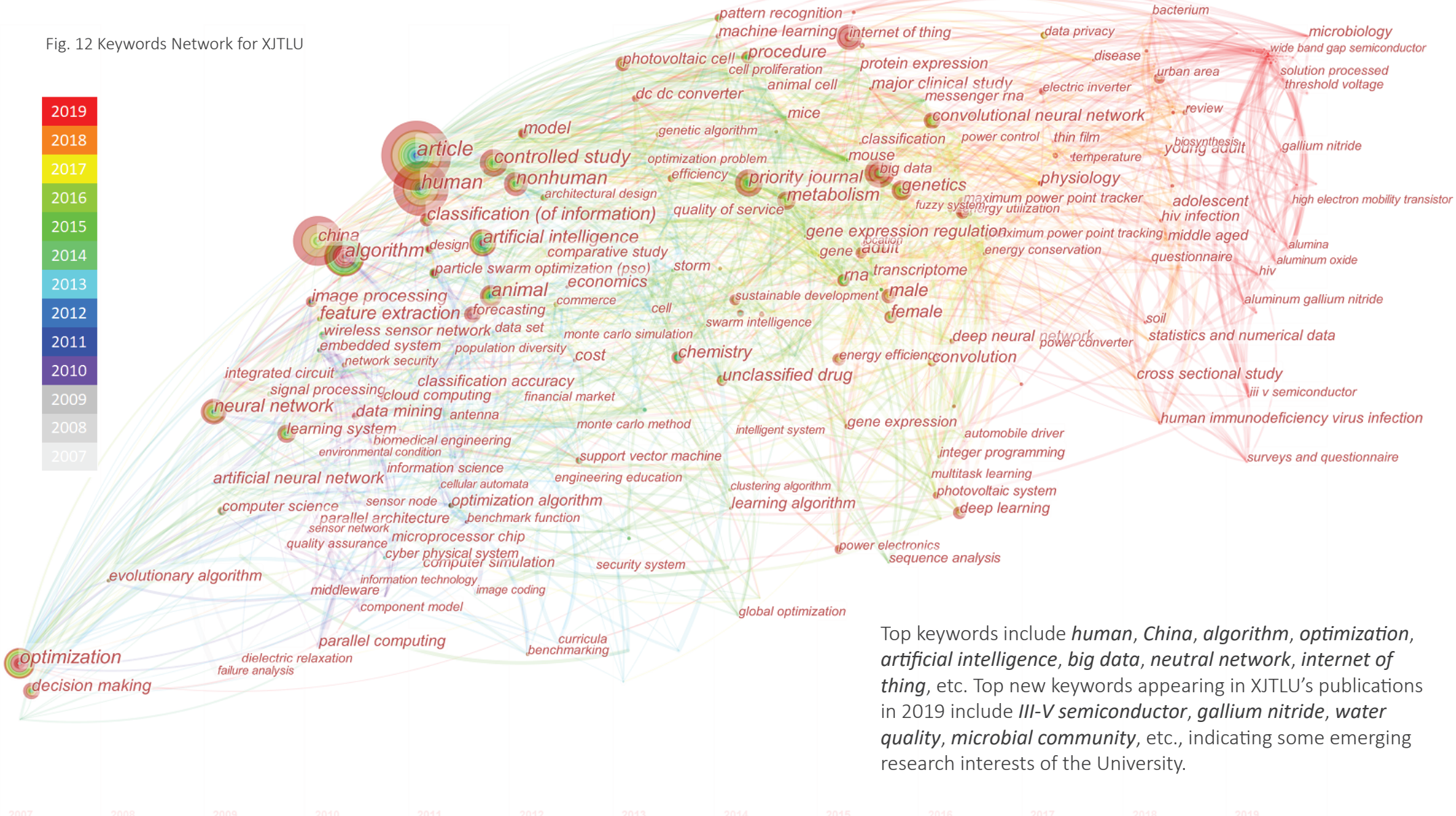
In XJTLU's Wheel of Science, it can be seen that some topic clusters related to Computer Science, Business and Engineering (in the upper right of the Wheel) tend to be multi-disciplinary. Some topic clusters in Medicine and Social Sciences are also more likely to be multi-disciplinary since there are a few bubbles scattered in the centre. These findings accord with the general trend of the inter-disciplinarity of XJTLU's research in the previous years.

Bubble size: Scholarly Output of XJTLU

Bubble position is based on dominant ASJC categories.

The keywords co-occurrence network displays the major keywords extracted from the publication title and the author keywords field. Each node represents a keyword, and its size indicates the occurrence frequency. Co-occurrence of keywords can be seen through the links between different keywords.

Fig. 12 Keywords Network for XJTLU



Top keywords include ***human***, ***China***, ***algorithm***, ***optimization***, ***artificial intelligence***, ***big data***, ***neutral network***, ***internet of thing***, etc. Top new keywords appearing in XJTLU's publications in 2019 include ***III-V semiconductor***, ***gallium nitride***, ***water quality***, ***microbial community***, etc., indicating some emerging research interests of the University.

MASS MEDIA

276
Mass Media Mentions (Print, 2011-)

0.17
Field-Weighted Mass Media (Print)

6,309
Mass Media Mentions (Online, 2014-)

1.40
Field-Weighted Mass Media (Online)

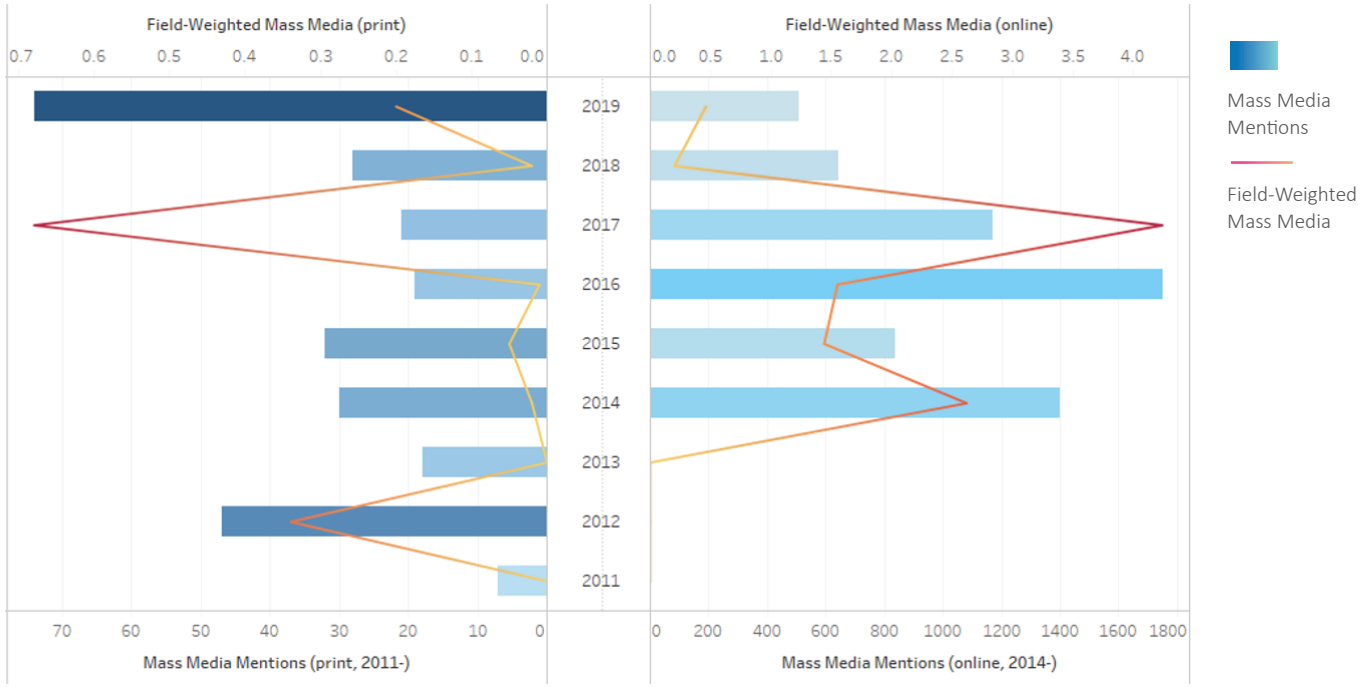


Fig. 13 Mass Media Mentions & Field-Weighted Mass Media of XJTLU Researchers

Mass media refers to the total number of times that the media referred to researchers of an institution. Several media types are covered, including online news, print clippings or text that was originally made available in print, blogs, and comments which are posted on blogs or some news articles. Mass media mentions can showcase the engagement of the broader public, and not only of the research community, and indicate some degree of societal impact.

XJTLU researchers have been mentioned for 276 times in print mass media since 2011, but the Field-Weighted Mass Media for print media mentions is much lower than the world's average. The main media outlet that are discussing XJTLU's outputs is **online mass media**, and the fied-weighted value is higher than 1.0.

BENCHMARKING PERFORMANCE

XJTLU's research volume and impact have been growing since its establishment. The FWCI of the University's outputs is 30% higher that the world average. Assessing XJTLU's performance against peer institutions of its kind can help to better measure the research competitiveness and potential of the University. Therefore, this section compares the research performance of XJTLU, University of Nottingham Ningbo China (UNNC, established in 2004) and Chinese University of Hong Kong, Shenzhen (CUHK-SZ, established in 2014) in terms of scholarly output and research impact in the recent 5 years.

When it comes to the outputs indexed in Scopus, XJTLU has outperformed and has 2,343 outputs in the past five years. UNNC and CUHK-SZ have similar research volume. This gap between XJTLU and CUHK-SZ in terms of scholarly output is expected to be futher narrowed in the coming years.

As for the impact, XJTLU has fallen behind. UNNC and CUHK-SZ have a much higher FWCI value than that of XJTLU, and have taken lead when looking into other impact indicators. Although XJTLU has published more papers than the other two peers, it still needs to raise the impact of its outputs in future.

	XJTLU	UNNC	CUHK-SZ
Scholarly Output 2015-2019	2,343	1,448	1,552
Field-Weighted Citation Impact	1.38	1.75	1.73
Citations per Publication	6.1	7.9	9.2
Output in Top 1% Citation Percentiles	1.5	2.2	2.8
Output in Top 5% Citation Percentiles	8.7	12.9	13.1
Output in Top 10% Citation Percentiles	14.9	21.3	21.3

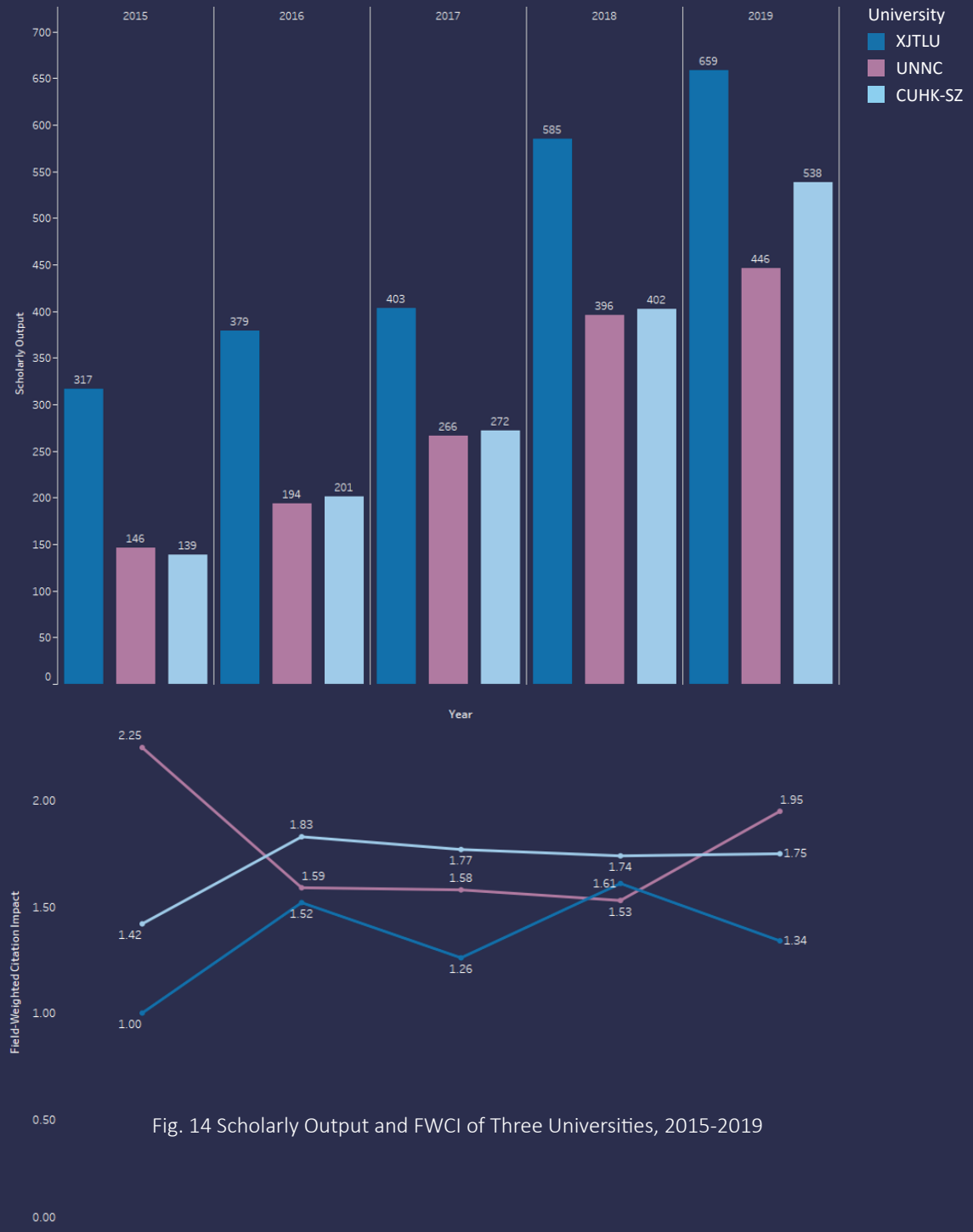


Fig. 14 Scholarly Output and FWCI of Three Universities, 2015-2019

The lower research impact of XJTLU may be due to the **document types of published outputs**. Among all the research publications, conference papers have taken a very large proportion. This is also closely related to XJTLU's research subject strength (that there are more publications in the fields of Computer Science and Engineering). However, this may affect the overall research impact of the University, since conference papers usually will not receive as many citations as journal articles do. In addition, in some subject fields, many citations which XJTLU's outputs have received came from conference papers, and the percentage of these citations are larger than the world's average (≈20%). This will sometimes be disadvantageous for the University to demonstrate its research impact. For example, in the *Essential Science Indicators* subject rankings, only citations from journal publications (i.e. articles and reviews) will be counted. This directly affected XJTLU's ranking in the ESI Engineering field.

The differences in the ASJC subject-based research impact of the three universities may further prove the speculation in some degree.

ASJC Subject Area	XJTLU		UNNC		CUHK-SZ	
Agricultural and Biological Sciences	74	1.22	28	1.69	79	1.45
Arts and Humanities	79	1.63	59	2.65	34	0.79
Biochemistry, Genetics and Molecular Biology	119	1.17	33	1.05	221	1.71
Business, Management and Accounting	204	1.69	228	2.76	42	1.82
Chemical Engineering	60	1.16	111	1.54	57	2.04
Chemistry	130	1.32	168	1.54	140	1.45
Computer Science	953	1.58	243	1.46	530	2.08
Decision Sciences	137	1.28	88	2.55	62	1.02
Dentistry	1	0.74	0	0.00	0	0.00
Earth and Planetary Sciences	52	1.49	59	1.71	56	1.39
Economics, Econometrics and Finance	177	1.20	145	1.90	40	1.22
Energy	179	1.63	194	2.32	88	1.83
Engineering	702	1.48	565	2.16	493	1.68
Environmental Science	139	1.66	146	1.93	67	1.99
Health Professions	5	2.33	4	1.57	10	1.09
Immunology and Microbiology	32	1.14	1	0.87	17	1.75
Materials Science	223	1.25	207	1.33	171	1.61
Mathematics	384	1.28	119	1.79	194	2.04
Medicine	142	1.15	29	1.93	198	1.39
Multidisciplinary	35	0.80	13	1.04	49	1.10
Neuroscience	42	1.79	6	0.67	26	1.04
Nursing	7	0.67	0	0.00	6	1.03
Pharmacology, Toxicology and Pharmaceutics	26	0.64	6	0.57	41	1.15
Physics and Astronomy	184	1.13	145	1.15	178	1.44
Psychology	31	1.64	24	1.90	68	1.18
Social Sciences	315	1.65	239	2.70	108	1.39
Veterinary	3	0.51	0	0.00	1	2.19

Fig. 15 Scholarly Output and FWCI of Three Universities in Different ASJC Subject Area, 2015-2019

When specific ASJC subject areas are considered, XJTLU has published more papers in **Computer Science**, **Engineering** and **Social Sciences** than UNNC and CUHK-SZ. But CUHK-SZ is stronger in Computer Science in terms of **FWCI**, and UNNC has higher **FWCI** in both Engineering and Social Science. The FWCI values above 2 indicate the high quality and impact of their outputs in these fields.

XJTLU has higher FWCI values in the field of Health Professions and Neuroscience, but taking into account the small number of outputs in these two fields, the FWCI can only provide limited reference value.

Although XJTLU has a better overall research impact than the world average, there is still a long way to go when compared with a few peers. More outputs should be published in scholarly journals, which helps to further increase the research impact of the University.

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Xi'an Jiaotong-Liverpool University Library
askalibrarian@xjtlu.edu.cn
+86 512 8816 6557
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