The Discipline Development of North China Electric Power University Based on ESI

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Abstract: This paper is to study the discipline development of North China Electric Power University (NCEPU) base on the Essential Science Indicators (ESI). It analyzes the field ranking, highly cited papers of NCEPU in ESI. It gives a comparison of the citations of NCEPU and the threshold of ESI top 1% in six disciplines. Finally it gives a suggestion of discipline development of NCEPU.

Keywords: ESI Discipline Development Analysis

1 INTRODUCTION

Essential Science Indicators (ESI) is one of ISI/Thomson's Web of Knowledge databases. It is a web-based and basic analysis and evaluation tool that was published by the world's famous Institute for Scientific Information (ISI) in 2001 to measure the performance of scientific researches and track the trend of scientific development. It is the quantitative analysis database that is established based on more than 10 million papers in over 11,000 kinds of academic journals in the world that are included in SCI (Science Citation Index Expanded) and SSCI (Social Sciences Citation Index). ESI has become one of the most important indicators to evaluate the international academic research level and influence of the colleges and universities, academic institutions, countries/regions, etc.

Three types of papers (Article, Review and Note) of SCIE and SSCI in Web of Science are included in ESI database. ESI is a ten-year rolling database and is updated every two months, which is in Jan. Mar. May. July. Sep. Nov. of each year. The data of over 11,000 kinds of academic journals are divided into 22 specific fields of research, which are in Tab 1.

Tab.1：The 22 specific fields of ESI

● Agricultural Science	● Mathematics
● Biology & Biochemistry	● Microbiology
● Chemistry	● Molecular Biology & Genetics
● Clinical Medicine	● Multidisciplinary *
● Computer Science	● Neuroscience & Behavior
● Economics & Business	● Pharmacology
● Engineering	● Physics
● Environment/ Ecology	● Plant & Animal Science
● Geosciences	● Psychiatry/Psychology
● Immunology	● Social Sciences--general
● Materials Science	● Space Science

ESI identifies the journal articles, scientists, institutions, countries, and journals by setting threshold as selection criteria (a certain number of total citations) for each of the disciplines. These thresholds, set to select some constant fraction of items, are described in an accompanying document (citation thresholds). Field rankings for scientists, institutions, countries, and journals are provided in ESI.

Scientists: Of the roughly 4 million scientists' names appearing in the 10 years of Thomson Reuters data surveyed, about 60,000 scientists are listed in ESI which represents the top 1% of authors in terms of total citations in each of the disciplines over the 10 years.

Institutions : About 700,000 institutional affiliations are scanned in the 10-year data file, and about 4,000 of these are selected for ESI, also representing the top 1% in each discipline (unification of institutional names is undertaken to obtain more accurate statistics).

Countries and journals: About 150 are selected out of about 200 scanned, and for journals about 5,000 of the 10,000, both representing the top 50% by discipline and total citations over the 10-year period.

ESI also provide the search of highly cited papers and hot papers.

Highly cited papers: Lists the top cited papers over the last 10 years in 22 scientific fields. Rankings are based on meeting a threshold of the top 1% by field and year based on total citations received.

Hot Papers: Papers published in the past two years that receive more citations during the past two months relative to other papers in the same field. About 1,800 hot papers are selected, representing the top 0.1% in the two-year period.

This paper analyzed the ESI ranking of NCPU and the discipline in the top 1% of the world. The highly cited papers of NCEPU were also listed and studied. The statistics of these papers are analyzed according to years, disciplines, citations and departments. It listed the six disciplines which publish the most papers in NCEPU and compared the citations of each discipline and the threshold of ESI top 1% of the world[1-2,5-14].

2 The disciplines in ESI top 1% of NCEPU

According to the newest ESI data updated on May 7, 2015, the ENGINEERING discipline of NCEPU is the only discipline in the top 1% of the world of ESI. As in ESI statistics, NCEPU ranks 366th of all 1151 institutions that in the world top 1% list of ESI. There are 838 papers with total 6742 citations and average citations 8.05 per paper in the period of January 1, 2005-February 28, 2015. Of all the 22 fields/disciplines in ESI, NCEPU with 17395 total citations ranks 2149th among all 4678 institutions in the top 1% ESI ranking[3-4]. All these statistics are in Tab.2.

Tab.2：The ESI ranking of ESI

Field	Papers	Citations	Citations per paper	Ranking	Number of institutions in top 1%	Ranking percentage
ENGINEERING	838	6742	8.05	366	1151	31.80%
All fields	2077	17395	8.38	2149	4678	45.94%

In the ENGINEERING field the top 10 institutions are as in Fig.1, Chinese Acad SCI, Tsing Hua Univ, Nanyang Technol Univ and Nanyang Technol Univ-NIE are ranked 4th, 7th, 8th, 9th. There are big differences in the papers and citations of NCEPU and these institutions.

INSTITUTION RANKINGS IN ENGINEERING

Display items with at least: 0 Citation(s)

Sorted by: Citations SORT AGAIN

1 - 20 (of 1151) [1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10] Page 1 of 58

	View	Institution	Papers	Citations	Citations Per Paper
1		CNRS	31,453	211,855	6.74
2		UNIV CALIF SYSTEM	14,990	141,606	9.45
3		US DEPT ENERGY	10,048	101,381	10.09
4		CHINESE ACAD SCI	13,665	97,084	7.10
5		IIT	12,588	78,506	6.24
6		SWISS FEDERAL INSTITUTES OF TECHNOLOGY DOMAIN	7,644	68,970	9.02
7		TSING HUA UNIV	10,141	60,022	5.92
8		NANYANG TECHNOL UNIV	7,126	57,197	8.03
9		NANYANG TECHNOL UNIV + NIE	7,123	57,195	8.03
10		MIT	5,158	53,298	10.33

Fig.1 The top 10 institutions in ENGINEERING field

3 The highly cited papers of NCEPU

According to the newest ESI data updated on May 7, 2015, there are 32 highly cited papers, which are in Tab.3.

Tab. 3：The highly cited papers of NCEPU

Title	Authors in NCEPU	Source	Citations	Years
OBSERVATION OF ELECTRON-ANTINEUTRINO DISAPPEARANCE AT DAYA BAY	Chen, Y. X.; Ma, X. B.; Wang, L. Z.	PHYS REV LETT	618	2012
REVIEW ON MULTI-CRITERIA DECISION ANALYSIS AID IN SUSTAINABLE ENERGY DECISION-MAKING	WANG JJ; JING YY; ZHANG CF; ZHAO JH	RENEW SUSTAIN ENERGY REV	174	2009
HIGH-PERFORMANCE INVERTED POLYMER SOLAR CELLS WITH SOLUTION-PROCESSED TITANIUM CHELATE AS ELECTRON-COLLECTING LAYER ON ITO ELECTRODE	TAN ZA; ZHANG WQ; ZHANG ZG; QIAN DP; HUANG Y; HOU JH; LI YF	ADVAN MATER	141	2012
THE PARAMETERIZATION REDUCTION OF SOFT SETS AND ITS APPLICATIONS	CHEN DG; TSANG ECC; YEUNG DS; WANG XZ	COMPUT MATH APPL	139	2005
ENERGY CONSUMPTION, CARBON EMISSIONS, AND ECONOMIC GROWTH IN CHINA	ZHANG XP; CHENG XM	ECOL ECON	131	2009
ADSORPTION OF COPPER(II) ON MULTIWALLED CARBON NANOTUBES IN THE ABSENCE AND PRESENCE OF HUMIC OR FULVIC ACIDS	SHENG GD; LI JX; SHAO DD; HU J; CHEN CL; CHEN YX; WANG XK	J HAZARD MATER	119	2010
SORPTION OF NI(II) ON GMZ BENTONITE: EFFECTS OF PH, IONIC STRENGTH, FOREIGN IONS, HUMIC ACID AND TEMPERATURE110	YANG ST; LI JX; LU Y; CHEN YX; WANG XK	APPL RADIAT ISOTOPES	111	2009
KINETICS AND THERMODYNAMICS OF ADSORPTION OF IONIZABLE AROMATIC COMPOUNDS FROM AQUEOUS SOLUTIONS BY AS-PREPARED AND OXIDIZED MULTIWALLED CARBON NANOTUBES	SHENG GD; SHAO DD; REN XM; WANG XQ; LI JX; CHEN YX; WANG XK	J HAZARD MATER	108	2010
ENERGY CONSUMPTION AND ECONOMIC GROWTH: EVIDENCE FROM CHINA AT BOTH AGGREGATED AND DISAGGREGATED LEVELS	YUAN JH; KANG JG; ZHAO CH; HU ZG	ENERG ECON	105	2008
ON THE GENERALIZATION OF FUZZY ROUGH SETS	YEUNG DS; CHEN DG; TSANG ECC; LEE JWT; WANG XZ	IEEE TRANS FUZZY SYST	98	2005
CONVERGENCE THEOREMS OF FIXED POINTS FOR KAPPA-STRICT PSEUDO-CONTRACTIONS IN HILBERT SPACES	ZHOU HY	NONLINEAR ANAL-THEOR METH APP	92	2008
IMPROVED MEASUREMENT OF ELECTRON ANTINEUTRINO DISAPPEARANCE AT DAYA BAY	Chen, Y. X.; Ma, X. B.; Wang, L. Z.	CHIN PHYS C	91	2013
ECOLOGICAL RISK ASSESSMENT OF HEAVY METALS IN SEDIMENT AND HUMAN HEALTH RISK ASSESSMENT OF HEAVY METALS IN FISHES IN THE MIDDLE AND LOWER REACHES OF THE YANGTZE RIVER BASIN	YI YJ; YANG ZF; ZHANG SH	ENVIRON POLLUT	88	2011
ADSORPTION OF EU(III) ONTO TIO2: EFFECT OF PH, CONCENTRATION, IONIC STRENGTH AND SOIL FULVIC ACID	TAN XL; FANG M; LI JX; LU Y; WANG XK	J HAZARD MATER	84	2009
SORPTION OF COPPER(II) ONTO SUPER-ADSORBENT OF BENTONITE-POLYACRYLAMIDE COMPOSITES	ZHAO GX; ZHANG HX; FAN QH; REN XM; LI JX; CHEN YX; WANG XK	J HAZARD MATER	79	2010
HIGHLY EMISSIVE AND COLOR-TUNABLE CUINS2-BASED COLLOIDAL SEMICONDUCTOR NANOCRYSTALS: OFF-STOICHIOMETRY EFFECTS AND	CHEN BK; ZHONG HZ; ZHANG WQ; TAN ZA; LI YF; YU CR; ZHAI TY; BANDO YS; YANG	ADV FUNCT MATER	73	2012

IMPROVED ELECTROLUMINESCENCE PERFORMANCE	SY; ZOU BS			
OPTIMIZATION OF CAPACITY AND OPERATION FOR CCHP SYSTEM BY GENETIC ALGORITHM	WANG JJ; JING YY; ZHANG CF	APPL ENERG	60	2010
THE OPTIMAL EVAPORATION TEMPERATURE AND WORKING FLUIDS FOR SUBCRITICAL ORGANIC RANKINE CYCLE	HE C; LIU C; GAO H; XIE H; LI YR; WU SY; XU JL	ENERGY	53	2012
WHY DID CHINAS ENERGY INTENSITY INCREASE DURING 1998-2006: DECOMPOSITION AND POLICY ANALYSIS	ZHAO XL; MA CB; HONG DY	ENERG POLICY	53	2010
CONVERGENCE THEOREMS OF FIXED POINTS FOR LIPSCHITZ PSEUDO-CONTRACTIONS IN HILBERT SPACES	ZHOU HY	J MATH ANAL APPL	52	2008
ADVANCES AND TRENDS OF ENERGY STORAGE TECHNOLOGY IN MICROGRID	TAN XG; LI QM; WANG H	INT J ELEC POWER ENERG SYST	46	2013
MAKING FISCHER-TROPSCH FUELS AND ELECTRICITY FROM COAL AND BIOMASS: PERFORMANCE AND COST ANALYSIS	LIU GJ; LARSON ED; WILLIAMS RH; KREUTZ TG; GUO XB	ENERG FUEL	46	2011
GENERALIZED H-2 FAULT DETECTION FOR TWO-DIMENSIONAL MARKOVIAN JUMP SYSTEMS	WU LG; YAO XM; ZHENG WX	AUTOMATICA	45	2012
FORECASTING STOCK INDICES USING RADIAL BASIS FUNCTION NEURAL NETWORKS OPTIMIZED BY ARTIFICIAL FISH SWARM ALGORITHM	SHEN W; GUO XP; WU C; WU DS	KNOWL-BASED SYST	44	2011
THERMAL CONDUCTIVITIES STUDY ON SILICA AEROGEL AND ITS COMPOSITE INSULATION MATERIALS	WEI GS; LIU YS; ZHANG XX; YU F; DU XZ	INT J HEAT MASS TRANSFER	42	2011
COMMON FIXED POINT THEOREMS ON GENERALIZED DISTANCE IN ORDERED CONE METRIC SPACES	CHO YJ; SAADATI R; WANG SH	COMPUT MATH APPL	39	2011
SPECTRAL MEASUREMENT OF ELECTRON ANTINEUTRINO OSCILLATION AMPLITUDE AND FREQUENCY AT DAYA BAY	Chen, Y. X.; Ma, X. B.; Wang, L. Z.	PHYS REV LETT	35	2014
EFFICIENT AND STABLE POLYMER SOLAR CELLS WITH SOLUTION-PROCESSED MOLYBDENUM OXIDE INTERFACIAL LAYER	TAN ZA; QIAN DP; ZHANG WQ; LI LJ; DING YQ; XU Q; WANG FZ; LI YF	J MATER CHEM A	30	2013
NEW EXISTENCE RESULTS FOR HIGHER-ORDER NONLINEAR FRACTIONAL DIFFERENTIAL EQUATION WITH INTEGRAL BOUNDARY CONDITIONS	FENG MQ; ZHANG XM; GE WG	BOUND VALUE PROBL	28	2011
CHARACTERISTICS AND MECHANISM STUDY OF ANALYTICAL FAST PYROLYSIS OF POPLAR WOOD	DONG CQ; ZHANG ZF; LU Q; YANG YP	ENERG CONV MANAGE	26	2012
OPTIMAL GEOMETRIC STRUCTURE FOR NANOFLUID-COOLED MICROCHANNEL HEAT SINK UNDER VARIOUS CONSTRAINT CONDITIONS	WANG XD; AN B; XU JH	ENERG CONV MANAGE	19	2013
A HYBRID ANNUAL POWER LOAD FORECASTING MODEL BASED ON GENERALIZED REGRESSION NEURAL NETWORK WITH FRUIT FLY OPTIMIZATION ALGORITHM	LI HZ; GUO S; LI CJ; SUN JQ	KNOWL-BASED SYST	13	2013

3.1 The statistics of publication years of the highly cited papers of NCEPU

The publication years of the 32 papers are mainly in 2010-2013 and an increasing trend are shown in 2005-2011. There is only one paper in 2014 because the age is closer.

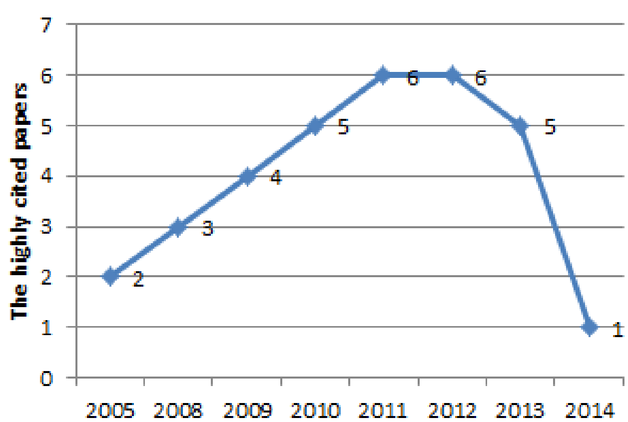

Fig.2 Publication years of the highly cited papers of NCEPU

3.2 The disciplines and departments of the highly cited papers of NCEPU

The highly cited papers of NCEPU are mainly in disciplines of ENGINEERING, MATHEMATICS, PHYSICS, MATERIALS SCIENCE, ENVIRONMENT/ECOLOGY, ECONOMICS & BUSINESS, COMPUTER SCIENCE and SOCIAL SCIENCES, GENERAL. ENGINEERING discipline, with the most papers, has 13 highly cited papers and is the only discipline in top 1% of NCEPU.

Tab.4：The disciplines and departments of the highly cited papers of NCEPU

Field	The number of highly cited papers	The number of papers in corresponding department
ENGINEERING	13	School of Energy Power and Mechanical Engineering (4 papers), School of Nuclear Science and Engineering(4 papers), Renewable Energy School(2 papers), School of Electrical & Electronic Engineering(1 paper), School of Mathematics & Physics (1 paper), School of Control and Computer Engineering(1 paper)
MATHEMATICS	5	School of Mathematics & Physics (5 papers)
PHYSICS	4	School of Energy Power and Mechanical Engineering (2 papers), Renewable Energy School(2 papers)
MATERIALS SCIENCE	3	Renewable Energy School(3 papers)
ENVIRONMENT/ECOLOGY	2	School of Energy Power and Mechanical Engineering (1 paper), School of Economic & Management(1 paper)
ECONOMICS & BUSINESS	2	School of Economic & Management(2 papers)
COMPUTER SCIENCE	2	School of Economic & Management(2 papers)
SOCIAL SCIENCES, GENERAL	1	School of Economic & Management(1 paper)

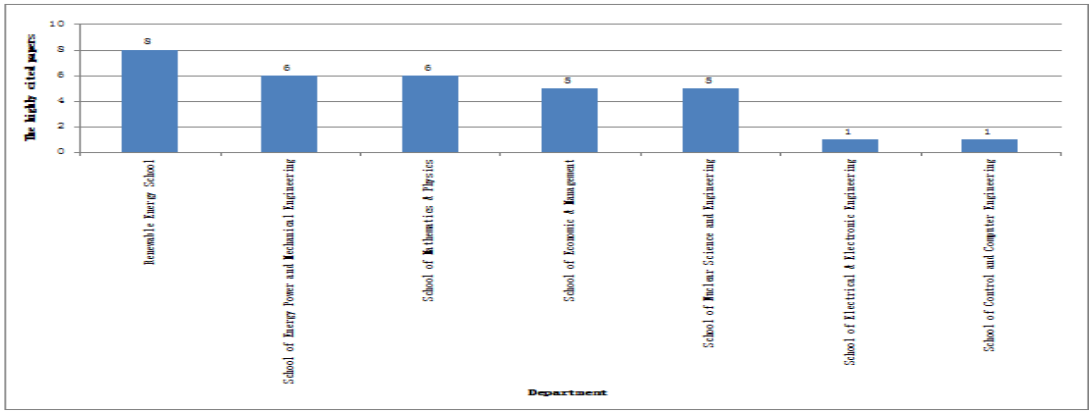

Fig.3 The departments of the highly cited papers of NCEPU

3.3 The cooperative countries/territories and institutions of highly cited papers of NCEPU

There are 9 papers cooperated with other countries/territories besides China and Hong Kong, China. The countries are mainly in USA, TAIWAN, RUSSIA, CZECH REPUBLIC, etc. which are in Tab.5.

Tab.5： The cooperative countries/territories of highly cited papers of NCEPU

Countries/Territories	Papers cooperated	The percentage of cooperation
USA	5	23.81%
TAIWAN	3	14.29%
RUSSIA	3	14.29%
CZECH REPUBLIC	3	14.29%
AUSTRALIA	2	9.52%
SOUTH KOREA	1	4.76%
JAPAN	1	4.76%
IRAN	1	4.76%
ICELAND	1	4.76%

There are 62 cooperative research institutions of 32 papers. The most are Chinese Acad SCI, Shandong Univ, Princeton Univ, etc.

Tab.6： The cooperative institutions of highly cited papers of NCEPU

Institutions	Papers cooperated	The percentage of cooperation
CHINESE ACAD SCI	9	6.12%
SHANDONG UNIV	4	2.72%
PRINCETON UNIV	4	2.72%
BEIJING NORMAL UNIV	4	2.72%
VIRGINIA TECH	3	2.04%
UNIV WISCONSIN	3	2.04%
UNIV SCI TECHNOL CHINA	3	2.04%
UNIV ILLINOIS	3	2.04%
UNIV HOUSTON	3	2.04%
UNIV HONG KONG	3	2.04%

3.4 The global influence of highly cited papers of NCEPU

This paper counted the citations of NCEPU highly cited papers in Web Of Science. There are 3009 citing papers in Web of Science Core Collection that cited the 32 highly cited papers of NCEPU. The citing papers are from over 100 countries and territories: USA (394), Korea (192), Japan (179), India (163), Germany (158), Italy (147), etc. These statistics show that the highly cited papers of NCEPU have certain global influence in the world.

4 The difference between NCEPU and ESI top 1% of the world

Based on the data of Web Of Science, this paper analyzed the papers of SCIE and SSCI from 2005 to 2015, and classified the papers into 22 ESI fields. The most fields are ENGINEERING, PHYSICS, MATHEMATICS, CHEMISTRY, ENVIRONMENT/ECOLOGY, MATERIALS SCIENCE and COMPUTER SCIENCE. The ENGINEERING field is already in top 1% of the world, so we counted the citation papers the other six fields and compared them with the ESI thresholds which are in Tab.9.

Tab. 7: The comparison of six disciplines of NCEPU with ESI thresholds

Field	Papers	Web Of Science citations	ESI thresholds	Differences
PHYSICS	478	4328	10453	-58.60%
MATHEMATICS	271	2061	3437	-40.03%
CHEMISTRY	245	2735	5510	-50.36%
ENVIRONMENT/ECOLOGY	291	3707	3208	15.55%
MATERIALS SCIENCE	215	1583	3150	-49.75%
COMPUTER SCIENCE	156	1967	2276	-13.58%

According to Tab.7, the ENVIRONMENT/ECOLOGY and COMPUTER SCIENCE disciplines are near to the ESI thresholds. But there is something to be noticed. The Web Of Science citations is different from the ESI citations, the former are citations from Web Of Science Core Collection, but the latter ESI citations are citations from SCIE and SSCI. In addition, the data of Tab.9 is from 2005 to 2015, while the ESI data on May 7, 2015 is in the period of January 1, 2005-February 28, 2015. So the Web Of Science citations in Tab.9 is bigger than the ESI citations, so there is some difference of the data.

5. Conclusions

According to the newest ESI data, ENGINEERING is the only discipline in the top 1% of the world and NCEPU ranks 366th of all 1151 institutions. There are 32 highly cited papers of ESI in NCEPU, which have certain global influence in the world. And the citations of ENVIRONMENT/ECOLOGY and COMPUTER SCIENCE disciplines in this paper's statistics are near to the ESI thresholds.

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