Anatomy of a Good Journal Article – Part 1: Getting Your Research Published

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PhD, PEng, CEng, FIChemE, FHEA, AAE

Director, Professor of Process Design & Integration
Centre of Excellence for Green Technologies
University of Nottingham Malaysia

About myself…

- Qualifications:
  - ✓ BEng and MEng & PhD (Chem Eng, UTM)
  - ✓ **140+** papers published in ISI-indexed journals
  - ✓ **≥200** publications and ***h*-index = 37** in Scopus
  - ✓ **>30** keynote/plenary presentations
  - ✓ Recipient of publication awards from Elsevier & Springer
  - ✓ Author & editors of 5 books
  - ✓ Editorial activities: Editor-in-Chief for ***Process Integration & Optimisation for Sustainability*** (Springer Nature; new journal); Subject Editor for ISI-indexed IChemE journal ***Process Safety and Environmental Protection*** (Elsevier); Editorial board member: ***Water Conservation Science and Engineering*** (Springer Nature);
- Professional involvements:
  - ✓ Deputy President, Asia Pacific Confederation of Chemical Engineering (APCChE)
  - ✓ Fellow, Institution of Chemical Engineers (IChemE)
  - ✓ Fellow, The Higher Education Academy (HEA), UK
  - ✓ Chartered Engineer (Engineering Council UK)
  - ✓ Professional Engineer (Board of Engineers M'sia)
  - ✓ Past chairman, ChE Tech Division, Institution of Engineers Malaysia
- Important awards:
  - ✓ Innovator of the Year 2009, Institution of Chemical Engineers UK
  - ✓ Young Engineer Award 2010, Institution of Engineers Malaysia
  - ✓ Outstanding Young Malaysian 2012, Junior Chamber International
  - ✓ Outstanding Asian Researcher and Engineer 2013, Society of Chemical Engineers, Japan
  - ✓ Top Research Scientist Malaysia 2016 , Academy of Science Malaysia

Workshop overview

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- Incentives for publications
- How to get started
- Life-cycle of publication
- How to measure your publication quality
- How to do world-class research

Some Myths

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- Publishing in journals is very difficult
- Publishing in journals can be very expensive
- Publishing does not have significant beneficial impact on society at large
- My **English** is poor

Why publish?

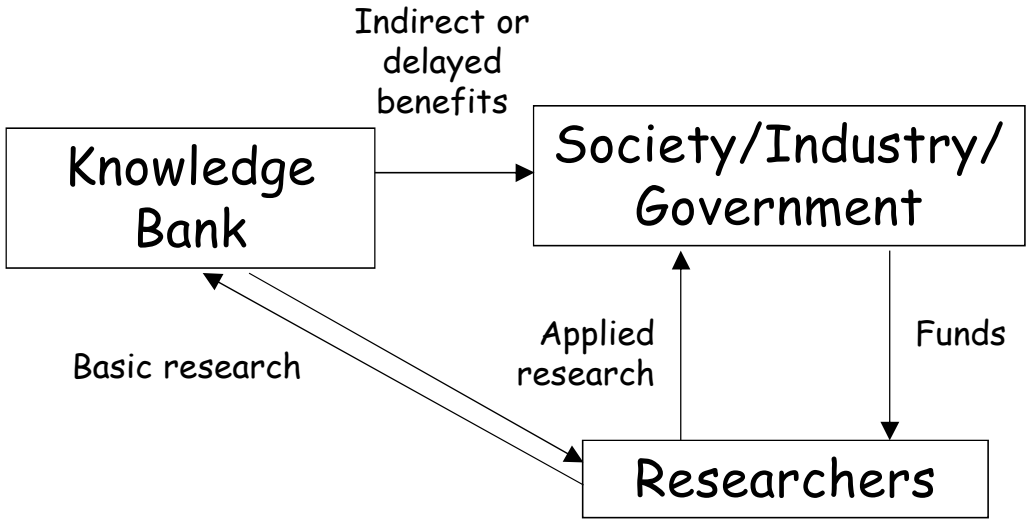
Research in academia

- Academic institutions have two main functions:
  - ✓**Transmit knowledge** (undergraduate)
  - ✓**Create knowledge** (postgraduate research)
- Knowledge is meaningless unless shared
  - ✓Scientific progress is **incremental in nature**

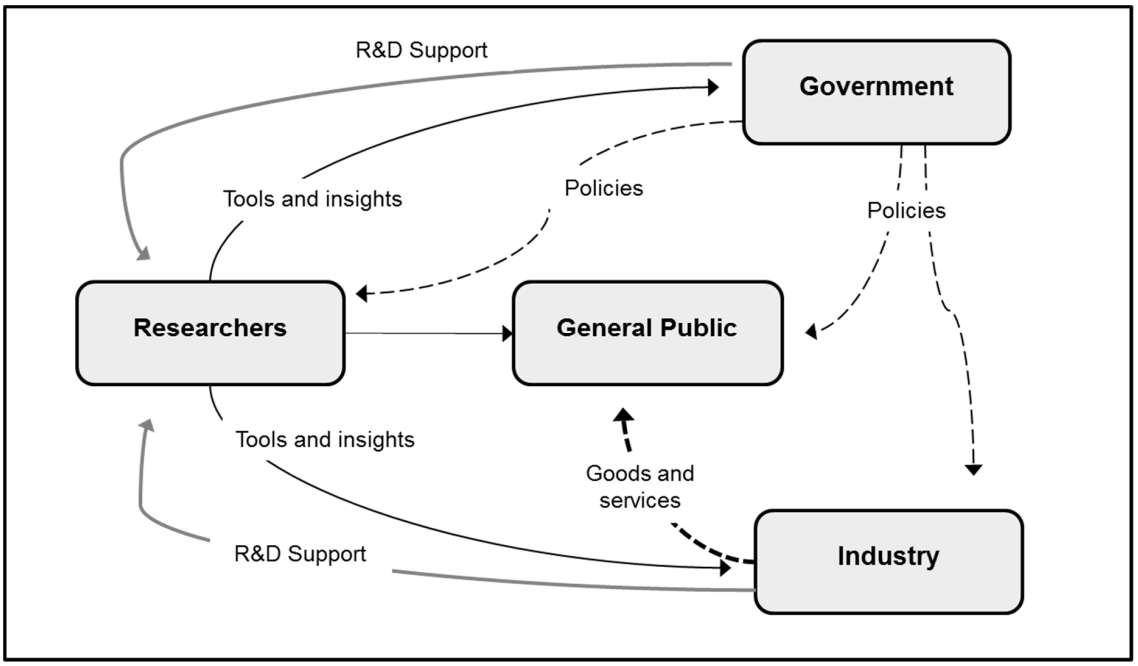
Research in academia

- To contribute knowledge as a **societal good**
- To provide **solutions** to national, regional and world problems
- To enrich the **national talent pool** with people able to compete in a knowledge-based global economy
- To enhance your university's international **reputation** – and thus, the value of the degrees we grant

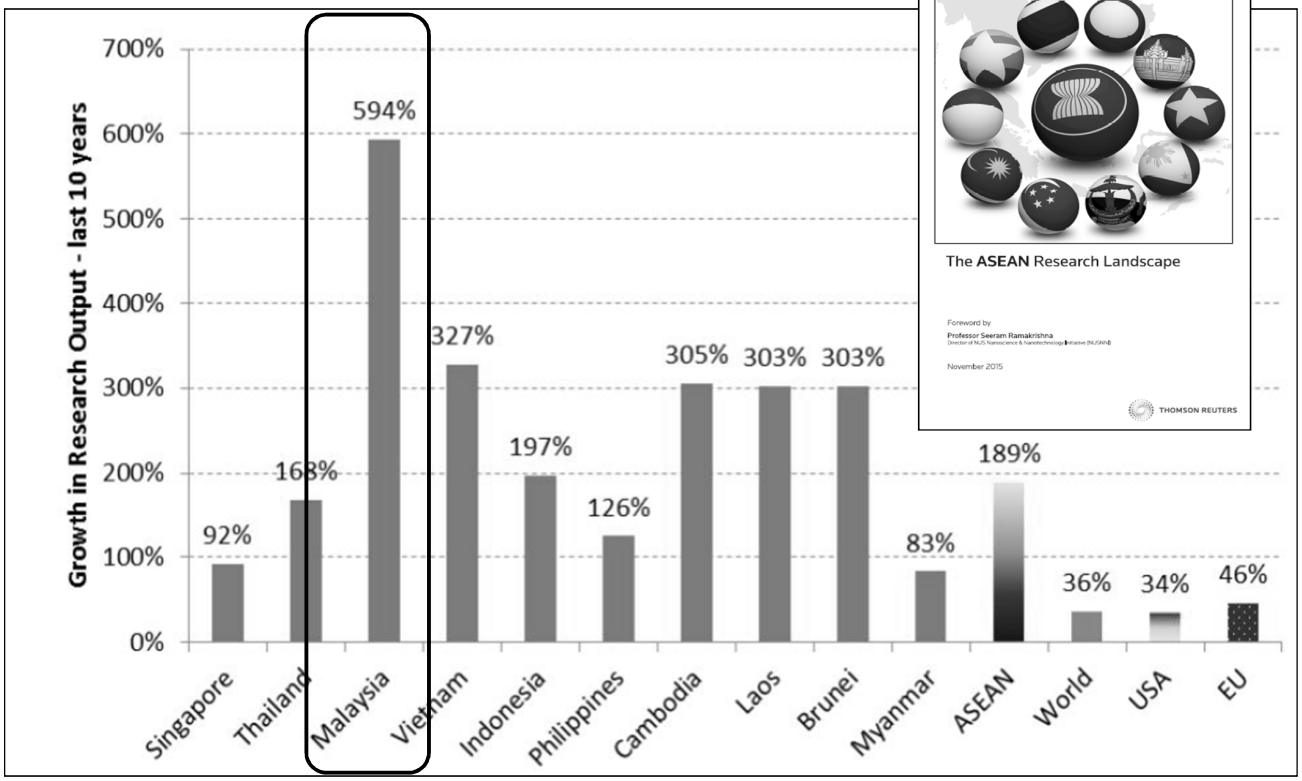
The research cycle



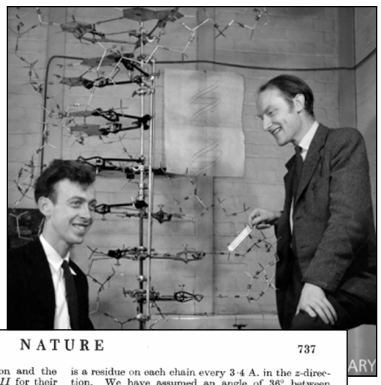
Interdependencies Research and Society



We are the highest!



Nobel Prize winning research and the value of great ideas



equipment, and to Dr. G. E. R. Deacon and the captain and officers of R.R.S. *Discovery II* for their part in making the observations.

[1] Young, F. B., Gerrard, H., and Jevons, W., *Phil. Mag.*, **40**, 149 (1920).

[2] Longuet-Higgins, M. S., *Mon. Not. Roy. Astro. Soc., Geophys. Supp.*, **5**, 285 (1949).

[3] Von Arx, W. S., Woods Hole Papers in Phys. Oceanog. Meteor., **11** (3) (1956).

[4] Ekman, V. W., *Arkiv. Mat. Astron. Fysik. (Stockholm)*, **2** (11) (1905).

MOLECULAR STRUCTURE OF NUCLEIC ACIDS

A Structure for Deoxyribose Nucleic Acid

WE wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest.

A structure for nucleic acid has already been proposed by Pauling and Corey[1]. They kindly made their manuscript available to us in advance of publication. Their model consists of three inter-twined chains, with the phosphates near the fibre axis, and the bases on the outside. In our opinion, this structure is unsatisfactory for two reasons:

is a residue on each chain every 3·4 A. in the z-direction. We have assumed an angle of 36° between adjacent residues in the same chain, so that the structure repeats after 10 residues on each chain, that is, after 34 A. The distance of a phosphorus atom from the fibre axis is 10 A. As the phosphates are on the outside, cations have easy access to them.

The structure is an open one, and its water content is rather high. At lower water contents we would expect the bases to tilt so that the structure could become more compact.

The novel feature of the structure is the manner in which the two chains are held together by the purine and pyrimidine bases. The planes of the bases are perpendicular to the fibre axis. They are joined together in pairs, a single base from one chain being hydrogen-bonded to a single base from the other chain, so that the two lie side by side with identical z-co-ordinates. One of the pair must be a purine and the other a pyrimidine for bonding to occur. The hydrogen bonds are made as follows: purine position 1 to pyrimidine position 1; purine position 6 to pyrimidine position 6.

If it is assumed that the bases only occur in the structure in the most plausible tautomeric forms (that is, with the keto rather than the enol configurations) it is found that only specific pairs of bases can bond together. These pairs are: adenine

- How did a Ph.D. student's "side research" create a technological revolution?
- Watson and Crick's discovery of the structure of DNA paved the way for the 21st Century **biotech age!**

How do I get started?

What kind of paper do I write?

What journal should I target?

What is the review process like?

Getting started

- Have **good material to begin with**
- Extensions of **conference papers** are good candidates for publication
- Major components of an MSc/MPhil or PhD **thesis**.
- **Invest time in reading journal articles regularly -- for benchmarking and to keep abreast of the state-of-the-art.**

Getting started

- There is no substitute for familiarity with recent developments in your fields
- Know…
  - ✓The people
  - ✓Their techniques
  - ✓Their findings
  - ✓The gaps in current knowledge
  - ✓How your work fits into the picture

Types of contributions

- Full paper (5 – 25 pages)
- Reviews (15 – 100+ pages)
- Others (2 – 15 pages)
  - ✓Short communications
  - ✓Short notes
  - ✓Technical notes
  - ✓Letters
  - ✓Etc.

The full paper

- Consists of complete research results
- Key elements:
  - ✓Abstract
  - ✓Introduction/Literature review/background
  - ✓Problem statement
  - ✓Research methodology
  - ✓Results and discussion
  - ✓Conclusions
  - ✓References

The review article

- Provides **a synopsis of "recent" research findings** in a specialized area
- Key components:
  - ✓Introduction
  - ✓Critical review of literature
  - ✓Conclusions/implications for future work
  - ✓References

The short note

- Documents preliminary but nevertheless potentially important results
- The distinction between a full article and a short note may be fuzzy, and the call can be made by:
  - ✓The author
  - ✓The journal editor
  - ✓The reviewer/s

Where to publish?

- R&D findings can be made **public** via different media:
  - ✓Website/blogs – no quality control ("gray literature")
  - ✓Conferences – relatively "**raw**" research results
  - ✓Magazines – less scientific ground
  - ✓Books – relatively outdated
  - ✓**Peer reviewed journals**

Choosing a journal

- Has the journal published articles similar to yours in the past 2 – 3 years?
- Does the journal name appear often in your reference list?
- Does the journal description scope match your work?

Journal "levels"

- Top journals (e.g., Nature, Science)
- ISI-indexed journals
- Abstracted (but not ISI-indexed) journals of major publishers
- Local peer-reviewed journals
- Non-refereed journals

Abstracting/Indexing

- **Abstracting** services were developed to facilitate rapid search of scientific literature
- **Indexing** services were also developed to keep track of the utilization of information (e.g., through citation statistics)
- These provide a means by third parties to identify "journals that matter"
- Over the years *Thomson Reuters Web of Science* (a.k.a., "ISI") has become the industry gold standard but others have emerged (e.g., Scopus, Google Scholar)

Publishers

- Major Commercial Publishers
  - ✓e.g., Elsevier, Wiley, Springer, Inderscience
- Major Professional Organizations
  - ✓e.g., ACS, ASME, AIChE, IEEE
- University-based Publishers
  - ✓e.g., Berkeley Electronic Press, Cambridge University Press
- Other Small-Scale Publishers
  - ✓e.g., IFRF, ISEIS, Japan Institute of Energy

ISI & impact factor

- The Institute for Scientific Information (ISI) lists the top scientific journals in the world
- An **Impact Factor (IF)** indicates the "importance" of a journal - **the average no of times a paper is cited within 2 years of publication in the journal**.
- See www.isinet.com for details

IF of selected journals (2015)

Name	Publisher	Impact Factor
Proc. Safety & Env. Protection	Elsevier/IChemE	2.551
Applied Energy	Elsevier	5.613
Science	AAAS	33.611
Clean Tech. & Env. Policy	Springer	1.934
Fuel	Elsevier	3.52
Chem. Eng. Res. Design	Elsevier/IChemE	2.348
Ind. Eng. Chem. Res.	American Chemical Society	2.587

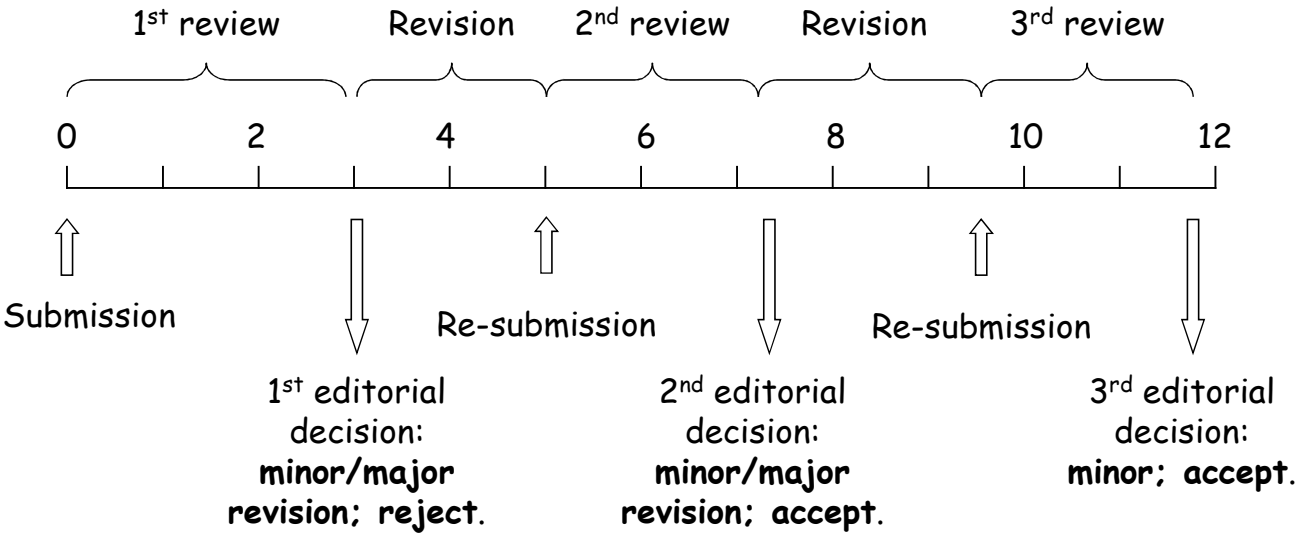
Caveats

- Impact factor is biased by
  - ✓Breadth of topics/audience covered by a journal
  - ✓Other discipline-specific factors
  - ✓Always **compare IF of journals in the same field**
  - ✓Comparison across different fields is meaningless
  - ✓**You can gauge the value of your paper by comparing citations with the journal IF**

The review process

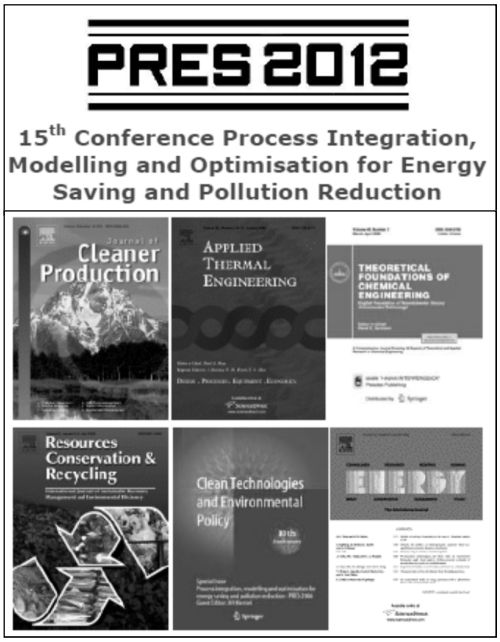
- Submit article + letter to editor + list of suggested reviewers
- Editor makes initial review, and passes manuscript to about 1 – 5 external reviewers, if acceptable
- Reviewers assess the manuscript, give comments to editor
- Editor relays comments to corresponding author
- Author revises (or declines to revise) the manuscript, and resubmits with a point-to-point response
- The process is repeated until the article is accepted

The review process



Some tips to speed up

- Special issues (normally fast-tracked review)
  - ✓ Dedicated to specific themes
  - ✓ Based on selected or invited papers from a conference
- **Present in conferences with special issues (even if they are more expensive!)**



Submission options

- By post (this is more or less obsolete)
- Electronic
  - ✓ Via e-mail to an editor
    - Editor-in-chief
    - Subject editor/Guest editor
    - Member of editorial board
  - ✓ Through a publisher's dedicated electronic manuscript submission system

Electronic submission system

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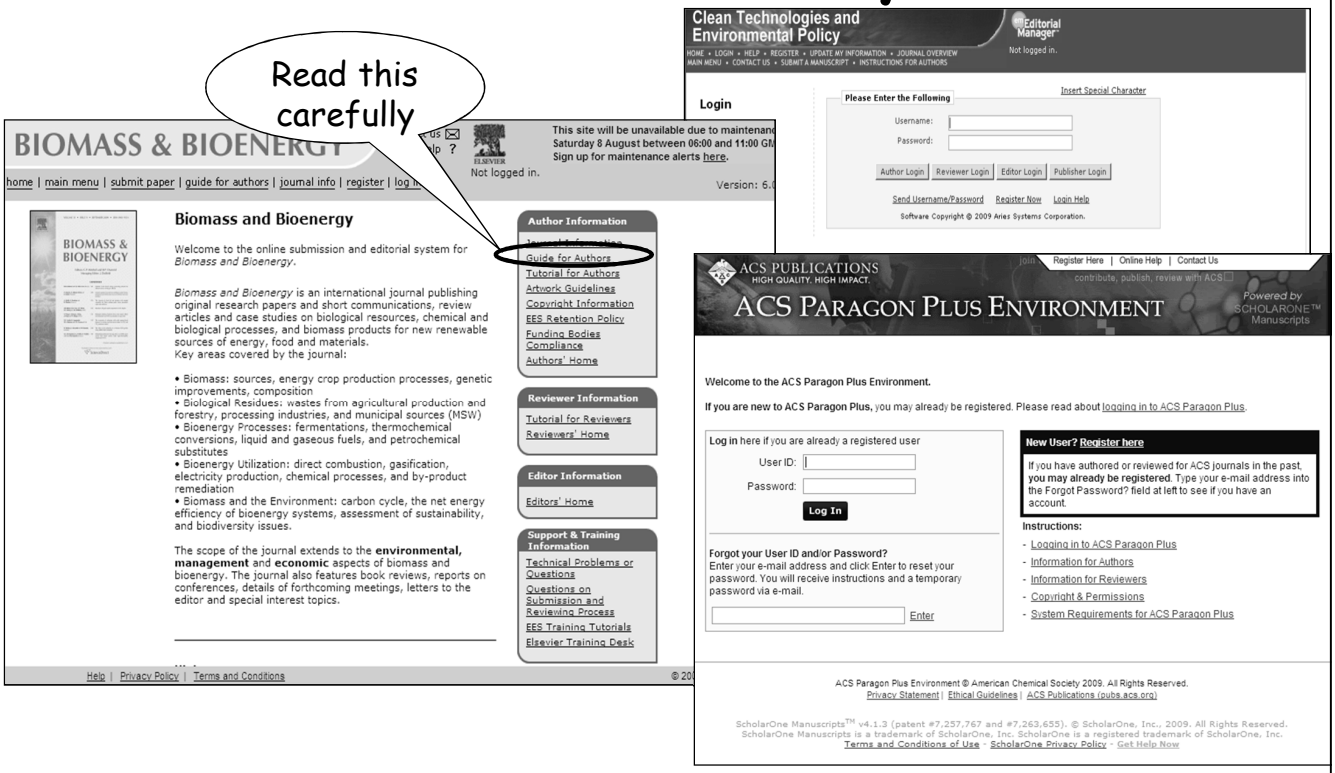

Electronic submission system

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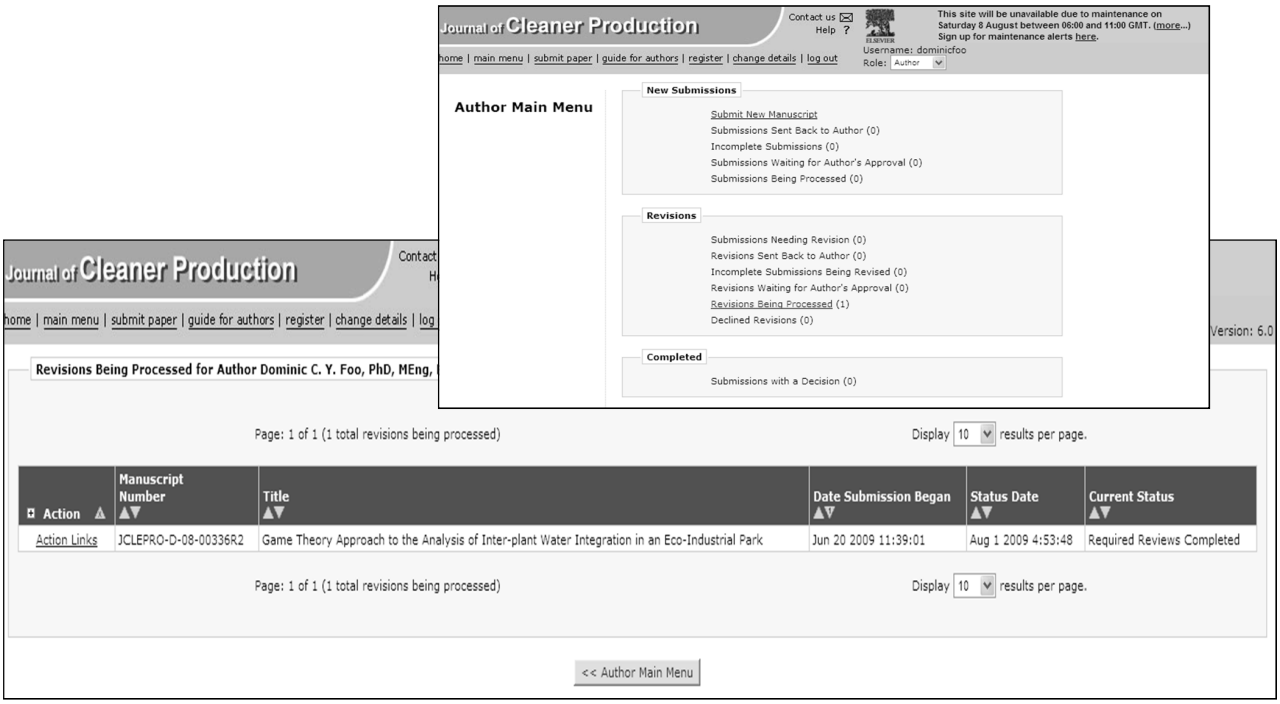

Documents to Submit

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- **Cover letter to editor**
  - ✓Brief description of the paper
  - ✓Suggested reviewers
- **Manuscript** (see guide for authors)
  - ✓Text (double space)
  - ✓Figures (usually 1 per page)
  - ✓Tables (usually 1 per page)
- Other documents as required by journal
- Supplementary e-files

Letter to editor (sample)

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Editor,
Industrial & Engineering Chemistry Research,
Department of Chemical Engineering,
University of Texas at Austin, 1 University Station
C0400, Austin, TX 78712-0231 18 August 2008

Dear editor,

SUBMISSION OF REVIEW PAPER TO INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH

I am submitting the review paper entitled "**ON PINCH-BASED REVIEW FOR THE SYNTHESIS OF WATER NETWORK. PART 1 – TARGETING**" for review and possible publication in *Industrial & Engineering Chemistry Research*. The paper reviews the current state-of-the-art techniques on water network synthesis based on the insight-based technique of pinch analysis.

The last review paper on this area was dated back to the last century. Since then, various targeting techniques have been proposed to fill the research gaps in the area of flowrate targeting, particularly for the fixed flowrate problem. An up-to-date review is therefore needed to summarise the recently developed works. Part 2 of this series which is currently under development, will discuss the various network design techniques for the water network.

I would like to recommend a few reviewers for this paper. All of them have a distinguished body of work in the field of water network synthesis:

1. Dr Raymond Girard Tan
   College of Engineering, De La Salle University-Manila
   2401 Taft Avenue, 1004 Manila, Philippines.
   Tel. +63-2-536-0257; +63-2-524-4611; Fax +63-2-524-0563
   E-mail: tanr_a@dlsu.edu.ph ; natdnomyar@yahoo.com

2. Dr Santanu Bandyopadhyay
   Indian Institute of Technology, Bombay
   Powai, Mumbai, 400076, India.
   Phone: +91-22-25767894; Fax: +91-22-25726875, 25723480
   E-mail: Santanu@me.iitb.ac.in

3. Prof. Mahmoud El-Halwagi
   McFerrin Professor
   Department of Chemical Engineering, Texas A&M University
   College Station, Texas 77843-3122, USA
   Tel: (979)845-3484 ; Fax (979) 845-6446
   E-Mail: El-Halwagi@TAMU.edu

4. Dr Thokozani Majozi
   Department of Chemical Engineering, University of Pretoria
   Lynnwood Road, Pretoria 0002, South Africa.
   Tel.: +27 12 420 4130; fax: +27 12 362 5173
   E-Mail: thoko.majozi@up.ac.za

I look forward to receiving feedback on the status of the paper from the journal.

Thank you.

Yours truly,

Dominic C. Y. Foo, PhD

Some tips

- A **good cover letter** always helps.
- Suggest **reviewers** who:
  - ✓Have done work similar to yours
  - ✓Subscribe to the same "school of thought"
  - ✓Are cited in your reference list
  - ✓You know personally (more friends will always help!)

Corresponding authors

- Normally someone with a permanent position
- Normally supervisor (with relatively longer stay than the students in an organization)
- Someone who knows how to answer the doubts if readers have inquiries when reading the paper.

Thoughts to keep in mind

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- If you've done your homework, there's a fair chance that you will get published
- The editors & reviewers have their own interest
  - ✓ If your paper fits the journal scope and is reasonably novel, the editor will be inclined to have it published
  - ✓ You must convince the majority of the reviewers of your views
- **Golden rule:** The fundamental criterion for publishability is **novelty, not degree of difficulty**.

Review results

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- **Accept** for publication as is (very rare!)
- **Minor revisions** (not requiring further peer review)
- **Major revisions** (additional round of review is required)
- **Reject** as unfit

When your receive reviews

- Take the comments like a professional
- What you should do:
  - ✓ Revise as they suggest
  - ✓ Revise along similar lines as their suggestion
  - ✓ Decline to revise as suggested, but explain why
  - ✓ In the event of conflicting comments, choose which revision you will follow
  - ✓ In most cases, the editor will make the final decision.
- Remember: Reviewers are human too!

Point to point response (sample)

Comments	Response
Sets "K" and "M" that used in Equations 2 - 6 should be defined in the problem statement.	Set "K" has been defined in the problem statement; while "M" has been defined in the automated targeting technique section, both in the original manuscript.
Page 11, line 8: "..higher than 500 ppm (i.e. SR3, SR4 and SR5) are considered for interception."	Revised as suggested

Point to point response (sample)

Comments	Response
I believe that paper would have been interesting in 1996 or 1998, but not now.	Does this mean that we should stop doing research in those conventional areas like distillation, drying, mixing, etc., since they are outdated? The answer is obviously "NO", since the research field is still evolving, with many new ideas and concept being brought into the area.

Use of English

Review of paper by Ng, Foo, Tan and Tan for CER&D

This paper presents a development of the Water Cascade Analysis table to enable ultimate flowrate targeting when both recycle/reuse and regeneration are incorporated into fresh and waste water targeting, and incorporating both fixed uptake and fixed flowrate processes.

This paper certainly represents an advance of the state-of-the-art in water system analysis, and is clearly worth publishing, after some additions and corrections as specified below.

Firstly, some more conceptual issues:

I wonder about a wider issue around the types of water using processes that such procedures allow for. These are limited to the fixed load/uptake or fixed flow rate options, where the first allows no change in water flow, and the second does allow for water generation or removal. The fixed load processes are also called mass transfer processes, which is a bit misleading, as real mass transfer is hardly likely to give a fixed load – the uptake will depend on the relative flows of the process and water streams, and the equipment used for the transfer (especially where we are dealing with existing systems). I would like to see work done on procedures that would allow for a change in the uptake as conditions in the network change. Perhaps the authors could comment on this.

Secondly, there are a number of grammatical errors that will need to be addressed (word order, errors of concord, incorrect use of definite and indefinite articles, etc). Will these be taken care of editorially? I presume so, and will only suggest such changes where they may cause confusion.

Use of English

Review II

This is a good piece of work and certainly worth publishing. It applies techniques developed by the authors for property-based networks to utility gas networks, and is a useful contribution to the field.

I would recommend certain changes before it can be published, as detailed below.

1. I must say that I do not appreciate the style of presenting the methodology piecemeal in between the examples – it would be much clearer if it were set out fully and then applied. This would also make it clearer that Figure 2 is not part of Example 1.

8. Language usage needs to be improved in many places. It is not clear to me whether this will be done editorially or not. Words which are incorrect are: "water" instead of "nitrogen" on line 6 of page 5, "16 kg/s" instead of "4 kg/s" (see Table 5) on the 3rd last line of page 7, and "hydrogen" instead of "gas" in line 6 of page 8.

- The **most important element of a paper is its technical content**. Language is just to deliver the concept through. Different disciplines also subscribe to different linguistic styles.

What if it is rejected?

- Find out the reasons:
  - ✓Not within the scope of the journal
  - ✓Scope of work is insufficient
  - ✓Novelty is insignificant (or not spelled out significantly)
  - ✓Bias of reviewers?
- Step forward:
  - ✓Revise & **re-submit** as new paper
  - ✓Revise & **submit to another journal**

After Acceptance

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- The editor will send you a **notice of acceptance**
- The editor sends the manuscript to the production section of the publishing house
- You will receive the **proofs** and **copyright transfer (CT) agreement**
- Send back corrected proofs and CT
- The article will be queued "in press" and may be published on-line (e.g., ScienceDirect) and assigned a **digitial object identifier (doi)**

Article in press

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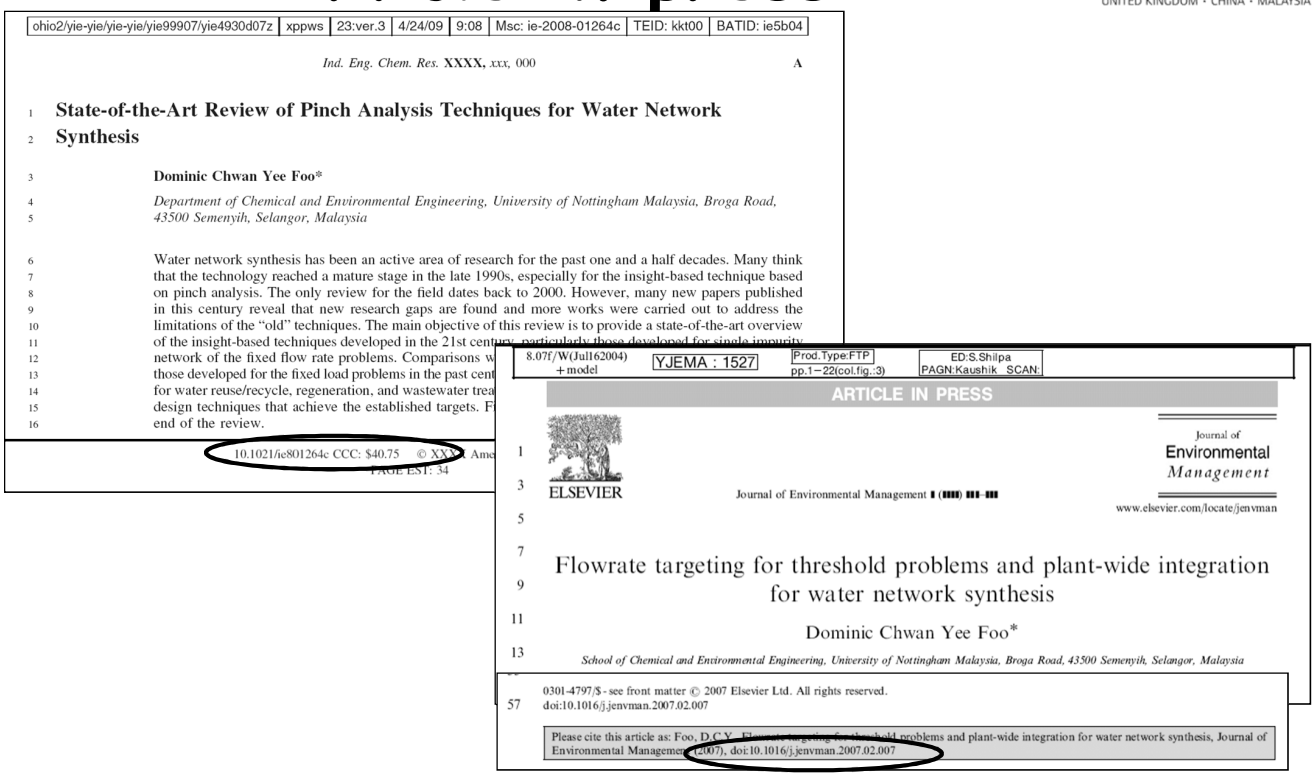

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Ind. Eng. Chem. Res. **XXXX,** *xxx,* 000 A

State-of-the-Art Review of Pinch Analysis Techniques for Water Network Synthesis

Dominic Chwan Yee Foo*

Department of Chemical and Environmental Engineering, University of Nottingham Malaysia, Broga Road, 43500 Semenyih, Selangor, Malaysia

Water network synthesis has been an active area of research for the past one and a half decades. Many think that the technology reached a mature stage in the late 1990s, especially for the insight-based technique based on pinch analysis. The only review for the field dates back to 2000. However, many new papers published in this century reveal that new research gaps are found and more works were carried out to address the limitations of the "old" techniques. The main objective of this review is to provide a state-of-the-art overview of the insight-based techniques developed in the 21st century, particularly those developed for single impurity network of the fixed flow rate problems. Comparisons w
those developed for the fixed load problems in the past cent
for water reuse/recycle, regeneration, and wastewater trea
design techniques that achieve the established targets. F
end of the review.

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Journal of Environmental Management

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Flowrate targeting for threshold problems and plant-wide integration for water network synthesis

Dominic Chwan Yee Foo*

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After acceptance

- The article will (eventually) be published in print with full citation details (i.e., volume and page numbers)
- **Publication of an article isn't the end of the story.**
- The true test of the value of your research is the interest it generates upon publication.

Measuring research productivity

Research Metrics
(Researchers)

- Number of published papers
  - ✓Annual publications
  - ✓Cumulative career publications
- Number of citations
  - ✓Scientific progress is incremental in nature
  - ✓Citations of one's research in the formal publications by other researchers provides an important measure of scientific value
  - ✓*h*-index

Research Metrics
(Institutions)

Criteria	Weight (%)
Academic peer review	40
Employer review	10
Faculty-student ratio	20
Citations per faculty	**20**
International faculty	5
International students	5

QS World University Rankings™

"Citations, evaluated in some fashion to take into account the size of institution, are the best understood and most widely accepted measure of *research strength*."

What is Scopus?

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- An abstract & citation database of international research literature - www.scopus.com
- Contains records and statistics of published papers from the mid-90's onward, which can be searched by:
  - ✓Topic/publication
  - ✓Institution
  - ✓Author, etc.

What is Scopus?

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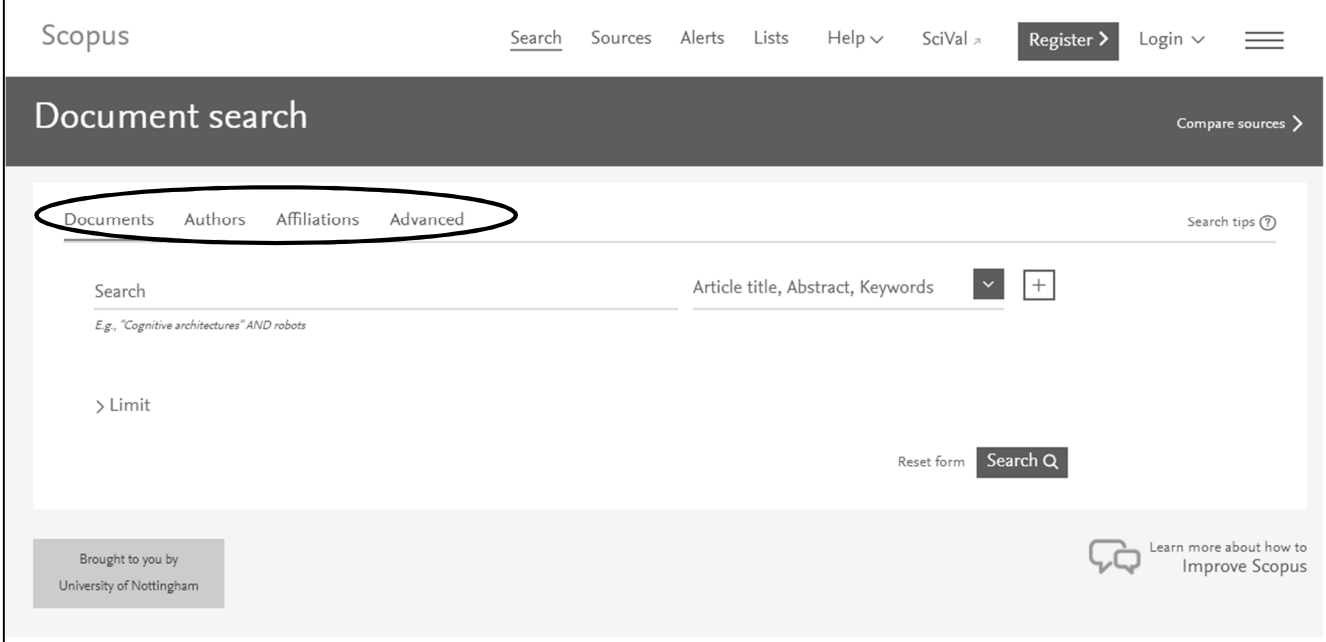

Scopus-listed articles from selected ASEAN universities

Institution	Articles in Scopus (as of Nov 20, 2016)
NUS (Singapore)	102,870
UM (Malaysia)	37,835
Chulalongkorn U. (Thailand)	24,223
Institut Teknologi Bandung (Indonesia)	6,609
UP-Diliman (Philippines)	3,133
DLSU (Philippines)	2,112
UNMC (Malasyia)	2,687

Scopus-listed articles from selected universities

Institution	Articles in Scopus (as of Nov 20, 2016)
NUS (Singapore)	102,870
UM (Malaysia)	37,835
Chulalongkorn U. (Thailand)	24,223
UC Berkeley (US)	208,345
Massachusetts Institute of Technology (US)	179,924
Imperial College (UK)	148,576
Tokyo Institute of Technology (Japan)	92,875
Hong Kong University of Science and Technology	37,896

Citation tracker

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Foo, D. C.Y.

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http://orcid.org/0000-0002-8185-255X

Other name formats: Chwan Yee Foo, Dominic | Foo, Dominic Chwan Yee | Foo, Dominic C.Y. | Foo, D. C.Y. | Foo, Chwan Yee | Foo, Dominic | Foo, Dominic C. | Yee Foo, Dominic Chwan | Foo, C. Y.

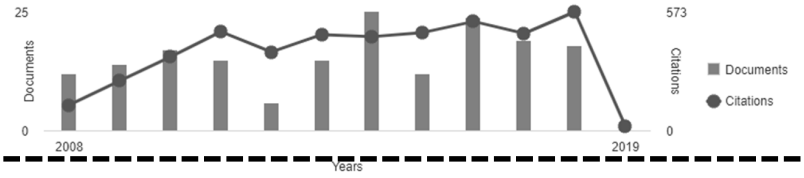
Subject area: Environmental Science | Chemical Engineering | Engineering | Chemistry | Energy | Computer Science | Biochemistry, Genetics and Molecular Biology | Mathematics | Materials Science | Business, Management and Accounting

h-index: 37 View *h*-graph

Documents by author 208 Analyze author output

Total citations 4685 by 1612 documents
View citation overview

Document and citation trends:



Where you published…

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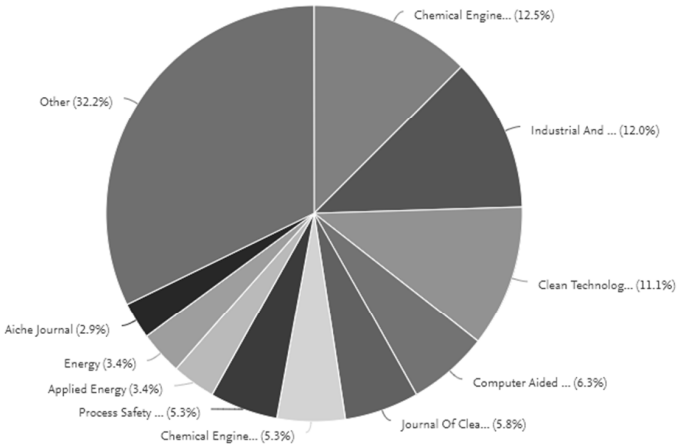
Source	Documents
Industrial And Engineering Chemistry Research	25
Clean Technologies And Environmental Policy	23
Computer Aided Chemical Engineering	13
Journal Of Cleaner Production	12
Chemical Engineering Research And Design	11
Process Safety And Environmental Protection	11
Applied Energy	7

Documents by source 208



by type

by year

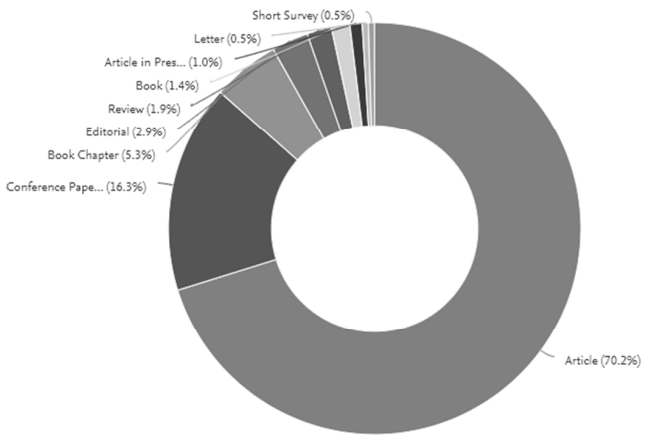
by subject

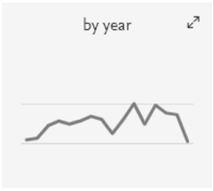
Types of publication

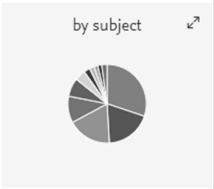
Document type	Documents
Article	146
Conference Paper	34
Book Chapter	11
Editorial	6
Review	4
Book	3
Article in Press	2
Letter	1
Short Survey	1

Documents by type

208







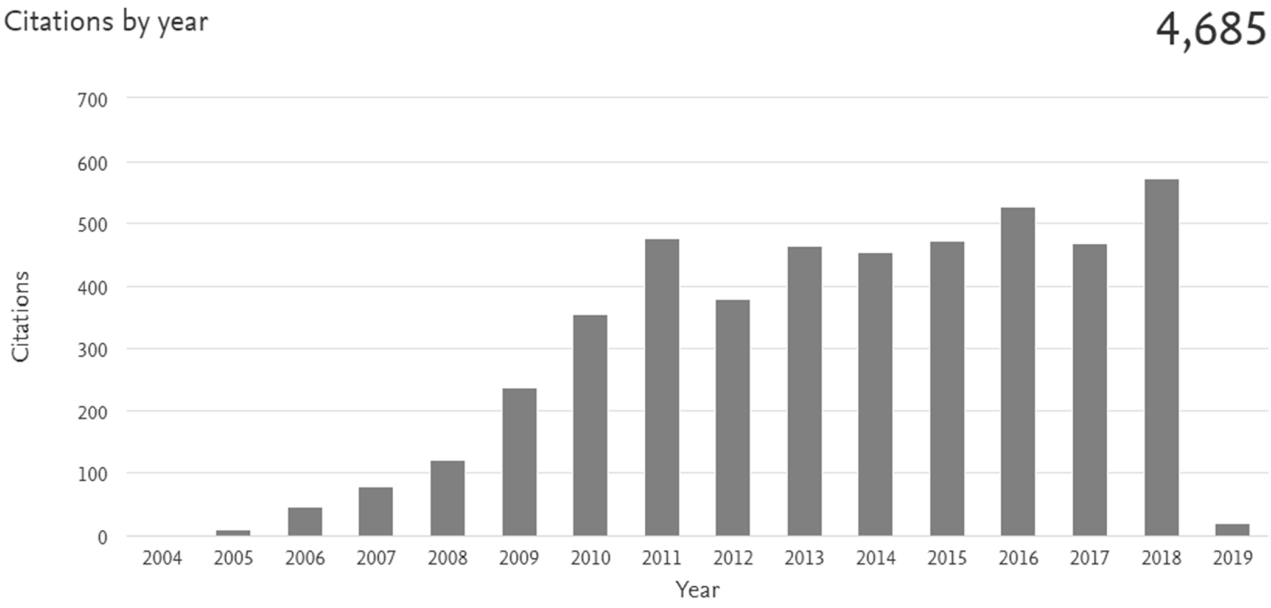
Your co-authors

150 Co-authors

Author Name	Co-authored Documents
Tan, Raymond R.	102
Ng, Denny K.S.	70
Lee, Jui Yuan	27
Ooi, Raymond E.H.	17
El-Halwagi, Mahmoud M.	17
Chew, Irene Mei Leng	16
Bandyopadhyay, Santanu	14
Tan, Yin Ling	13
Chen, Cheng-Liang	13

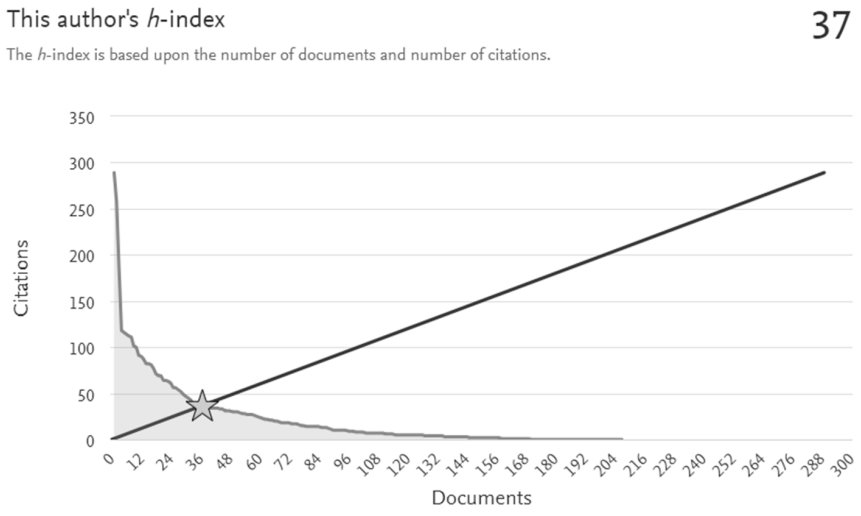
Citation

Citation by other researchers is the principal benchmark of research quality.



h-index

Documents	Citations	Title
1	289	State-of-the-art re...
2	258	Targeting the min...
3	186	Pinch analysis app...
4	118	Setting the minim...
5	116	Surplus diagram a...
6	114	Synthesis of maxi...
7	112	Automated targeti...
8	111	Synthesis of direct...
9	101	Automated targeti...



The h-index

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PNAS

An index to quantify an individual's scientific research output

J. E. Hirsch*

Department of Physics, University of California at San Diego, La Jolla, CA 92093-0319

Communicated by Manuel Cardona, Max Planck Institute for Solid State Research, Stuttgart, Germany, September 1, 2005 (received for review August 15, 2005)

I propose the index *h*, defined as the number of papers with citation number ≥*h*, as a useful index to characterize the scientific output of a researcher.

citations | impact | unbiased

For the few scientists who earn a Nobel prize, the impact and relevance of their research is unquestionable. Among the rest of us, how does one quantify the cumulative impact and relevance of an individual's scientific research output? In a world of limited resources, such quantification (even if potentially distasteful) is often needed for evaluation and comparison purposes (e.g., for university faculty recruitment and advancement, award of grants, etc.).

The publication record of an individual and the citation record

(*i*) Total number of papers (N_p). Advantage: measures productivity. Disadvantage: does not measure importance or impact of papers.

(*ii*) Total number of citations ($N_{c,tot}$). Advantage: measures total impact. Disadvantage: hard to find and may be inflated by a small number of "big hits," which may not be representative of the individual if he or she is a coauthor with many others on those papers. In such cases, the relation in Eq. **1** will imply a very atypical value of a, >5. Another disadvantage is that $N_{c,tot}$ gives undue weight to highly cited review articles versus original research contributions.

(*iii*) Citations per paper (i.e., ratio of $N_{c,tot}$ to N_p). Advantage: allows comparison of scientists of different ages. Disadvantage: hard to find, rewards low productivity, and penalizes high productivity.

(*iv*) Number of "significant papers," defined as the number of

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- A metric that accounts for both **quality** & **quantity**
- The **number of papers** of an author being **cited at least h times**.
- Example:
  - ✓An author has 10 papers listed in Scopus;
  - ✓3 of these papers have been cited >3 times;
  - ✓h-index = 3.

Some Scopus statistics (Nov 2016)

Name	Field	Affiliation	Documents in Scopus	h-Index
L.T. Fan	Chem. Eng.	Kansas State University (US)	518	36
J. Yan	Energy Eng.	KTH (Sweden)	187	33
J.-Y. Lee	Chem. Eng.	National Taiwan University	47	11
C.-L. Chen	Chem. Eng.	National Taiwan University	125	20
J. J. Klemes	Energy Eng.	Pázmány Péter Catholic University (Hungary)	341	34
F. Kydland*	Economics	UC Santa Barbara (USA)	30	13

The h-index

- *h* index remains useful as a measure of **cumulative achievement**
- However, h-index may continue to increase over time even long after the scientist has stopped publishing

The m-index

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- The *m*-index is no longer useful if a scientist does not maintain his or her level of productivity.
- The m-index is given by:

$$m = h/n$$

- where, n = time elapsed since the 1st published paper till present

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The m-index

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- A value of *m* ≈ 1 (i.e., an *h* index of 20 after 20 years of scientific activity) ➔ characterizes a successful scientist
- A value of *m* ≈ 2 (i.e., an *h* index of 40 after 20 years of scientific activity), ➔ outstanding scientists, likely to be found only at the top universities or major research laboratories.
- A value of *m* ≈ 3 or higher (i.e., an *h* index of 60 after 20 years, or 90 after 30 years) ➔ truly unique individuals.

Rules of Thumb

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Benchmark statistics for a "moderately productive" researcher:

- ✓Number of articles in Scopus ≅ Age in years
- ✓*h*-Index ≅ Research career in years (i.e., Hirsch's *m* = 1 criterion)

Concluding Remarks

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- Journals publication = cutting edge research findings
- In many disciplines, journal publication is not dominated by western researchers.
- **Get the right research team to do cutting edge research & get good publications!**

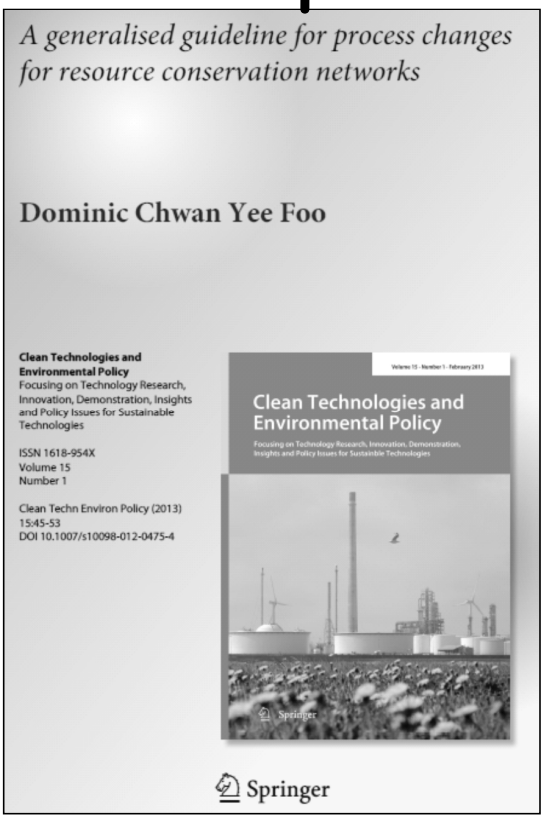
Anatomy of a Good Journal Article – Part 2: General Structure of a Good Paper

Dominic C. Y. Foo, PhD, MIEM, PEng, FHEA, AAE
Professor of Process Design & Integration
Centre of Excellence for Green Technologies
Dept of Chemical & Environmental Engineering

Anatomy of a good paper

- ***Documentation of your ideas, activities and results***
- Key elements:
  - ✓ Abstract
  - ✓ Introduction/Literature review/background
  - ✓ Problem statement
  - ✓ Research methodology
  - ✓ Results and discussion
  - ✓ Conclusions
  - ✓ References

An example to learn from



- Idea conceived in the midst of textbook writing (1-2 year earlier before submission).
- Just **1 month** from submission to acceptance for publication:
  - ✓ Submission: 31 Dec 2011
  - ✓ Review received: 22 Jan 2012 (CNY eve)
  - ✓ Re-submission: 25 Jan 2012 (3rd day of CNY)
  - ✓ Acceptance: 1 Feb 2012

Clean Techn Environ Policy (2013) 15:45–53
DOI 10.1007/s10098-012-0475-4

ORIGINAL PAPER

A generalised guideline for process changes for resource conservation networks

Dominic Chwan Yee Foo

Received: 31 December 2011 / Accepted: 1 February 2012 / Published online: 27 March 2012

The Title

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Keywords Process integration · Pinch analysis · Targeting · Resource conservation · Water minimisation

(Linnhoff et al. 1982; Smith 1995, 2005) into systematic design techniques for various resource conversation purposes, owing to the following reasons, i.e. rise of public awareness towards environmental sustainability, rise of raw materials and waste treatment costs, ever-tightening emission legislation, etc. In particular, the synthesis of resource conservation network (RCN) such as water, hydrogen and property networks has gained good attention from both academic and industrial practitioners. In general, the developed techniques for RCN synthesis can be classified into *insight-based* (based on pinch analysis) and mathematical optimisation tools, which are dedicated for direct reuse/recycle (Wang and Smith 1994; Hallale 2002; El-Halwagi et al. 2003; Manan et al. 2004; Kazantzi and El-Halwagi 2005; Prakash and Shenoy 2005; Foo et al. 2006a, b; Foo and Manan 2006; Bandyopadhyay 2006; Bandyopadhyay et al. 2006; Ng et al. 2009a; Saw et al. 2011; Ponce-Ortega et al. 2011; Kheireddine et al. 2011) and regeneration networks (Wang and Smith 1994; Kuo and Smith 1998; Hallale 2002; Manan et al. 2004; Kazantzi and El-Halwagi 2005; Foo et al. 2006a, b; Foo and Manan

- Concise but complete
- Need not be the same as the title of your Ph.D. thesis
- Tailored to the "norms" of the journal or the discipline **(such knowledge is part of being an expert in your area)**

The Abstract

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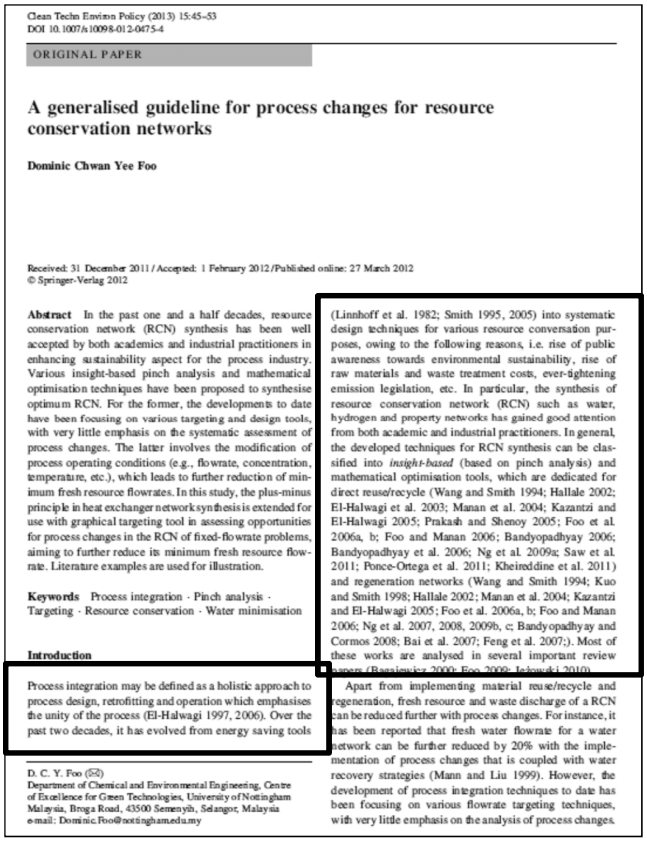
- A **brief synopsis** of your paper (typically 200 words or so)
- Organized the same way as the entire paper, with less detail.
- Write it in such a way that the reader gets a **clear picture of your research even without reading the full article**.

The Introduction



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Introduction

Process integration may be defined as a holistic approach to process design, retrofitting and operation which emphasises the unity of the process (El-Halwagi 1997, 2006). Over the past two decades, it has evolved from energy saving tools

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(Linnhoff et al. 1982; Smith 1995, 2005) into systematic design techniques for various resource conversation purposes, owing to the following reasons, i.e. rise of public awareness towards environmental sustainability, rise of raw materials and waste treatment costs, ever-tightening emission legislation, etc. In particular, the synthesis of resource conservation network (RCN) such as water, hydrogen and property networks has gained good attention from both academic and industrial practitioners. In general, the developed techniques for RCN synthesis can be classified into *insight-based* (based on pinch analysis) and mathematical optimisation tools, which are dedicated for direct reuse/recycle (Wang and Smith 1994; Hallale 2002; El-Halwagi et al. 2003; Manan et al. 2004; Kazantzi and El-Halwagi 2005; Prakash and Shenoy 2005; Foo et al. 2006a, b; Foo and Manan 2006; Bandyopadhyay 2006; Bandyopadhyay et al. 2006; Ng et al. 2009a; Saw et al. 2011; Ponce-Ortega et al. 2011; Kheireddine et al. 2011) and regeneration networks (Wang and Smith 1994; Kuo and Smith 1998; Hallale 2002; Manan et al. 2004; Kazantzi and El-Halwagi 2005; Foo et al. 2006a, b; Foo and Manan 2006; Ng et al. 2007, 2008, 2009b, c; Bandyopadhyay and Cormos 2008; Bai et al. 2007; Feng et al. 2007;). Most of these works are analysed in several important review papers (Bagajewicz 2000; Foo 2009; Jeżowski 2010).

Apart from implementing material reuse/recycle and regeneration, fresh resource and waste discharge of a RCN can be reduced further with process changes. For instance, it has been reported that fresh water flowrate for a water network can be further reduced by 20% with the implementation of process changes that is coupled with water recovery strategies (Mann and Liu 1999). However, the development of process integration techniques to date has been focusing on various flowrate targeting techniques, with very little emphasis on the analysis of process changes.

- Start with a general introduction to relevant **background issues**
  - ✓ Brief history
  - ✓ Some relevant works
- For some works, **use of statistics** is a good way to add depth.
- **Avoid verbatim quotes except for key definitions. This is a form of plagiarism even with citations!**

The Introduction (continued)

In the process integration research, analysis for process changes was first reported for heat exchanger network synthesis, using the plus-minus principles (Linnhoff and Vredeveld 1984; Smith 1995, 2005). Mann and Liu (1999) later extended the plus-minus principles for water network of the fixed-load problem. A more generic procedure for the fixed-load problem was later reported by Feng et al. (2009). However, note that the fixed-load problem is only applicable to a small category of mass transfer-based water-using operations, e.g. scrubber, washing, etc., but not other water networks with fixed-flowrate operations, e.g. cooler tower make-up, etc. (see discussion in Hallale (2002), Manan et al. (2004) and Foo et al. (2006a)); as well as other types of RCNs such as hydrogen and property networks.

Concurrently, recent trend in RCN synthesis has seen the growing emphasis on the fixed-flowrate problems (Foo 2009), where limited work on process changes have been reported. Hallale (2002) first reported the strategies for fresh resource reduction by manipulating the flowrate and quality of sinks and sources in the *higher quality region* of an RCN. Later works on process changes, e.g. Manan et al. (2004), Foo et al. (2006b) and Bandyopadhyay (2006) are mainly based on the same principles proposed by Hallale (2002). Note however, that these principles are not illustrated using the well-established plus-minus principles. Besides, waste reduction without the reduction of fresh resources was not reported. Hence, these are the subjects of this study. On the other hand, it is also worth mentioning that among the various mathematical optimisation techniques, the model developed by El-Halwagi et al. (1996) for the synthesis of waste interception and allocation networks does consider the options for process changes (though not demonstrated in the paper).

In the following section, the plus-minus principles for the reduction of fresh resource and/or waste discharge for an RCN is illustrated. To elucidate the proposed approach, several literature case studies are used for illustration.

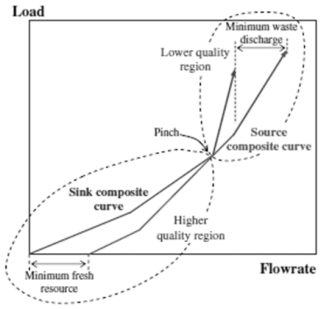

Fig. 1 Higher and lower quality regions

in the higher quality region will automatically lead to reduced waste discharge from the lower quality region. Hence, in order to reduce both fresh resource and waste discharge for an RCN, the following strategies shall be implemented in the higher quality region:

1. Decrease/eliminate the flowrate requirement of process sink(s)
2. Reduce the quality requirement of process sink(s)
3. Improve the quality level(s) of process source(s), with/without increasing the flowrate of process source(s).

On the other hand, if the intention was only to reduce waste discharge in the lower quality region alone (e.g. for cases where fresh resource has been reduced extensively), the following strategies are to be adopted:

4. Increase the flowrate(s) of process sink(s) in the lower quality region, decreasing the quality level(s) of process sink(s).

- Begin discussing the research problem itself
- Discuss key concepts and methods
- Add a historical account of recent research literature (i.e., within past 5 years).

The Introduction (continued)

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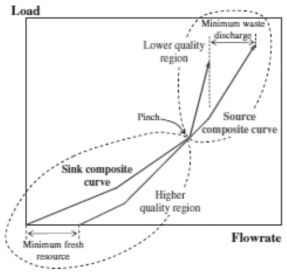
In the following section, the plus-minus principles for the reduction of fresh resource and/or waste discharge for an RCN is illustrated. To elucidate the proposed approach, several literature case studies are used for illustration.

The plus-minus principle for RCN

Figure 1 shows an *material recovery pinch diagram* (MRPD) that is commonly used for flowrate targeting in an RCN (El-Halwagi et al. 2003, 2006; Prakash and Shenoy 2005). As shown, the pinch point divides the RCN into higher and lower quality regions. Fresh resource is used in the higher quality region; while waste is discharged in the lower quality region.

In principle, any attempt to maximise the use of process sources in the process sinks will lead to the reduction of fresh resource and/or waste discharge for the RCN. Note also that any attempt to reduce fresh resource consumption



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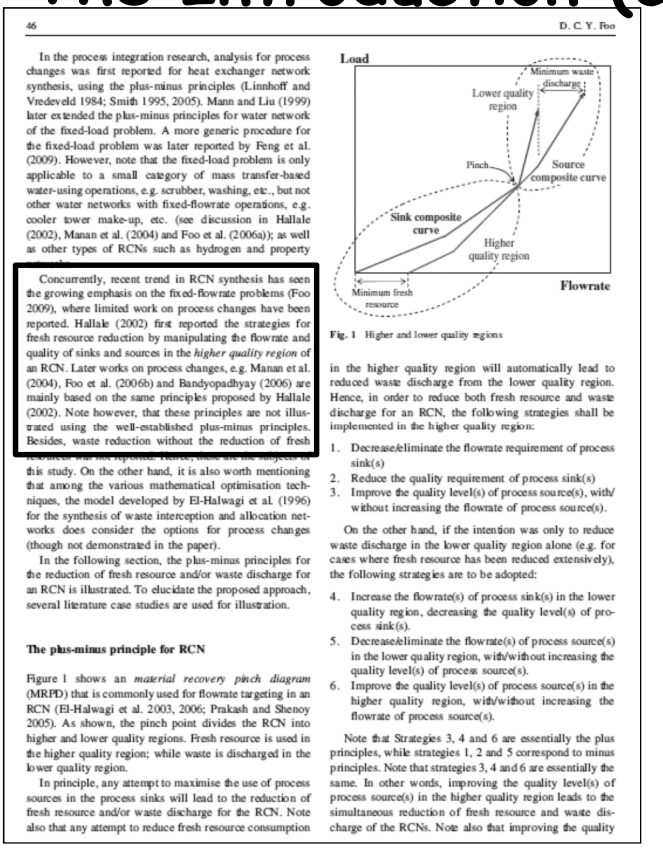
5. Decrease/eliminate the flowrate(s) of process source(s) in the lower quality region, with/without increasing the quality level(s) of process source(s).
6. Improve the quality level(s) of process source(s) in the higher quality region, with/without increasing the flowrate of process source(s).

Note that Strategies 3, 4 and 6 are essentially the plus principles, while strategies 1, 2 and 5 correspond to minus principles. Note that strategies 3, 4 and 6 are essentially the same. In other words, improving the quality level(s) of process source(s) in the higher quality region leads to the simultaneous reduction of fresh resource and waste discharge of the RCNs. Note also that improving the quality

- **End the introduction by explicitly declaring the novelty of your work.**
- Use qualifiers and disclaimers as appropriate.
- It also helps to give an outline of how the rest of the paper is organized.
- Don't neglect the introduction. **A lot of papers get rejected due to poor starts.**

The Introduction (continued)



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In the following section, the plus-minus principles for the reduction of fresh resource and/or waste discharge for an RCN is illustrated. To elucidate the proposed approach, several literature case studies are used for illustration.

The plus-minus principle for RCN

Figure 1 shows an *material recovery pinch diagram* (MRPD) that is commonly used for flowrate targeting in an RCN (El-Halwagi et al. 2003, 2006; Prakash and Shenoy 2005). As shown, the pinch point divides the RCN into higher and lower quality regions. Fresh resource is used in the higher quality region; while waste is discharged in the lower quality region.

In principle, any attempt to maximise the use of process sources in the process sinks will lead to the reduction of fresh resource and/or waste discharge for the RCN. Note also that any attempt to reduce fresh resource consumption

Fig. 1 Higher and lower quality regions

in the higher quality region will automatically lead to reduced waste discharge from the lower quality region. Hence, in order to reduce both fresh resource and waste discharge for an RCN, the following strategies shall be implemented in the higher quality region:

1. Decrease/eliminate the flowrate requirement of process sink(s)
2. Reduce the quality requirement of process sink(s)
3. Improve the quality level(s) of process source(s), with/without increasing the flowrate of process source(s).

On the other hand, if the intention was only to reduce waste discharge in the lower quality region alone (e.g. for cases where fresh resource has been reduced extensively), the following strategies are to be adopted:

4. Increase the flowrate(s) of process sink(s) in the lower quality region, decreasing the quality level(s) of process sink(s).
5. Decrease/eliminate the flowrate(s) of process source(s) in the lower quality region, with/without increasing the quality level(s) of process source(s).
6. Improve the quality level(s) of process source(s) in the higher quality region, with/without increasing the flowrate of process source(s).

Note that Strategies 3, 4 and 6 are essentially the plus principles, while strategies 1, 2 and 5 correspond to minus principles. Note that strategies 3, 4 and 6 are essentially the same. In other words, improving the quality level(s) of process source(s) in the higher quality region leads to the simultaneous reduction of fresh resource and waste discharge of the RCNs. Note also that improving the quality

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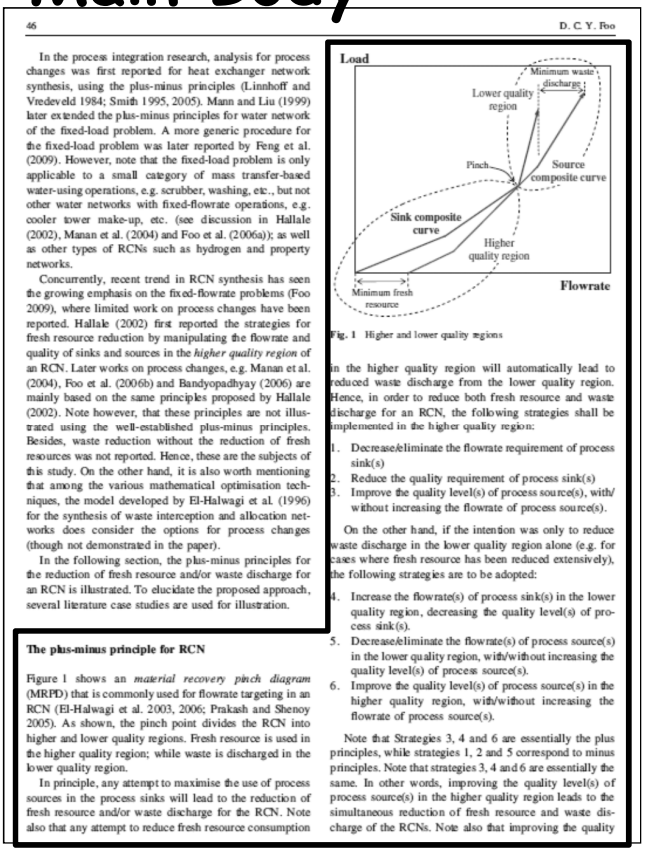
Main Body



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Load
Minimum waste discharge
Lower quality region
Pinch
Source composite curve
Sink composite curve
Higher quality region
Minimum fresh resource
Flowrate

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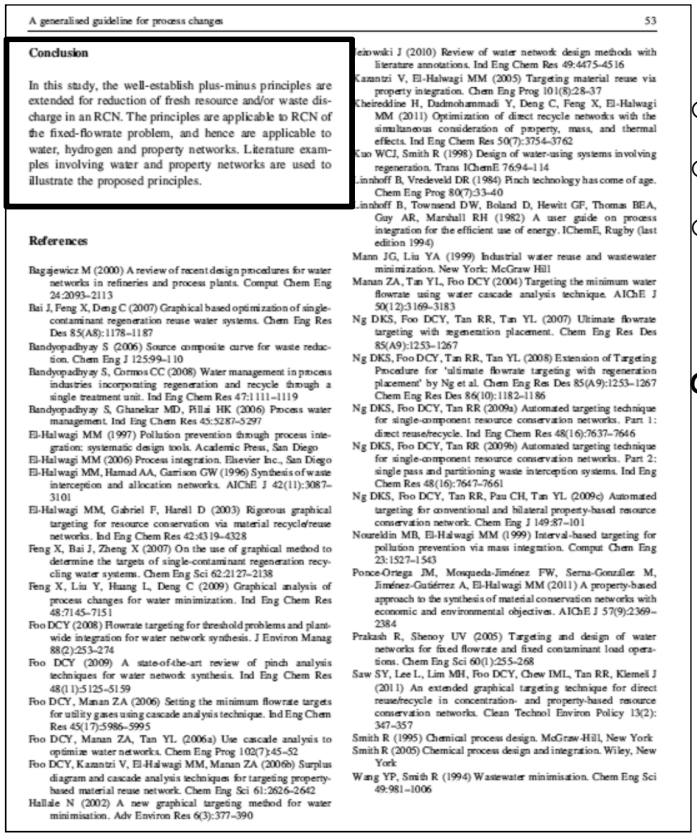
Conclusions



A generalised guideline for process changes 53

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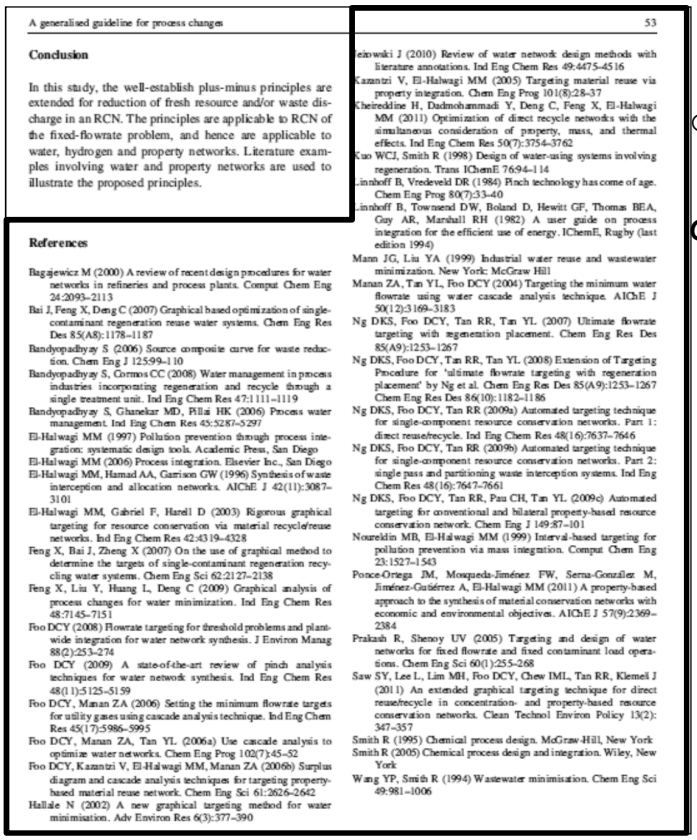

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ORIGINAL PAPER

A generalised guideline for process changes for resource conservation networks

Dominic Chwan Yee Foo

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Keywords Process integration · Pinch analysis · Targeting · Resource conservation · Water minimisation

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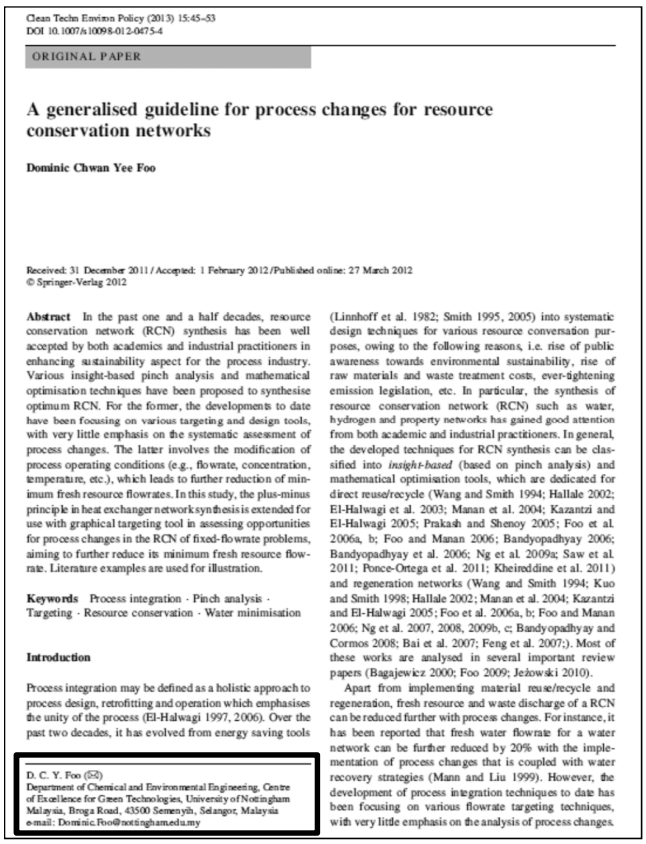

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Introduction

Process integration may be defined as a holistic approach to process design, retrofitting and operation which emphasises the unity of the process (El-Halwagi 1997, 2006). Over the past two decades, it has evolved from energy saving tools (Linnhoff et al. 1982; Smith 1995, 2005) into systematic design techniques for various resource conversation purposes, owing to the following reasons, i.e. rise of public awareness towards environmental sustainability, rise of raw materials and waste treatment costs, ever-tightening emission legislation, etc. In particular, the synthesis of resource conservation network (RCN) such as water, hydrogen and property networks has gained good attention from both academic and industrial practitioners. In general, the developed techniques for RCN synthesis can be classified into *insight-based* (based on pinch analysis) and mathematical optimisation tools, which are dedicated for direct reuse/recycle (Wang and Smith 1994; Hallale 2002; El-Halwagi et al. 2003; Manan et al. 2004; Kazantzi and El-Halwagi 2005; Prakash and Shenoy 2005; Foo et al. 2006a, b; Foo and Manan 2006; Bandyopadhyay 2006; Bandyopadhyay et al. 2006; Ng et al. 2009a; Saw et al. 2011; Ponce-Ortega et al. 2011; Kheireddine et al. 2011) and regeneration networks (Wang and Smith 1994; Kuo and Smith 1998; Hallale 2002; Manan et al. 2004; Kazantzi and El-Halwagi 2005; Foo et al. 2006a, b; Foo and Manan 2006; Ng et al. 2007, 2008, 2009b, c; Bandyopadhyay and Cormos 2008; Bai et al. 2007; Feng et al. 2007;). Most of these works are analysed in several important review papers (Bagajewicz 2000; Foo 2009; Jeżowski 2010).

Apart from implementing material reuse/recycle and regeneration, fresh resource and waste discharge of a RCN can be reduced further with process changes. For instance, it has been reported that fresh water flowrate for a water network can be further reduced by 20% with the implementation of process changes that is coupled with water recovery strategies (Mann and Liu 1999). However, the development of process integration techniques to date has been focusing on various flowrate targeting techniques, with very little emphasis on the analysis of process changes.

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- A permanent email address is desired.
- Should include other co-authors (e.g. collaborators, students) if possible.

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Synthesis of distributed wastewater treatment networks for one- and two-contaminant systems

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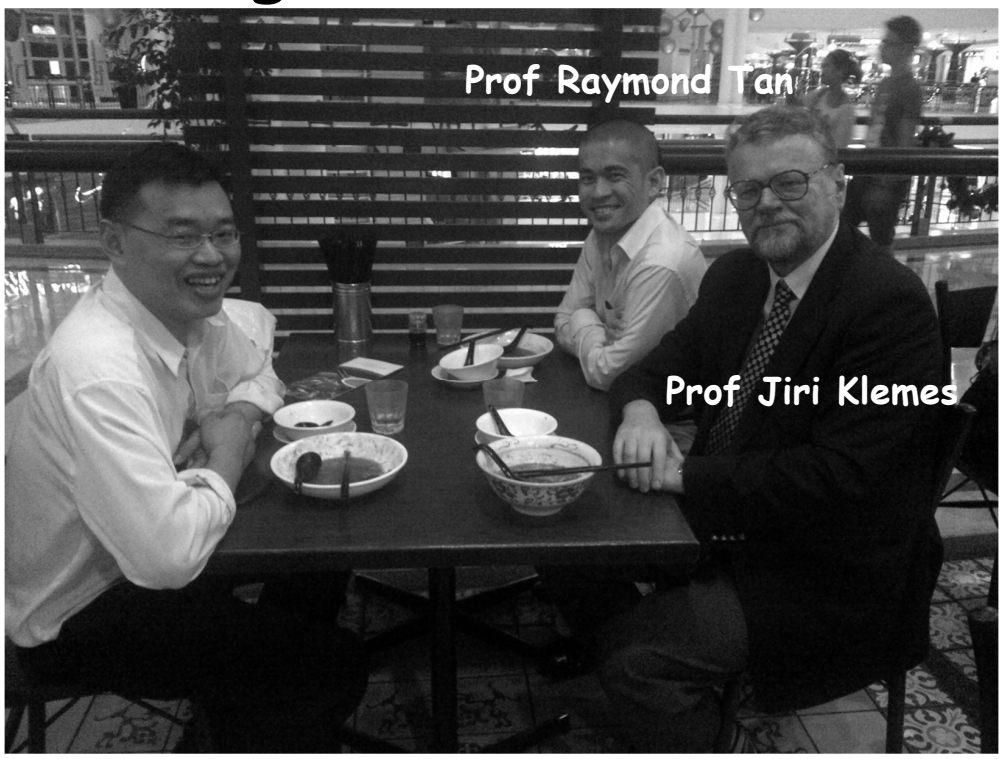
Concluding Thoughts

1. At Ph.D. level, **novelty** (not degree of difficulty) is the universal standard.
2. Potential for success of your paper begins during the conceptualization stage of your research
3. The writing of the article is not a detached activity, but reflects the ideas underlying your research.
4. The publication requirement poses a stiff challenge… but countless Ph.D. students have done it before. **You can do it too!**

Acknowledgments



Thank You
Questions and Comments are Welcome

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