SCI논문쓰기

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SCI(E) 저널이란?

- ISI Web of Knowledge에서 선정한 Science Citation Index (Expanded) database에 오른 학술논문집들
- 기준: (1) Basic Publishing Standards, (2) Editorial Contents, (3) International Diversity, (4) Citation Analysis

SCI(E) 논문기획

- Choose the scope of work
- Significance and Research Needs
- Original ideas and good questions (hypotheses)
- Design an appropriate experimental framework with acceptable methods
- Get the good data!
- Analyze the data and explain whether your data tell about the questions or hypotheses (Figures and Tables).
- Choose your target SCI(E) journal
- Just DO WRITE!

Choosing the scope of work

- 인문 및 예술, 사회과학, 경영학, 정보학, 수학, 생물학, 물리학, 화학, 지구과학, 각종 응용분야 (의학, 약학, 공학, 임농학 etc.)

- 해당하는 학회나 해당 분야 주요 연구자들을 연구범위를 고려하는 것이 필요함. (Think about who will be your potential readers and/or job/funding providers)

Significance and Needs

- 연구범위가 해당 분야에서 중요하고 미래성이 있다고 생각하는가?
- 일반대중에게 그리고 과학전반적으로 중요하다고 이야기 할 수 있나?
- 그럼에도 불구하고 (1) 무엇이 부족한가, (2) 무엇이 문제인가?
- 상기 질문에 대한 답은 해당연구분야에 대한 현황 파악이 요구됨.

Key Questions/Hypothesis

- 논문심사자들에게 가장 중요한 요소 (연극에서 보면 주인공의 스토리에 해당함)
- 왜 이 질문이 우선해야 하는가?(unknowns, unsolved problems) - 우선 순위는 context issue 이기도 함.
- Hypothesis: 독립적인 실험으로 테스트 할 수 있어야 (방법상의 타당성 필요)

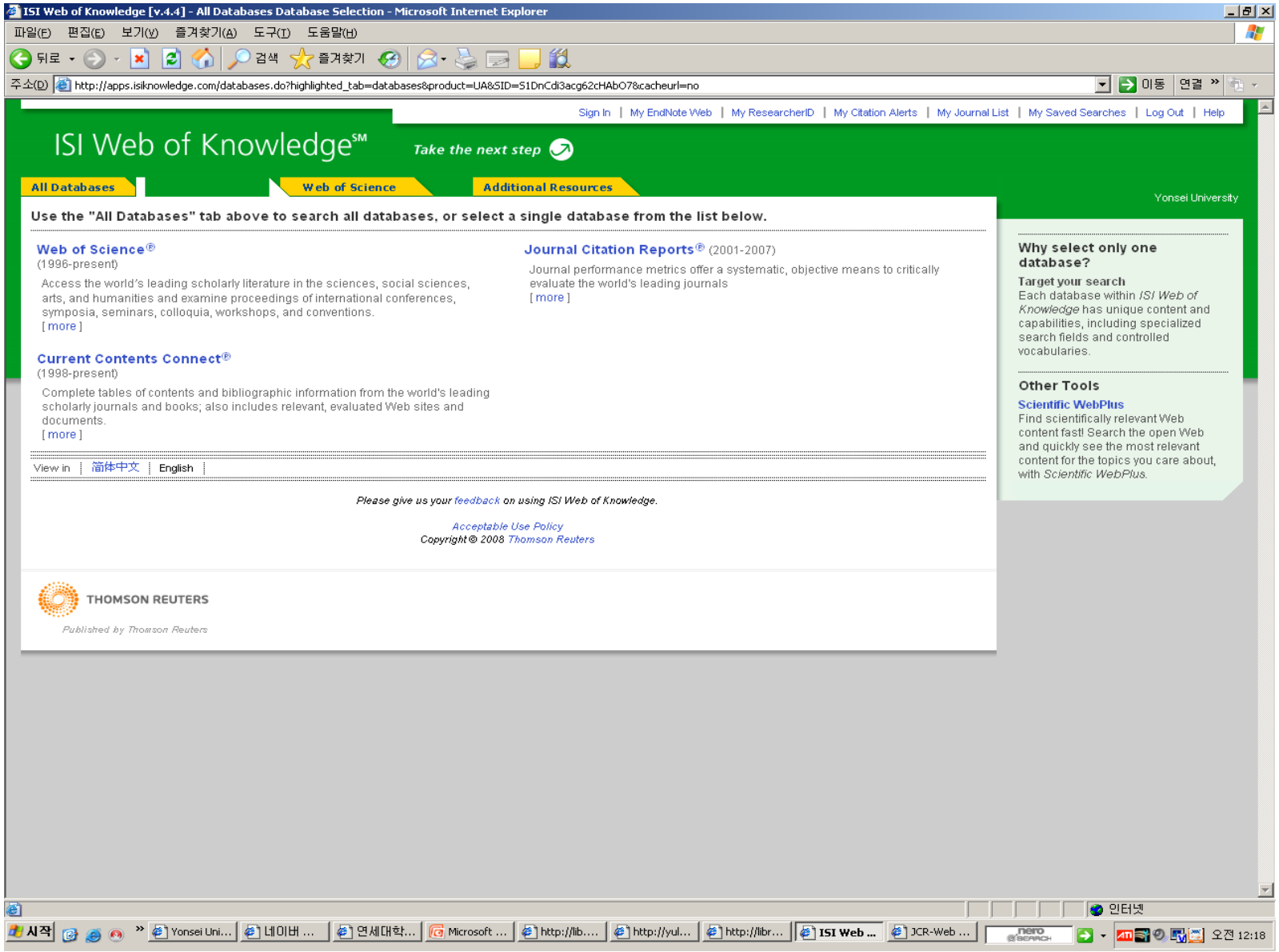
Experimental Design for "Good" Data

- "GOOD"의 정의: Hypothesis에 대한 답을 줄 수 있는 Data – YES or NO or Unknown
- 앞 단계에서 언급한 중요성, 연구필요성, Key Questions과 Hypothesis를 Well-delivery할 수 있는 실험기획이 필요함
- 철저한 문헌과 현황 파악에 입각. 하지만 독창적이 요소도 포함해야…

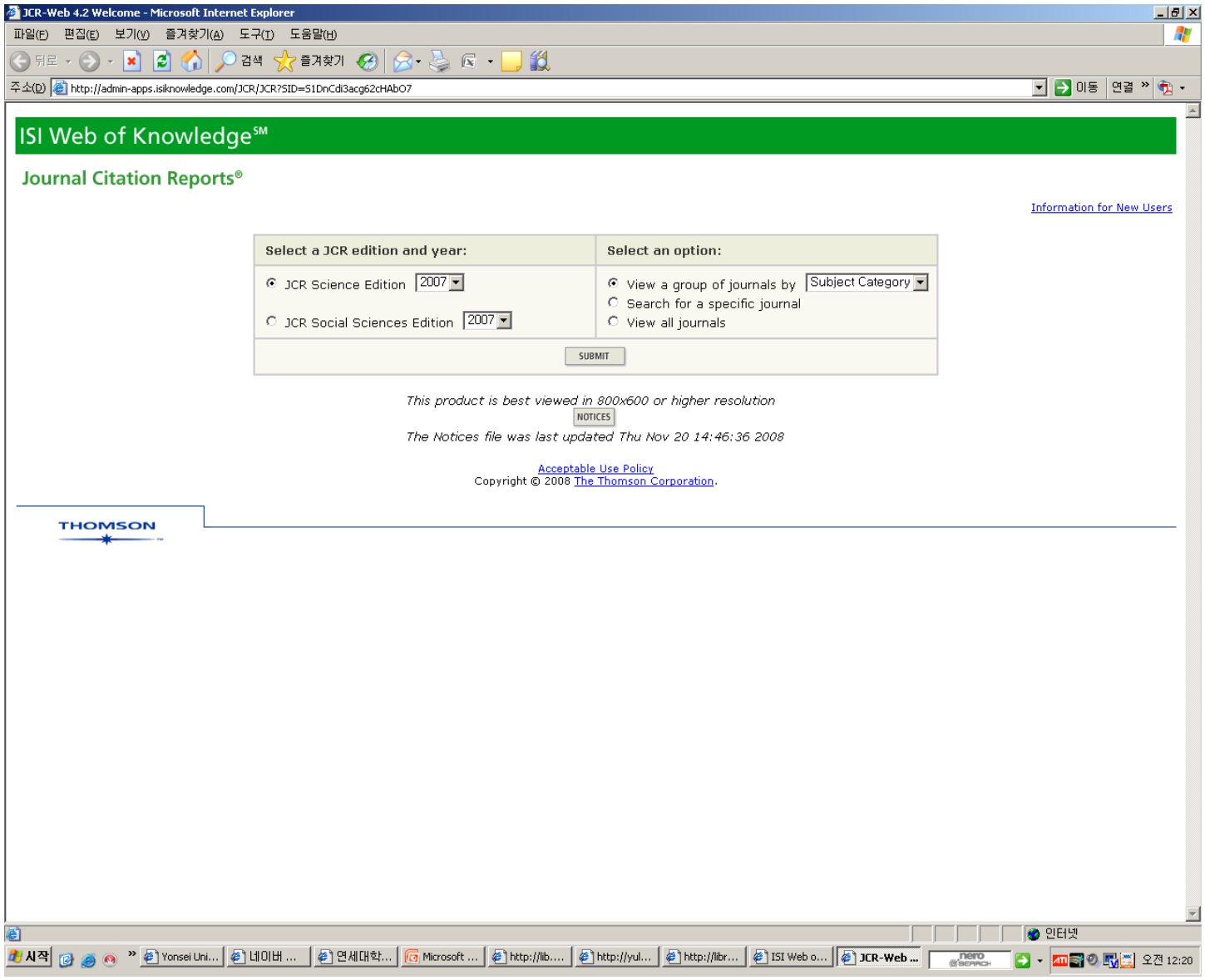
Data Analysis

- Hypothesis tested?
- What is the take-home message in this work? (1분만에 연구의 주요 findings를 정리하면?)
- 주요 finding들이 Figure와 Table로 나타나도록 창의적으로 표현 (Power Point presentation 작성 -FeedBack-수정 cycle 반복)
- Draft 작성은 Data Analysis의 최종 및 최상급 단계이다.

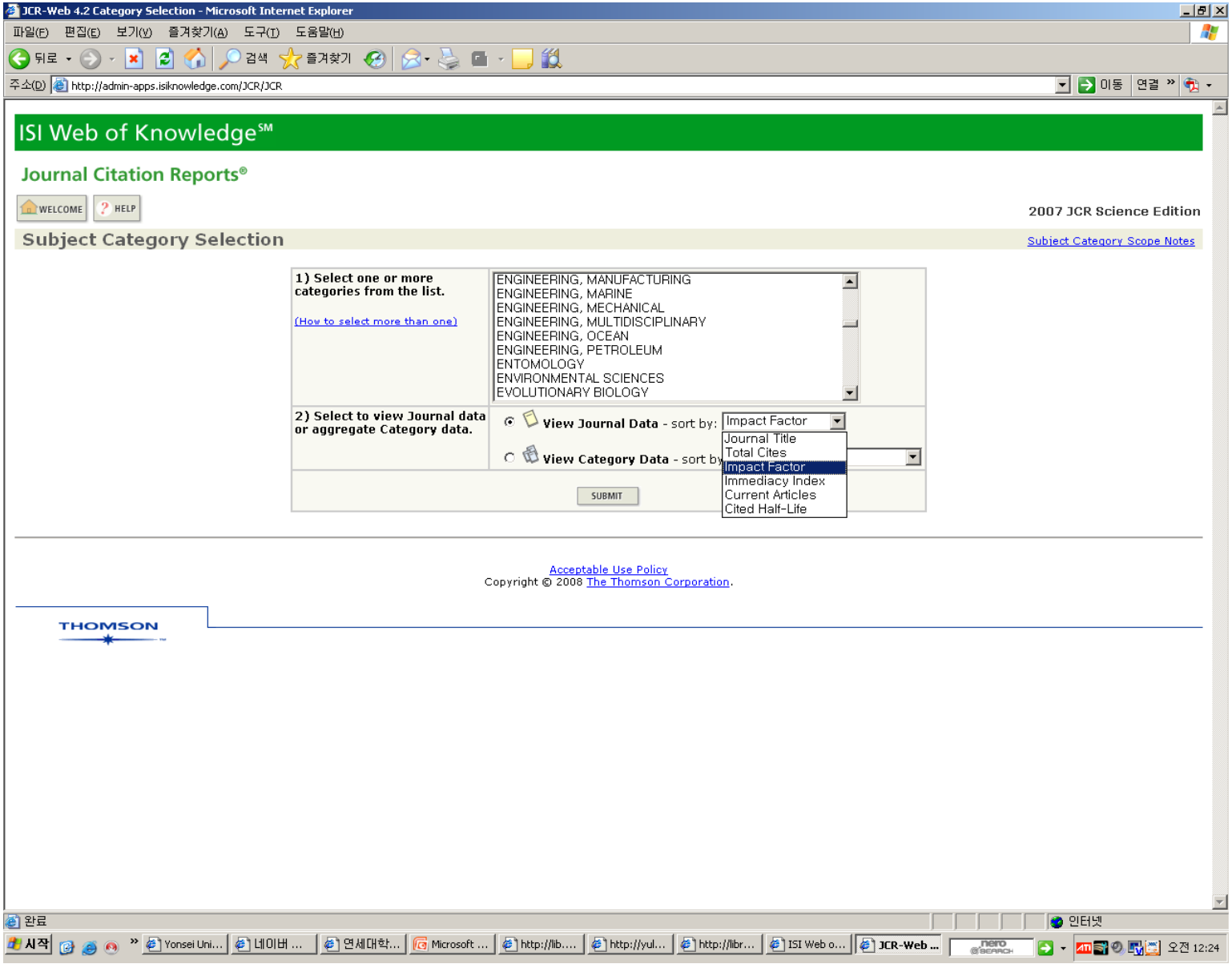
Choosing SCI(E)Journal



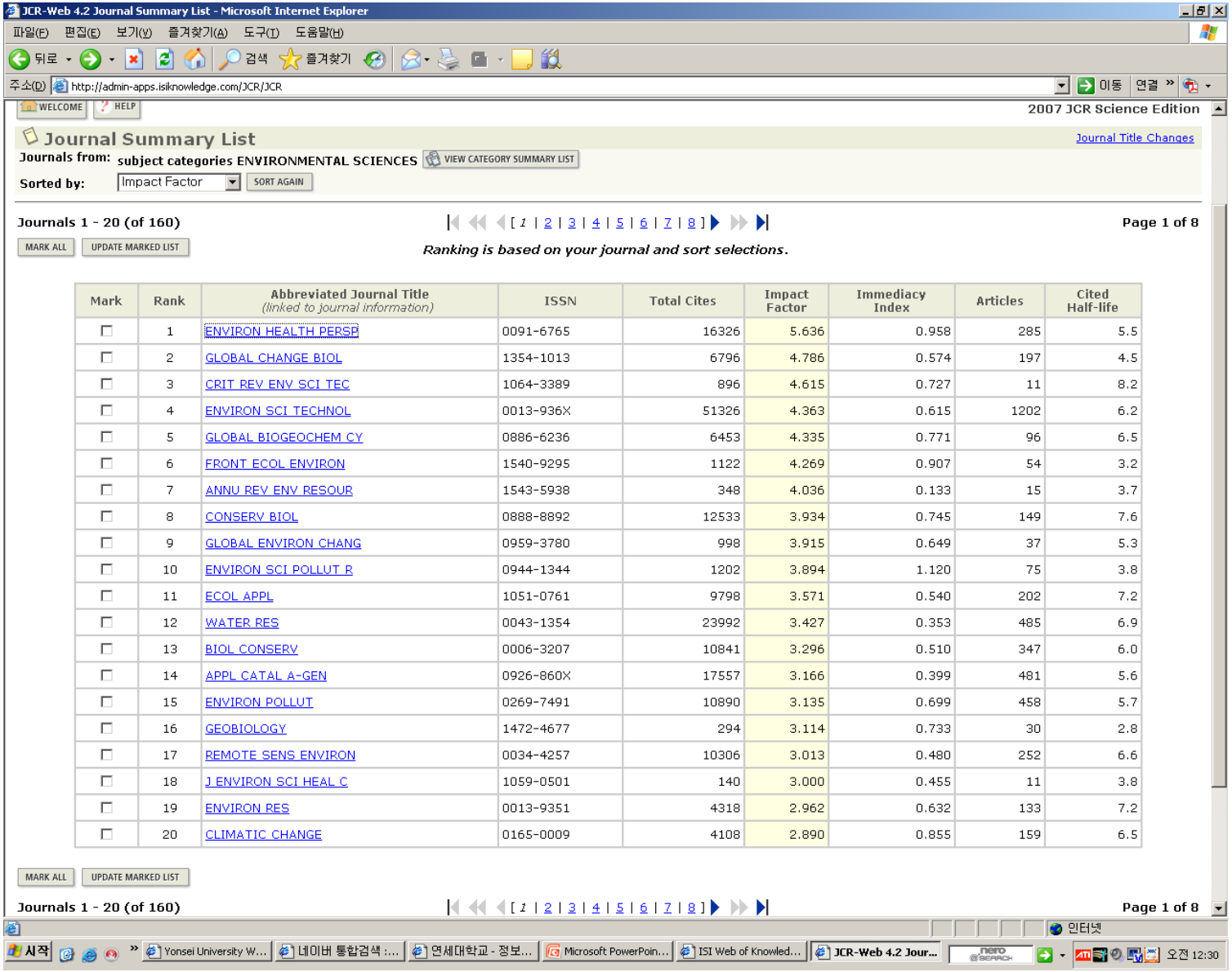
해당분야 SCI(E)저널 찾기



해당분야 SCI(E)저널 찾기



해당분야 SCI(E)저널 찾기



Mark	Rank	Abbreviated Journal Title (linked to journal information)	ISSN	Total Cites	Impact Factor	Immediacy Index	Articles	Cited Half-life
☐	1	ENVIRON HEALTH PERSP	0091-6765	16326	5.636	0.958	285	5.5
☐	2	GLOBAL CHANGE BIOL	1354-1013	6796	4.786	0.574	197	4.5
☐	3	CRIT REV ENV SCI TEC	1064-3389	896	4.615	0.727	11	8.2
☐	4	ENVIRON SCI TECHNOL	0013-936X	51326	4.363	0.615	1202	6.2
☐	5	GLOBAL BIOGEOCHEM CY	0886-6236	6453	4.335	0.771	96	6.5
☐	6	FRONT ECOL ENVIRON	1540-9295	1122	4.269	0.907	54	3.2
☐	7	ANNU REV ENV RESOUR	1543-5938	348	4.036	0.133	15	3.7
☐	8	CONSERV BIOL	0888-8892	12533	3.934	0.745	149	7.6
☐	9	GLOBAL ENVIRON CHANG	0959-3780	998	3.915	0.649	37	5.3
☐	10	ENVIRON SCI POLLUT R	0944-1344	1202	3.894	1.120	75	3.8
☐	11	ECOL APPL	1051-0761	9798	3.571	0.540	202	7.2
☐	12	WATER RES	0043-1354	23992	3.427	0.353	485	6.9
☐	13	BIOL CONSERV	0006-3207	10841	3.296	0.510	347	6.0
☐	14	APPL CATAL A-GEN	0926-860X	17557	3.166	0.399	481	5.6
☐	15	ENVIRON POLLUT	0269-7491	10890	3.135	0.699	458	5.7
☐	16	GEOBIOLOGY	1472-4677	294	3.114	0.733	30	2.8
☐	17	REMOTE SENS ENVIRON	0034-4257	10306	3.013	0.480	252	6.6
☐	18	J ENVIRON SCI HEAL C	1059-0501	140	3.000	0.455	11	3.8
☐	19	ENVIRON RES	0013-9351	4318	2.962	0.632	133	7.2
☐	20	CLIMATIC CHANGE	0165-0009	4108	2.890	0.855	159	6.5

SCI(E) 저널 선정시 고려사항

- Scope of researches and readers
- Higher Impact Factor
- First turn-around time (duration of the first review process)
- Duration for publication after acceptance decision
- Cost of publications
- Availability to public

SCI(E)논문제출, 심사 및 출판과정

- 제출: (1) guideline for authors를 잘 따라야; (2) 대부분 on-line submission; (3) Editor/Reviewer를 추천 (적은 피하고 친구는 선택하고); (4) Cover Letter

- 3-6 명의 심사위원들이 선정되어서 평가
  - "rejection"
  - "re-review after major revisions"
  - "re-review after minor revisions"
  - "acceptance"

- Acceptance 편지를 받은 후에 (FUN PART!)
  - Copyright Transfer Agreement
  - Off-Prints Purchasing
  - Proof-Reading
  - PubMed (NCBI) registration

SCI(E)논문게재 TIPS

- Journal, editor, reviewer의 선정이 중요
- 환경분야의 다양성과 다학제적 성향을 잘 이용하라.
- Reviewer의 비판에 담담하게 그러나 철저하게 대응하라.
- Rejection결정이 되면 다시 수정해서 제출한다. 심사위원도 사람이다. 두 번째에는 마음이 약하다 (시간도 없다)
- 국제학회에 참석하고 학술활동을 활발히 해서 인적 네트워크를 형성하라

논문기획 중점사항

- 해당 분야의 연구현황 파악 능력
  (문헌조사, 학술현황, 전문가 연구동향…)
- 기존 연구에 대한 날카로운 비판력
- 핵심 질문/문제점과 기발한 leading hypothesis 도출
  (방법상의 현실성 고려 포함은 당연!)
- 신속한 실험추진과 보안
- 실험결과 분석 후 feedback 및 추가실험 고려한 실험 연구 시간분배 (think accurately and move fast)

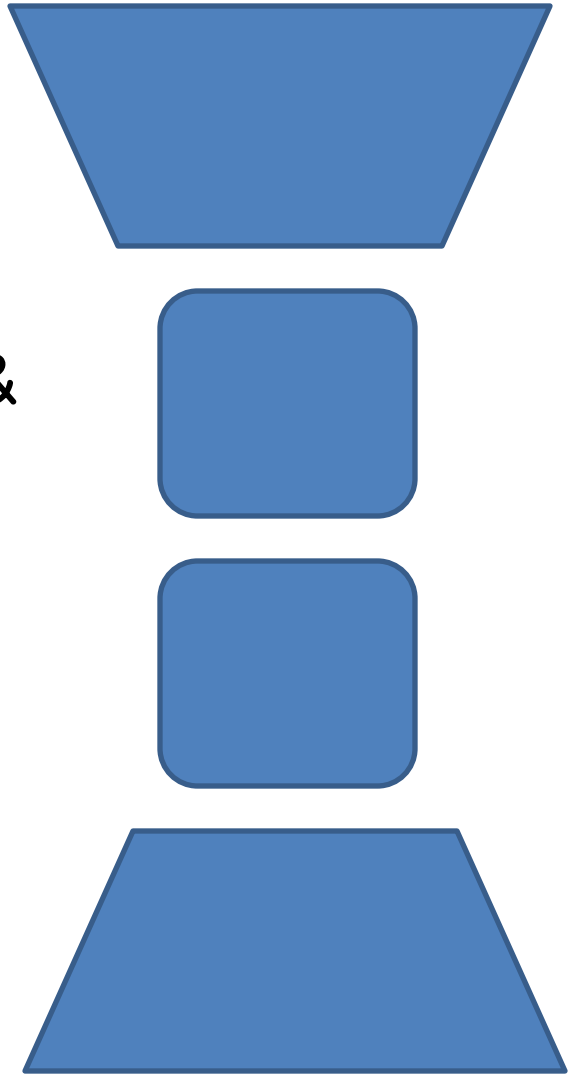
Typical Manuscript Contents

- 표지 (title, 저자 정보, 교신저자 정보, 경우에 따라 running title)
- ABSTRACT (글자수 제한 있는 경우도 있음)
- Introduction (저널의 Scope와 잘 매치되어야)
- Materials and Methods
- Results/Discussion (같이 혹은 따로)
- Conclusions (과학저널에는 없는 경우가 많음)
- Acknowledgement (사사)
- References
- Figure Captions
- Tables
- Original Figures

Draft Outline

- Power Point 자료를 수정해 가면서 Outline 작성 후 초안 (Draft) 작성 – 앞서 언급됨
- **Introduction:** 중요성, 필요성, **Key-Q/H, 연구목표,** 접근방식의 특이성
- **Materials and Methods: 연구목표 별** 실험 방법 정리
- **Results:** 연구목표별로 **Figures and Tables 배치; Discussion을 위한 '전주곡'**
- Discussions: 주요 finding 별로 의미있는 정보 제공을 위한 토의 및 제안 사항들
- Abstract: **TAKE-HOME-MESSAGE 제시**

Overall shape of a research paper



Introduction

General
to
Specific

Methods &
Materials

Results

Discussion

Specific
To
General

Frequencies of Selected Features in IMRD

	Introduction	Methods	Results	Discussion
Present Tense	High	Low	Low	High
Past Tense	Mid	High	High	Mid
Passive Voice	Low	High	Variable	Variable
Citations	High	Low	Variable	High
Qualifications	Mid	Low	Mid	High
Commentary	High	Low	Variable	HIgh

Introduction

- 연구분야의 범위 및 중요성
- Example: “TCE is a widespread contaminant in groundwater in the world (WHO, 2006). The pollutant compound can be co-oxidized by a variety of groundwater and soil microorganisms under aerobic conditions…. One of its biodegradation intermediate, vinyl chloride, is a known carcinogen to human.
- Tip: 여기서 연구분야의 주요연구자들의 논문을 인용하셔요.

Introduction

- 해당연구분야에서 연구필요성 및 G/H제시
- Example: “Many TCE-cooxidizing aerobic bacteria are known. However, little is known about ……although such information is important in ……..According to thermodynamics, it is possible for -----to occur------(ref). Because of ……, we had speculated that------(이것이 hypothesis 임). This has yet to be experimentally determined under field conditions.

Introduction

- 연구목적 설정, 접근방법의 특이성
- Example: “In this work, we examined…….and validated ----- For these examination and validation, we used new Titanium pyrosequencing technique. Although standard pyrosequencing has been proved for environmental applications, applicability of the novel Titanium technique has yet to be validated for environmental study purposes.”

Materials and Methods

- Function for hypothesis-testing papers: tells the reader what experiments you did to answer the question posed in the Introduction.

- Function for descriptive papers: tells what experiments you did to obtain the message stated in the Introduction.

- Function for methodology papers: tells describes the new methods and tells what experiments you did to test the new method.

Materials

Chemicals

- drugs/chemicals
- culture media
- buffers
- gases etc.

What was examined

- experimental materials
- experimental organisms or organs
- field characteristics of interest of this work

Methods

Essential information

- What you did (including Study Design)
- In what order
- How you did it
- Why you did it

Other information (as needed)

- Preparation
- Assumptions
- Definitions of indicators.

Materials and Methods

Example: Johnson et al., 2006, Biodegradation

- Study Design
- Bacterial strains and growth conditions
- Toluene degradation kinetics
- Deactivation rate measurements
- Toluene culturability assays
- Chemical analysis methods
- Data analysis methods

Results

- 실험결과를 이슈별로 나누어서 하나의 그림이나 표로 제시 (반복적 PPT 자료 수정)

- 특정연구 목적 별과 연계하는 문장으로 시작

Ex. In the A condition, B was examined using method C (Fig. 1).

- Figure나 Table을 이해하는데 필요한 설명 (가급적 Figure 나 Table이 자체설명할 수 있도록 작성)

- Figure나 Table의 Data의 주요 경향을 명확하게 기술 (통계적 유의성, 논리적인지 검토)하고 이의 의미 간략히 제시

Ex. According to the results, A is significantly different from B. This indicates that our result is opposite compared to the previous other studies (refs). [이 부분은 다소 Discussion 과 중복되므로 주의]

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EXAMPLE1:
Characterization of Dechlorination

Following a lag period of a week, PCE was dechlorinated to lesser chlorinated ethenes in all microcosms tested (Figure 1). PCE was dechlorinated to TCE in TM and PCE was dechlorinated up to *cis*-DCE in BM. However, even after 90 days of incubation, further dechlorination did not occur. These indicate that the microcosms with the bottom sediments exhibited further dechlorination than the microcosms with the top sediments, although neither microcosm achieved complete dechlorination.

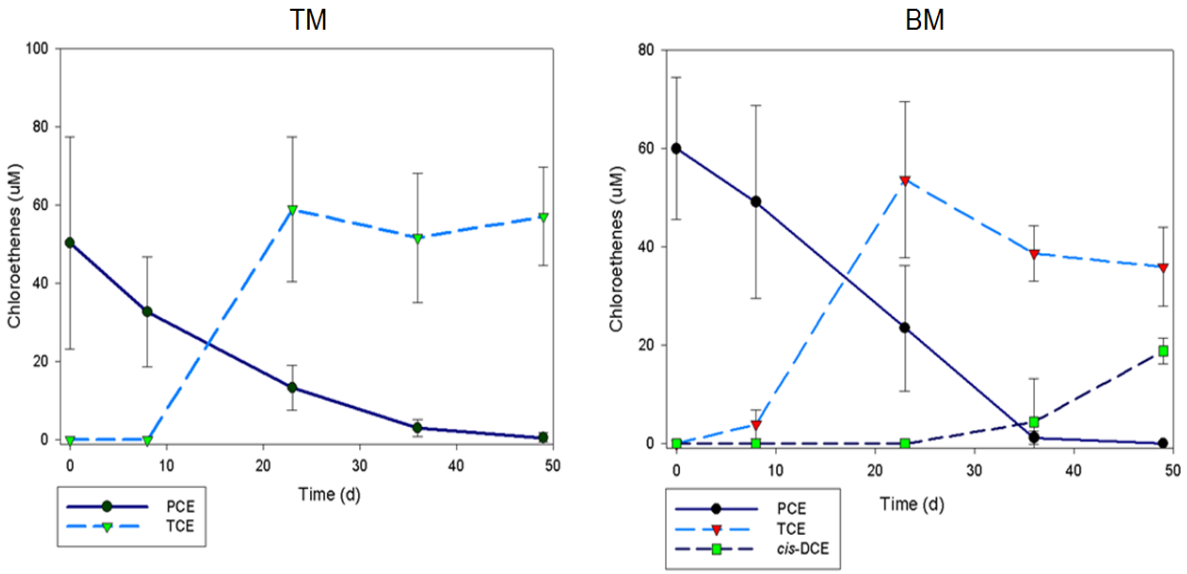

Figure 1. Reductive dechlorination of PCE (●) to TCE (▼) or *cis*-DCE (■) in the microcosms for top (TM) or bottom (BM) tidal flat sediments. The Y-axis error bar indicates a standard error from at least two independent microcosm experiments.

EXAMPLE 2:
Quantification of Desulfuromonas spp. in Dechlorinating Communities

To examine the effect of dechlorination on total bacterial growth, quantification of bacterial 16S rRNA genes was performed for the microbial communities before and after incubation samples. According to our qPCR results, total bacterial 16S rRNA gene copies in the initial top and bottom sediments ranged $3.10 - 5.55 \times 10^{11}$ and $3.22 - 3.25 \times 10^{11}$ gene copies per gram of soil, respectively (Figure 4). After 50 days of incubation, the 16S rRNA gene copies of total bacteria per gram of soil decreased to $2.47 - 2.49 \times 10^{11}$ for TM and $1.61 - 1.67 \times 10^{11}$ for BM. The reduction of 16S rRNA gene copies indicates that inhibition of bacterial growth resulted from exposure to PCE and/or its degradation intermediates (ref, + prof.Park's AEM paper).

Titanium pyrosequencing results showed that *Desulfuromonas* populations were identified as the predominant group grown in the dechlorinating communities (Table 2). To confirm this observation, we conducted qPCR to quantify 16S rRNA genes of *Desulfuromonas*. The gene copy numbers of *Desulfuromonas* spp. greatly increased during the incubation period, i.e., approximately 200-fold increased for the top sediment microcosms and 70-fold for the bottom sediment microcosms (Figure 4). After 50 days of incubation, Desulfuromonas populations became the predominant ones, i.e., 55.75% and 70.09% of total 16S rRNA gene copies for TM and BM, respectively.

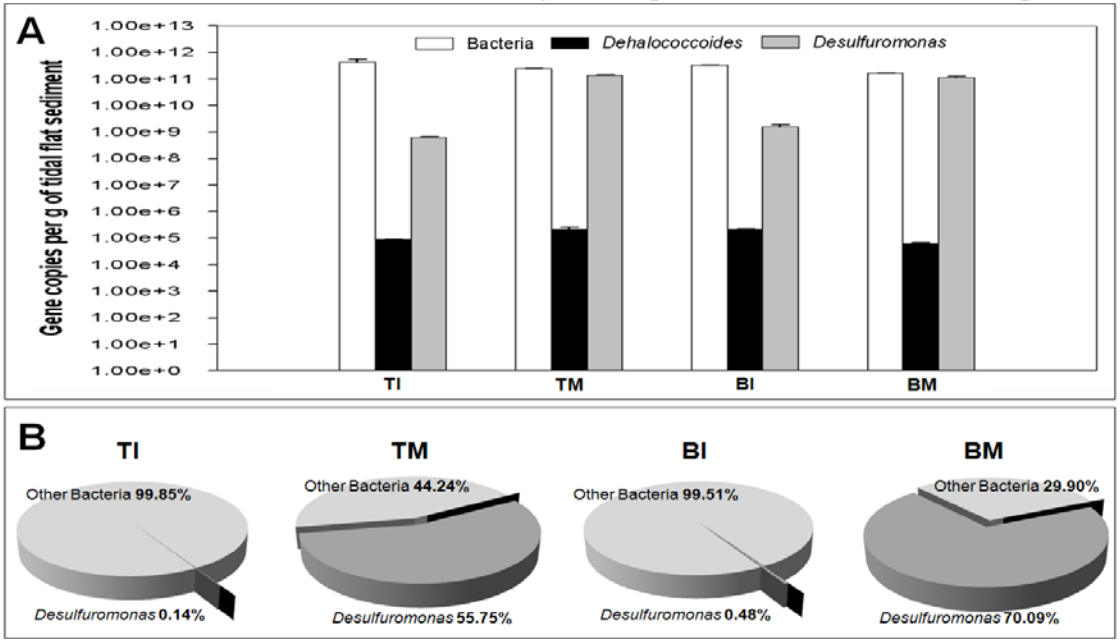

Figure 4. 16S rRNA-based qPCR results for total bacteria, *Desulfuromonas* and *Dehalococcoides* in the tidal mudflat sediments (TI, BI) and their dechlorinating microcosms (TM, BM)

Study Design

- For hypothesis-testing research in which all experiments are designed in advance, the overview of the experiments should be given.

- Often in a separate subsection of Methods, called “Study Design”.

Study Design

- Essential contents:

(1) Questions asked,
(2) Independent variables (Input; Stimuli)
(3) Dependent variables (Output; Response)
(4) All Controls (positive, negative etc.)

- Additional contents:

(1) Experimental matrix
(2) Order of explorations
(3) Sample selection/size/methods

Questions?