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TOWARDS INDUSTRY 4.0 By KNOWLEDGE MANAGEMENT

A Scientometric Framework: Application for Knowledge Management (KM) in Industry Between 2014 and 2019

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University Batna 2, Algeria

PLAN

Introduction

1- Knowledge management

2- Scientometry

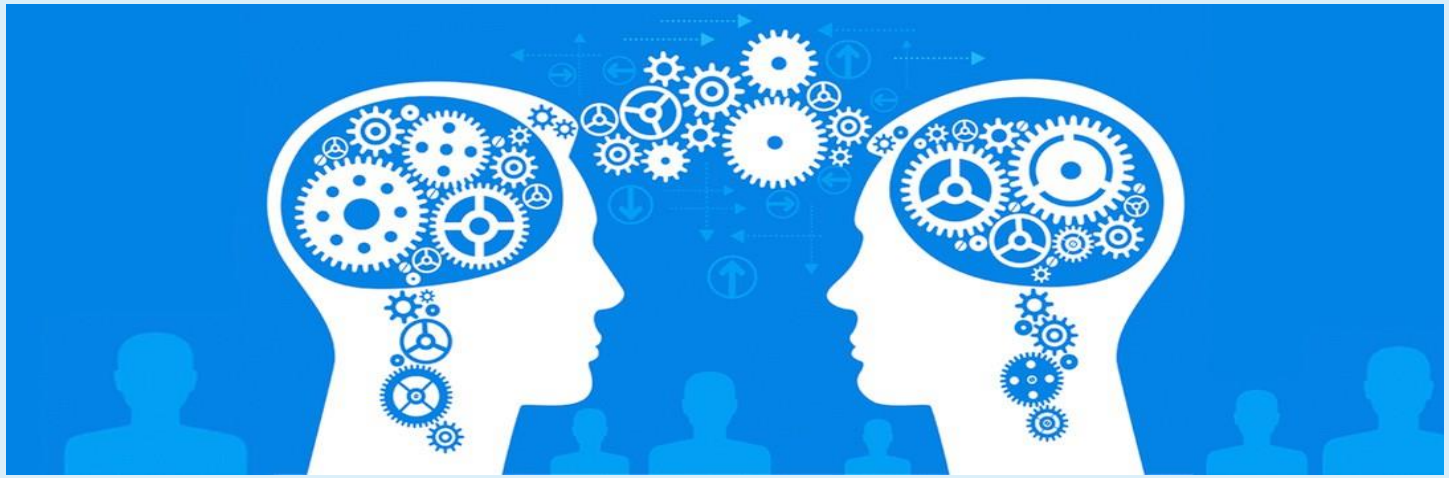
3- Application of scientometry on Knowledge Management (KM) in Industry Between 2014 and 2019

4- Application of scientometry on Knowledge Management (KM) in Industry 4.0

Conclusion

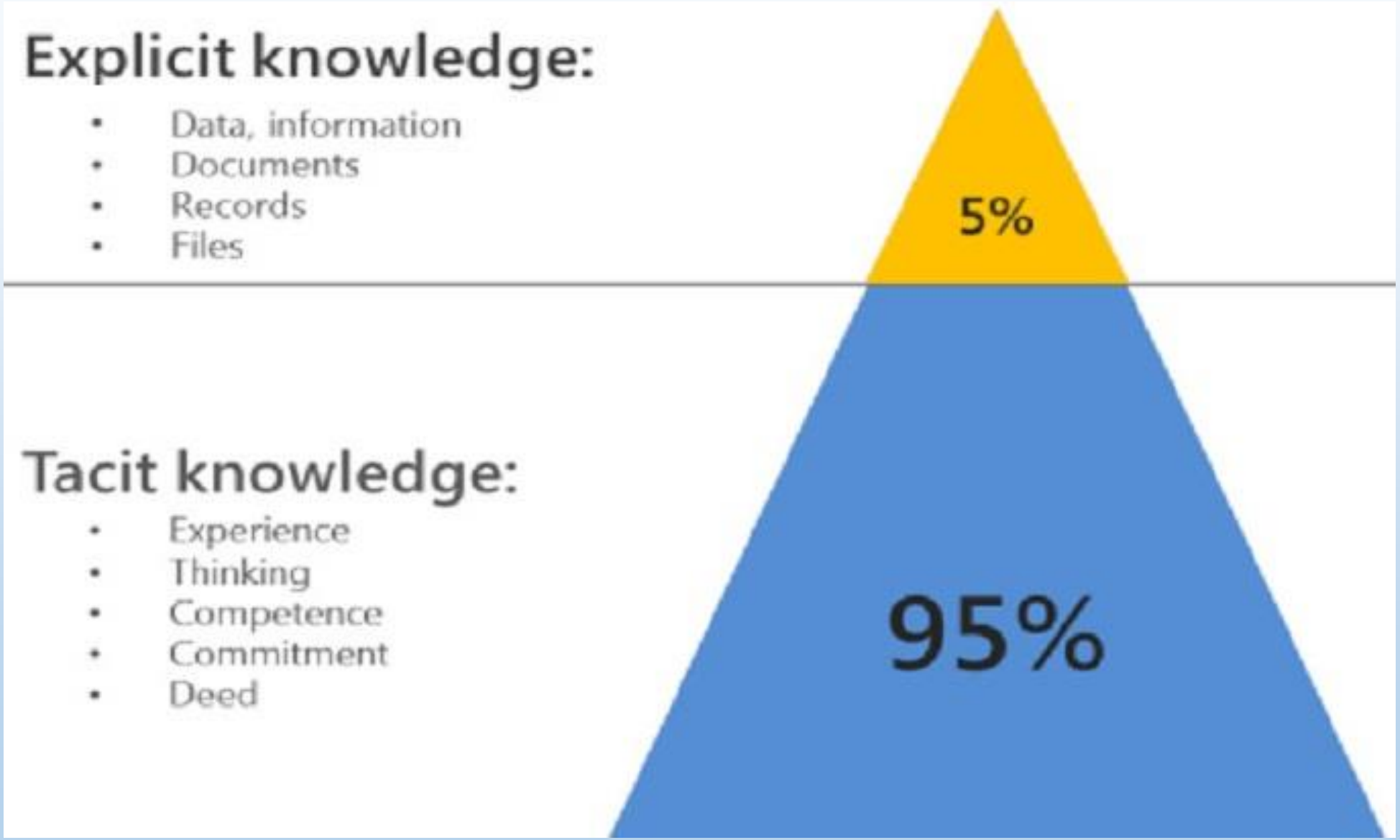
Introduction

Analyzes of scientific production are indeed essential references for determining research orientations. By offering tools for evaluating scientific research. Our objective is to analyze scientific knowledge management work in industry taken from the SCOPUS database, using scientometric indices.

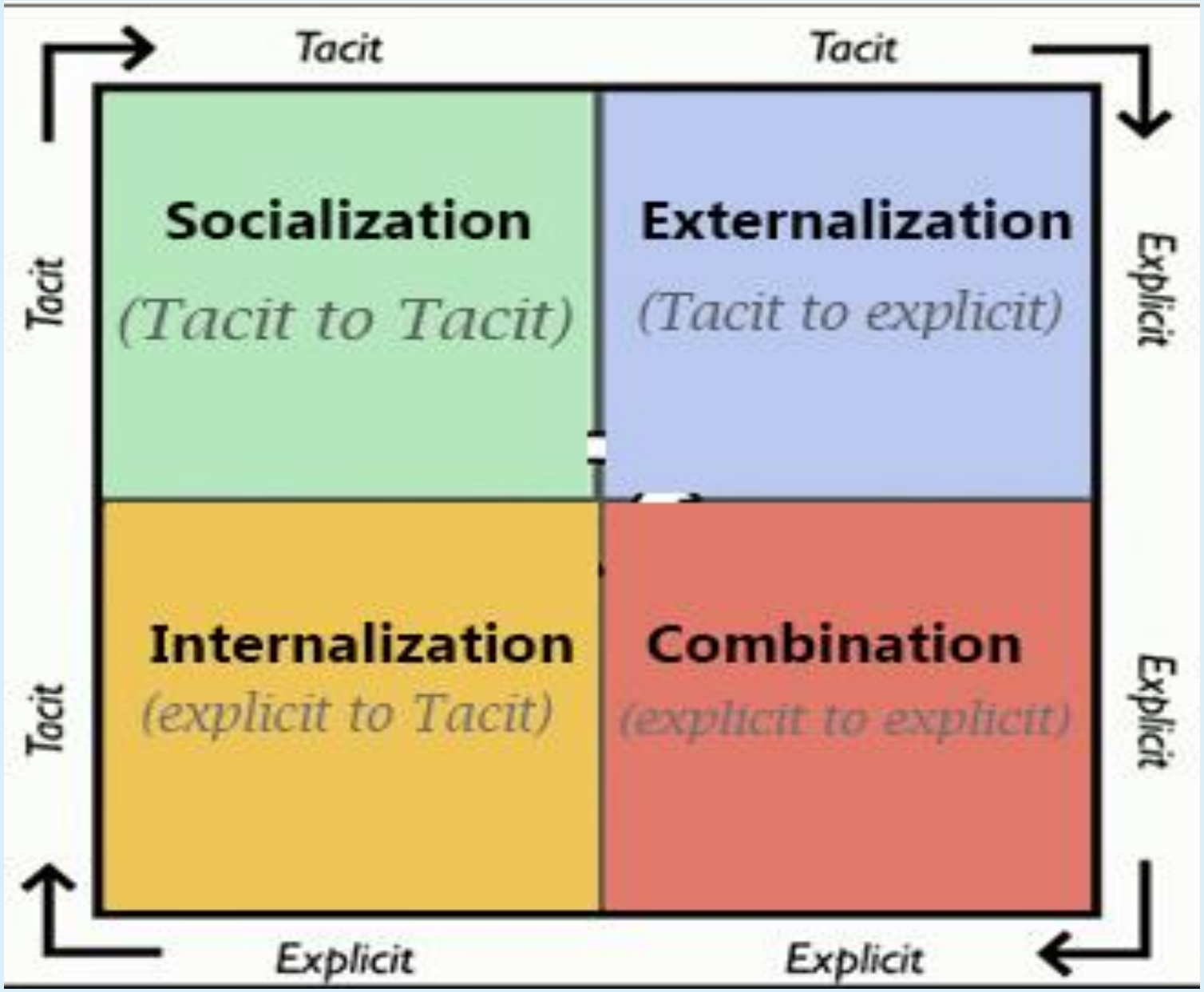


KNOWLEDGE MANAGEMENT

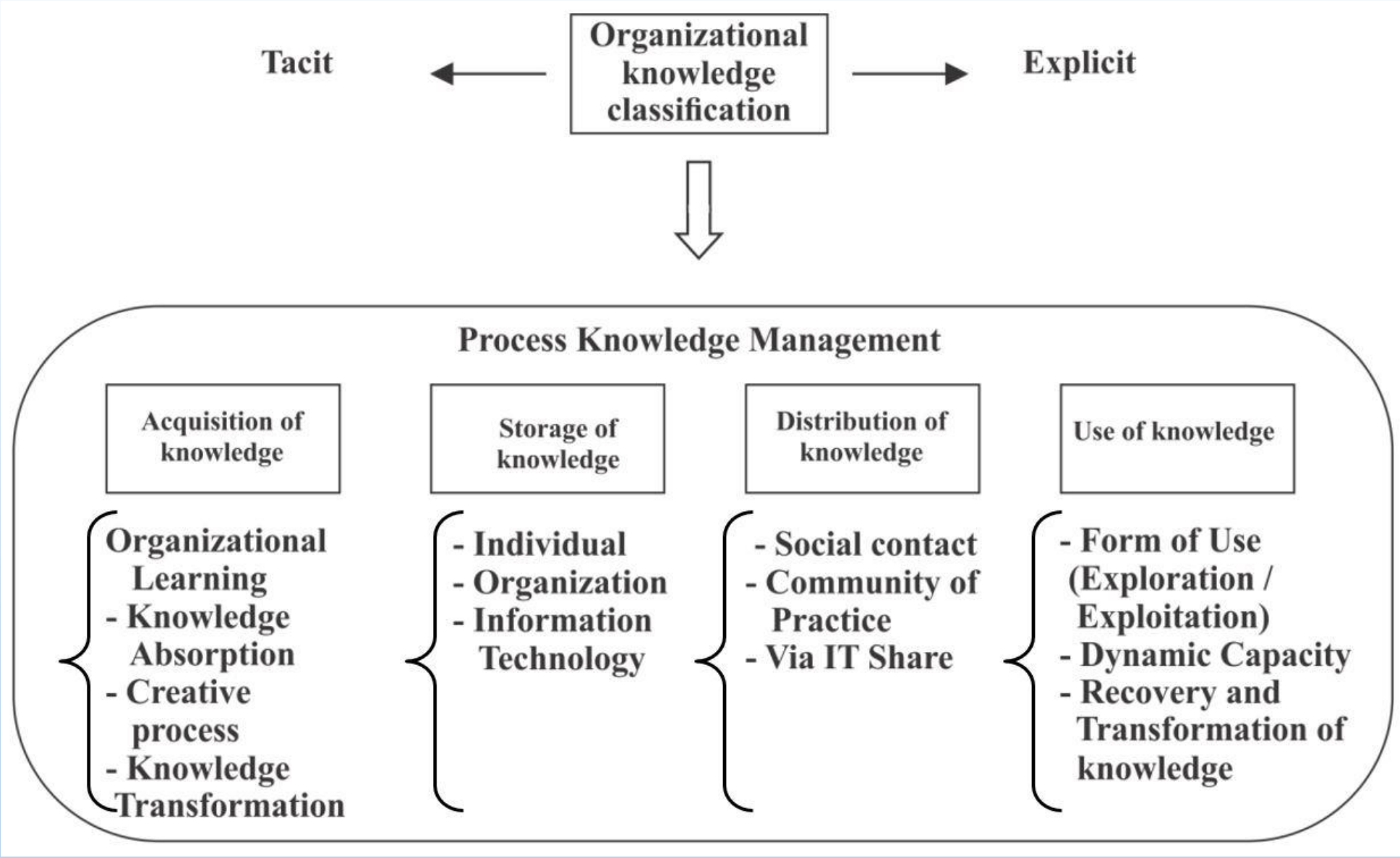
Explicit and tacit knowledge

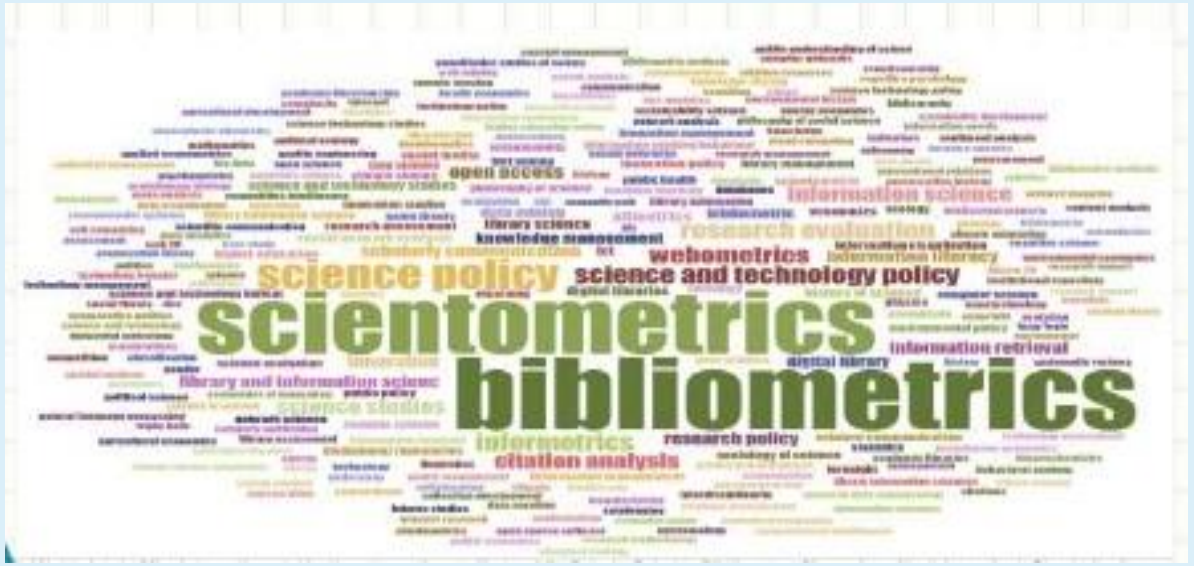


Transformations of explicit and tacit knowledge



Knowledge management process





SCIENTOMETRY

Scientometry

Is the measure of scientific and technical activity, to which is attached specialized bibliometrics in the field of scientific and technical information.

Scientometric indexes

Permettent de donner des mesure sur la production scientifique d'un chercheur, d'un journal, d'un centre de recherche ou de leur impact sur la communauté de recherche.

Scientometric indexes

I-index

The Immediacy Index measures the average number of times an article published in a given journal in a given year is cited in the same year.

H-index

It allows you to find a number h of articles which have at least h citations from an author

G-index

is the rank of an article whose square is equal to the cumulative citations of an author's articles

π-index

The introduction of a new impact index (π-index) aimed to focus on very influential newspaper articles and is calculated by the formula π-index = 0.01 C(Pπ)

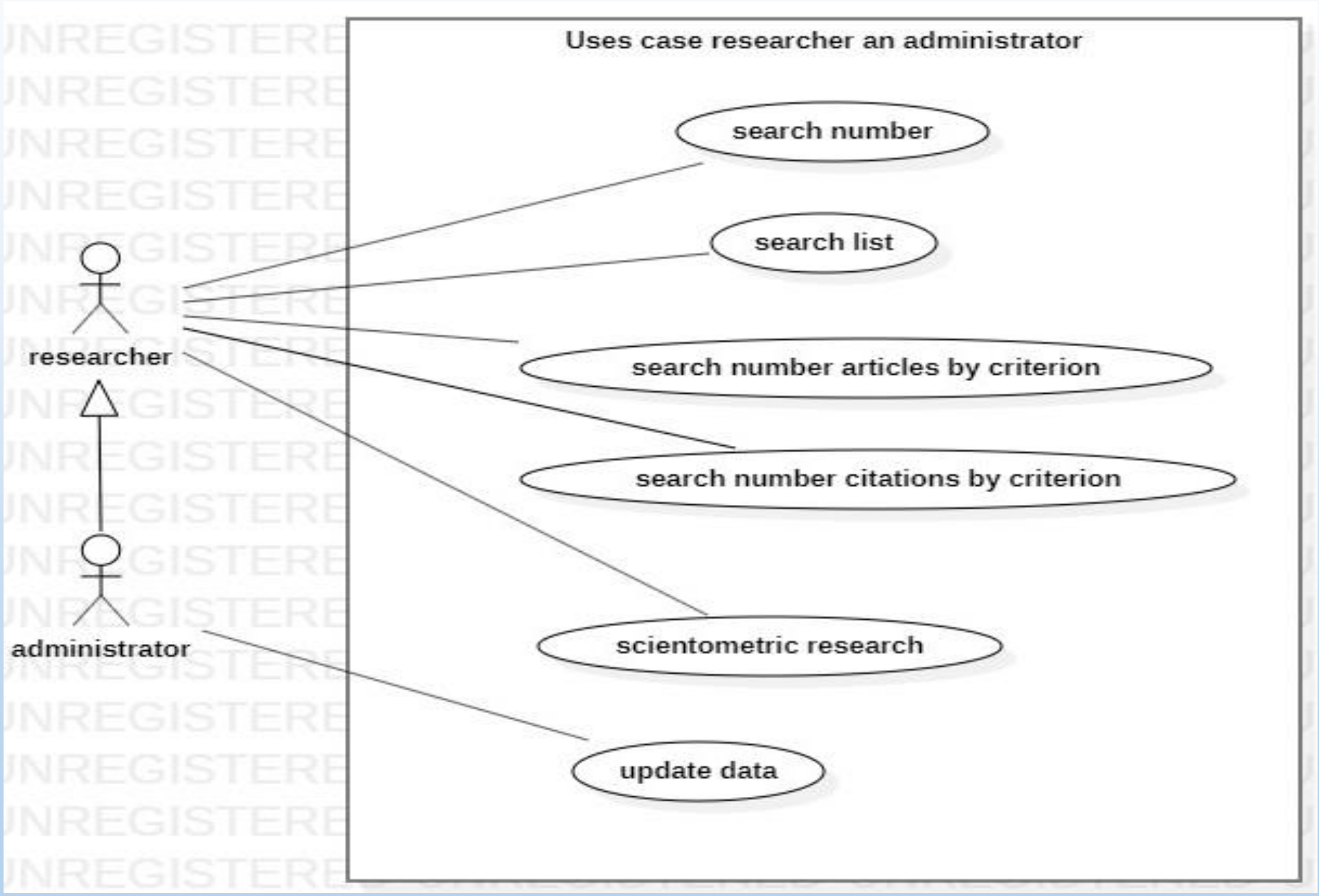
Co-authorship index

The co-authorship index (CAI) is another possible way to analyze patterns of collaboration between authors.

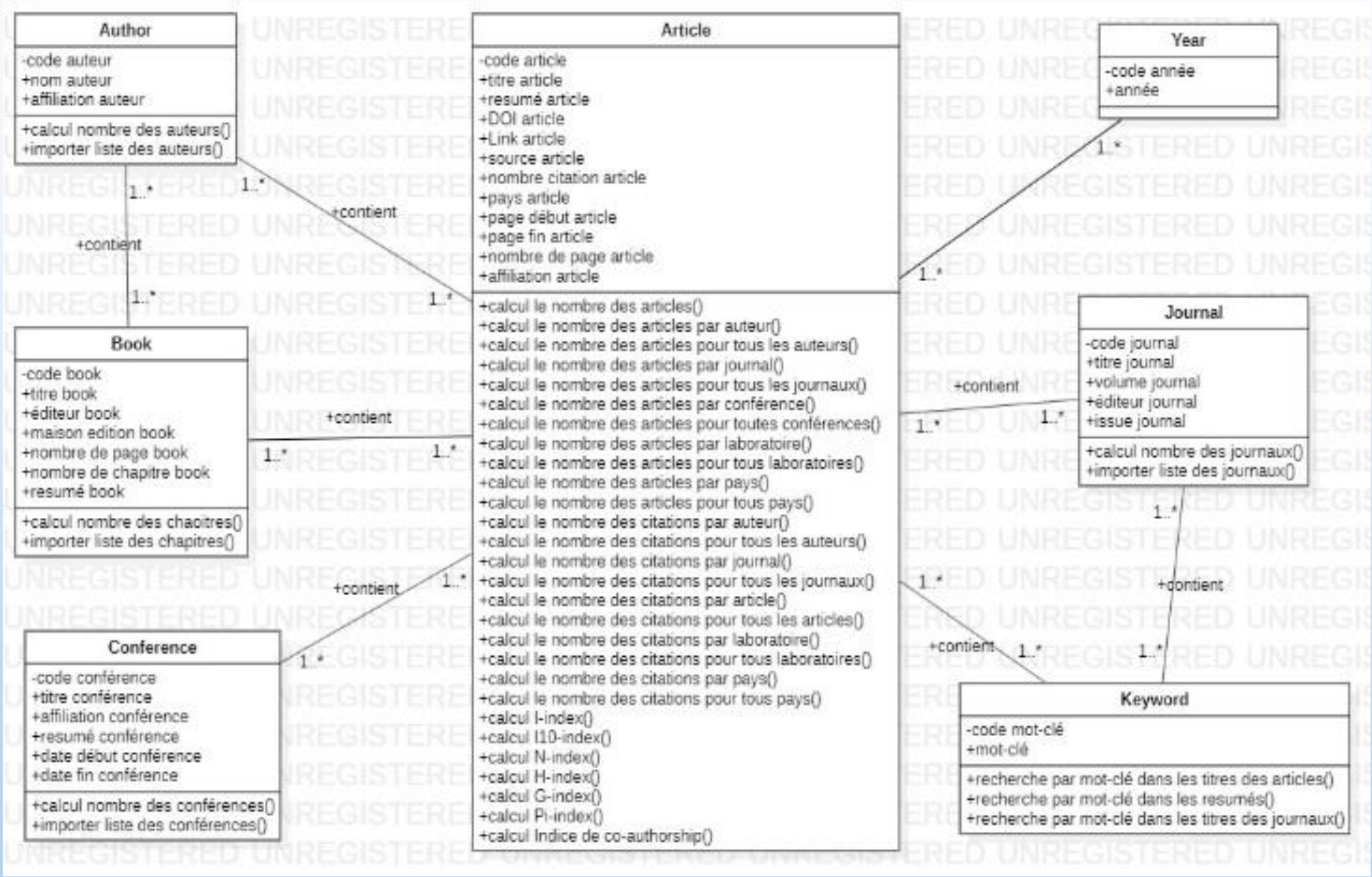
CAI = ((Nij / Nio) / (Noj / Noo)) ×100
Nij : is the number of articles by "j" authors of a country "i“
Nio: is the total number of articles of a country "i"
Noj: is the number of articles by "j" authors from all countries
Noo: is the total number of articles from all countries

Application of scientometry on Knowledge Management (KM) in Industry Between 2014 and 2019

Application Design (UML): General Use Case

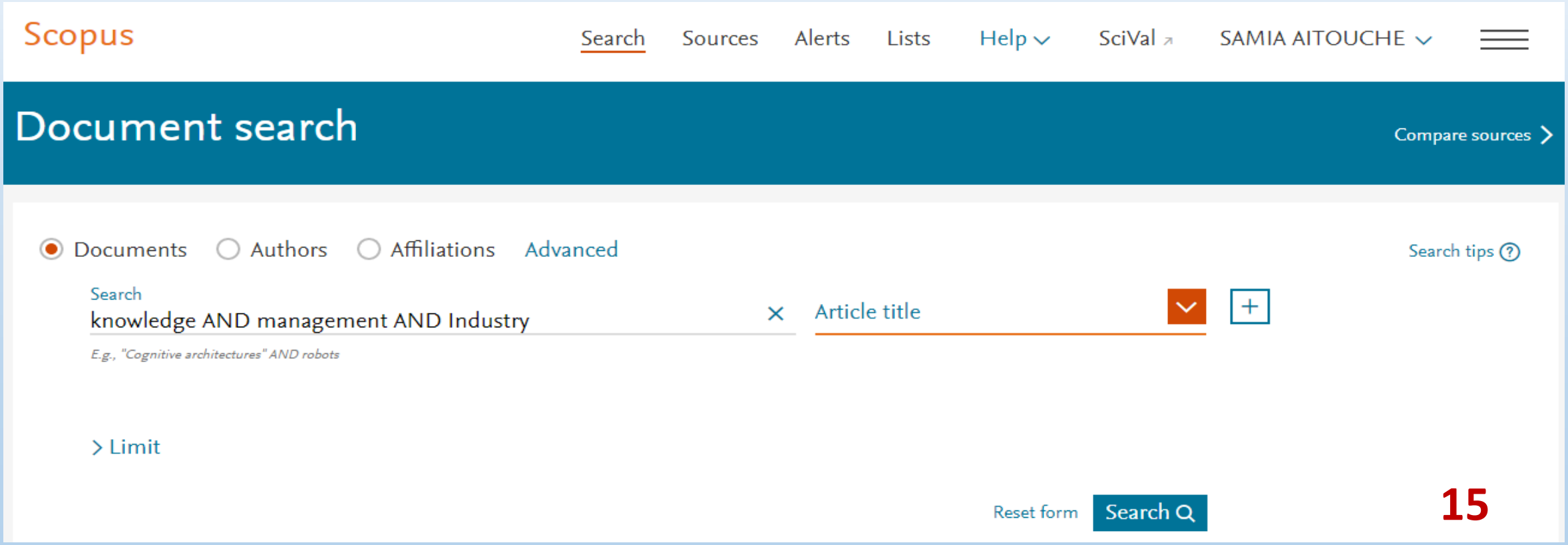


Object class diagram



Used data

SCOPUS Is the world's largest database of abstracts and citations, scientific journals, books and conference proceedings, covering research topics from all scientific and technical disciplines.



Used data

Data is a collection of articles from SCOPUS on knowledge management in industry.

The search in SCOPUS is made by the query which finds the articles containing in their title the expression («Knowlege management » and (Industry OR industrial OR Manufacturing OR Factory OR production OR product OR company OR firm OR enterprise OR organization)).

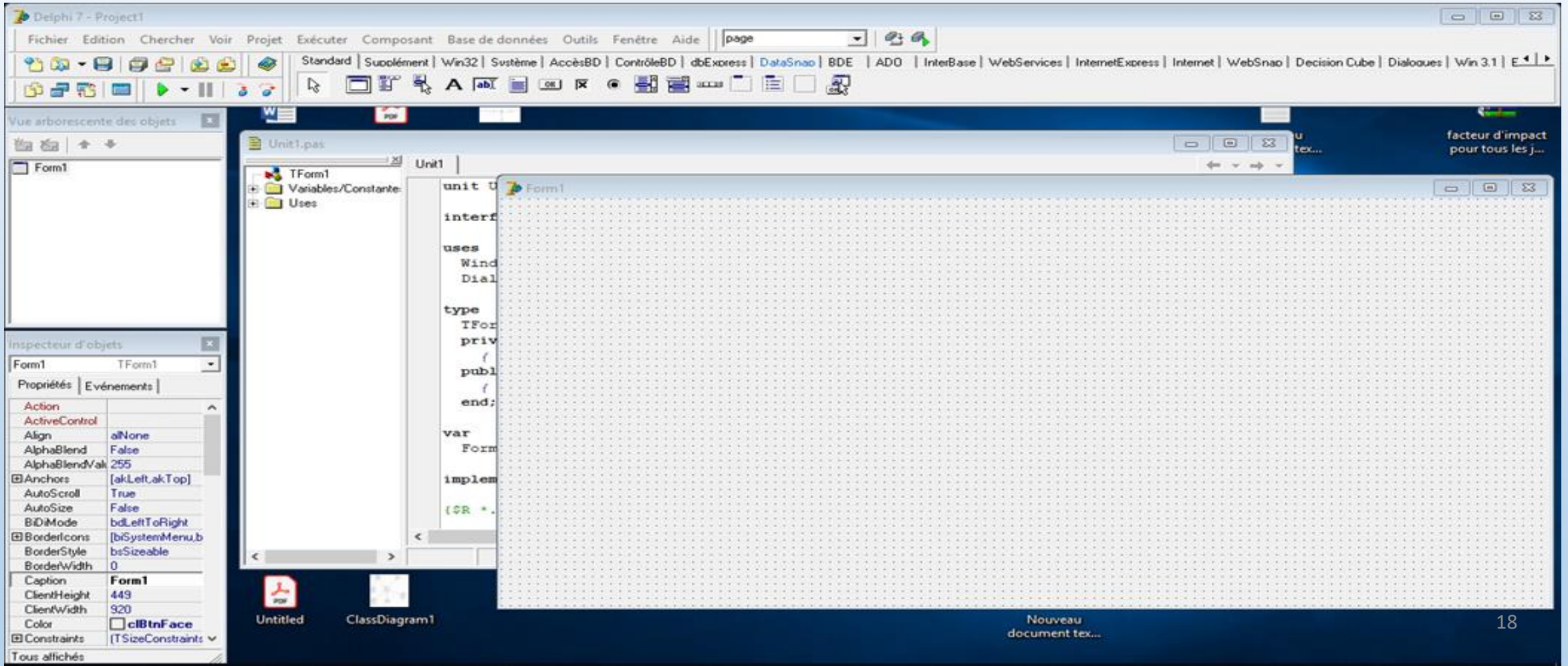
- From the result obtained, service companies and articles that discuss the relationship between industry and academia are omitted.

Used data (exported from SCOPUS)

	A	B	C	D	E	F	G	
1	Authors,Author(s) ID,Title,Year,Source title,Volume,Issue,Art. No.,Page start,Page end,Page c							
2	Richter S., W	5,719E+10	5,6639E+10	3,5557E+10	,Knowledge	University o	Victoria Univ	W
3	Paszek A.,"S	,Processing c	Decision tre	Production I	Technologic	Decision tre	Forestry	Kr
4	Zimmer J., M	5,7208E+10	,Operational	Faculty of M	Madeja, M.,	Knowledge	Managemer	M
5	Dave M., Sin	1,6533E+10	5,72E+10	5,7202E+10	,Knowledge	National Cor	Department	Al
6	Razi M.J.M.,	5,5759E+10	5,5607E+10	5,7202E+10	5,7208E+10	,Knowledge	Tamrin, M.I.	Da
7	?erbancea F.	3,527E+10	5,7205E+10	,Ethics in knc	The Buchare	St?nescu, A.	Laz?r, V., Th	cc
8	Phengchan P	5,7206E+10	,Advantages	Faculty of Bu	Thangpreecl	Knowledge	Palm oil	Su
9	Ghasemi B.,	3,6168E+10	,Developing	Department	Valmohamn	KM processe	information	bu
10	Tikakul C.T.,	7403717780	,Internationa	Thomson, A	Manufacturi	Small and M	Thailand	UI
11	Attia A., Essa	5,7202E+10	,Organizatior	Arab Acader	Operations a	Essam Eldin,	Organizatior	O
12	Ceptureanu	5,0461E+10	3,3568E+10	3,5254E+10	,An explorat	Department	Ceptureanu,	O
13	Yildirmaz H.,	7005066498	5,7202E+10	,Impact of Kr	Department	Department	Atilla Öner,	He
14	Badpa A., Sal	2,5826E+10	5,719E+10	,Understand	Salim, J., Fac	Yahaya, J., F	however, lit	In
15	Mishra P.C.,	5,7204E+10	5,7204E+10	,The Role of	Indian Instit	Kishore, S., I	Shivani, S., M	hi
16	Telaga A.S., I	5,7203E+10	5,7203E+10	,Knowledge-	Librianti, A.I	Rahayu, P.A	Nonaka, I., L	St
17	Zhou J., Liu J	3,6181E+10	,A Method o	Liu, J., Schoc	Domain sub	Knowledge	Iterative me	Kr
18	Rahim M.A.,	5,7203E+10	1,6481E+10	,Knowledge	Fachgebiet I	Stolipin, J., I	Wenzel, S., I	M
19	Armenta-He	5,7203E+10	5,5617E+10	5,7203E+10	5,6367E+10	,Knowledge	Department	Ur
20	Sarina T.,"55	,Enhancing k	Akbari, N., G	Andreeva, T	Ardichvili, A	Employee e	Bamber, G.J	Ba
21	Garrick J.,"57	,A critical dis	1968) influe	Industry trai	Organizatior	Performativ	Tacit knowle	W
22	Wang Y., Bla	5,7194E+10	5,6352E+10	5,7201E+10	,A Knowledg	Callaghan In	Blache, R., C	Zh
23	Ministry of B	(2014) Addit	(2014) Addit	(2015) 3D Pr	Garg, A., Tai	Adam, G.A.C	Adam, G.A.C	W
24	Vernadat F.B	5,7201E+10	5,7189E+10	7006303804	6508186303	,Information	Guest Editor	Ch
25	Brahami M.,	2,339E+10	,A Model to I	Laboratory I	Matta, N., La	Industrial Se	Information	Kr
26	Nuryanti, Sai	5,7194E+10	5,7205E+10	,The effect o	Samsir, Facu	Andreas, P.,	Competitive	In
27	Deng Y., Li C.	1.62E+10	5.5629E+10	.An integrate	School of Ma	Li, C., Schoo	Wang, D., Sc	Kr

DELPHI development environment

Borland Delphi is a development environment based on the Pascal language. It allows to easily create Microsoft Windows applications, with a minimum of programming.



18

The features of the application

1- Calculating numbers

	A	B
1	Le nombre des articles	198
2		
3		

	A	B
1	Le nombre des auteurs	542
2		
3		

	A	B
1	Le nombre des chapitres	9
2		

	A	B
1	Le nombre des conférences	50
2		
3		

	A	B
1	Le nombre des journaux	138
2		
3		

2- List display

Athors list

	A	B
1	La liste des auteurs	
2	Razi M.J.M.	
3	Tamrin M.I.M.	
4	Dahlan A.R.A.	
5	Ali N.A.M.	
6	Habibullah M.	
7	?erbancea F.	
8	St?nescu A.	
9	Laz?r V.	
10	Ghasemi B.	
11	Valmohammadi C.	
12	Tikakul C.T.	
13	Thomson A.	
14	Attia A.	
15	Essam Eldin I.	
16	Ceptureanu S.I.	
17	Ceptureanu E.G.	
18	Olaru M.	

Sheet1

Books, journals and conferences list

	A	B	C	D	E	F	G
1	La liste des journaux						
2	Proceedings - International Conference on Information and Commun						
3	Quality - Access to Success						
4	Kybernetes						
5	Electronic Journal of Knowledge Management						
6	Journal of Knowledge Management						
7	Energies						
8	International Journal of Innovation and Technology Management						
9	Journal of Theoretical and Applied Information Technology						
10	Journal of Global Information Technology Management						
11	AIP Conference Proceedings						
12	Handbook of Research on Knowledge Management for Contemporar						
13	The Palgrave Handbook of Knowledge Management						
14	European Journal of Training and Development						
15	Journal of Mechanical Design, Transactions of the ASME						

Sheet1

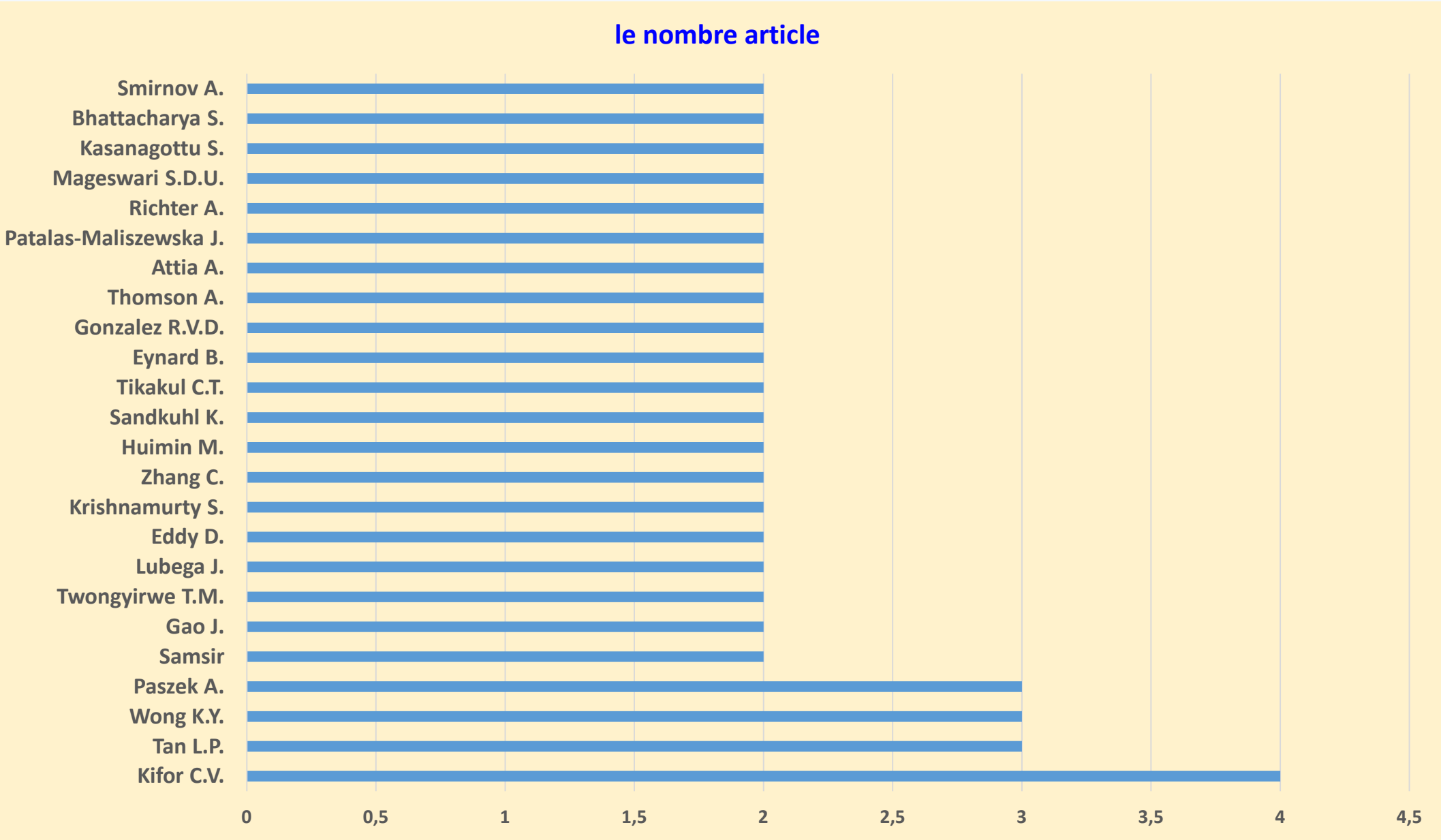
Countries list

	A	B
1	La liste des pays	
2	Malaysia	
3	Romania	
4	Iran	
5	United Kingdom	
6	Egypt	
7	Saudi Arabia	
8	Turkey	
9	Germany	
10	India	
11	Indonesia	
12	Mexico	
13	Spain	
14	Australia	
15	New Zealand	
16	Algeria	
17	France	
18	China	

Sheet1

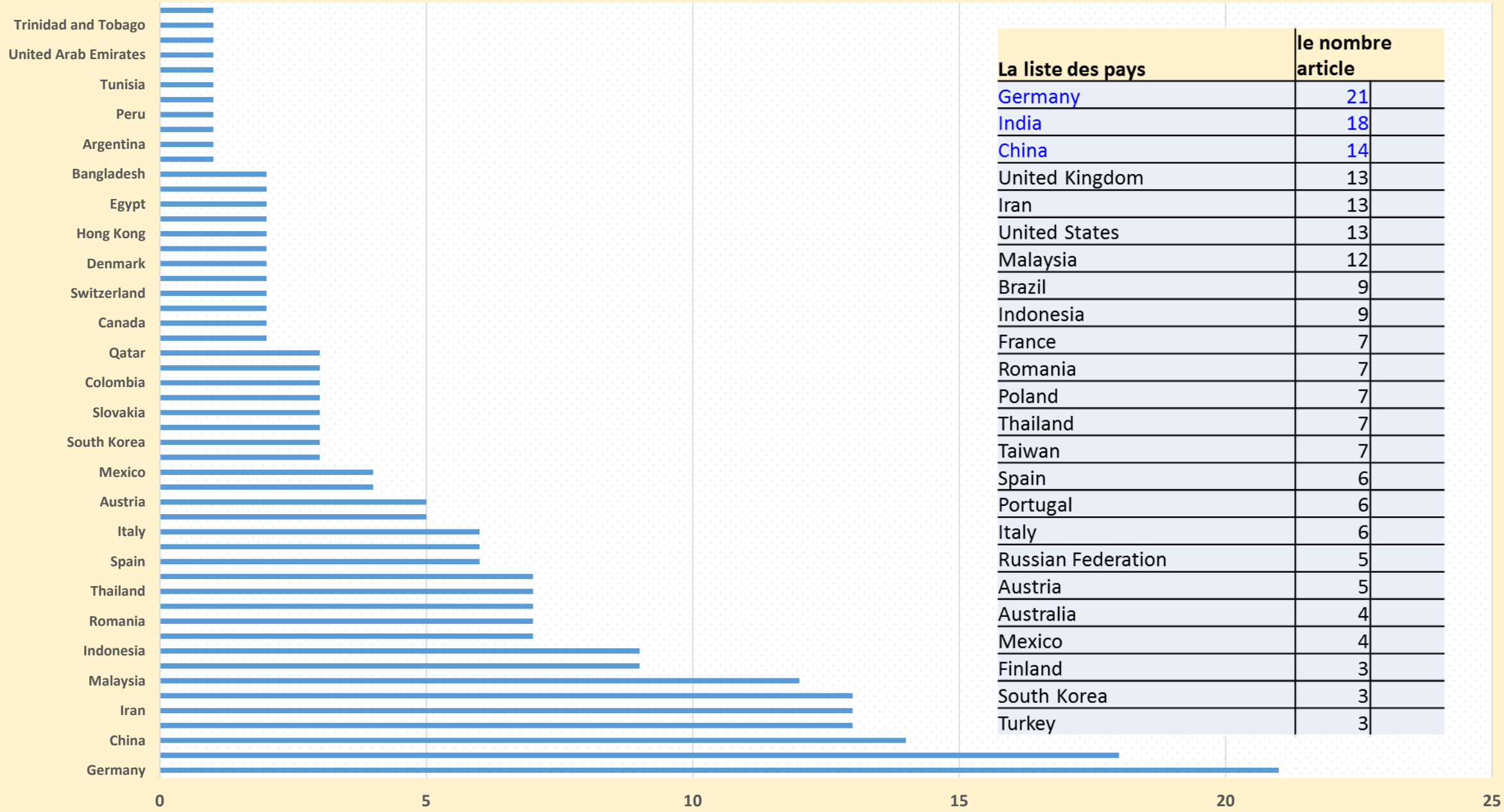
3- Number of articles by criterion

Per author



Number of articles per journal, conference and book

Number of articles per country



La liste des pays	le nombre article
Germany	21
India	18
China	14
United Kingdom	13
Iran	13
United States	13
Malaysia	12
Brazil	9
Indonesia	9
France	7
Romania	7
Poland	7
Thailand	7
Taiwan	7
Spain	6
Portugal	6
Italy	6
Russian Federation	5
Austria	5
Australia	4
Mexico	4
Finland	3
South Korea	3
Turkey	3

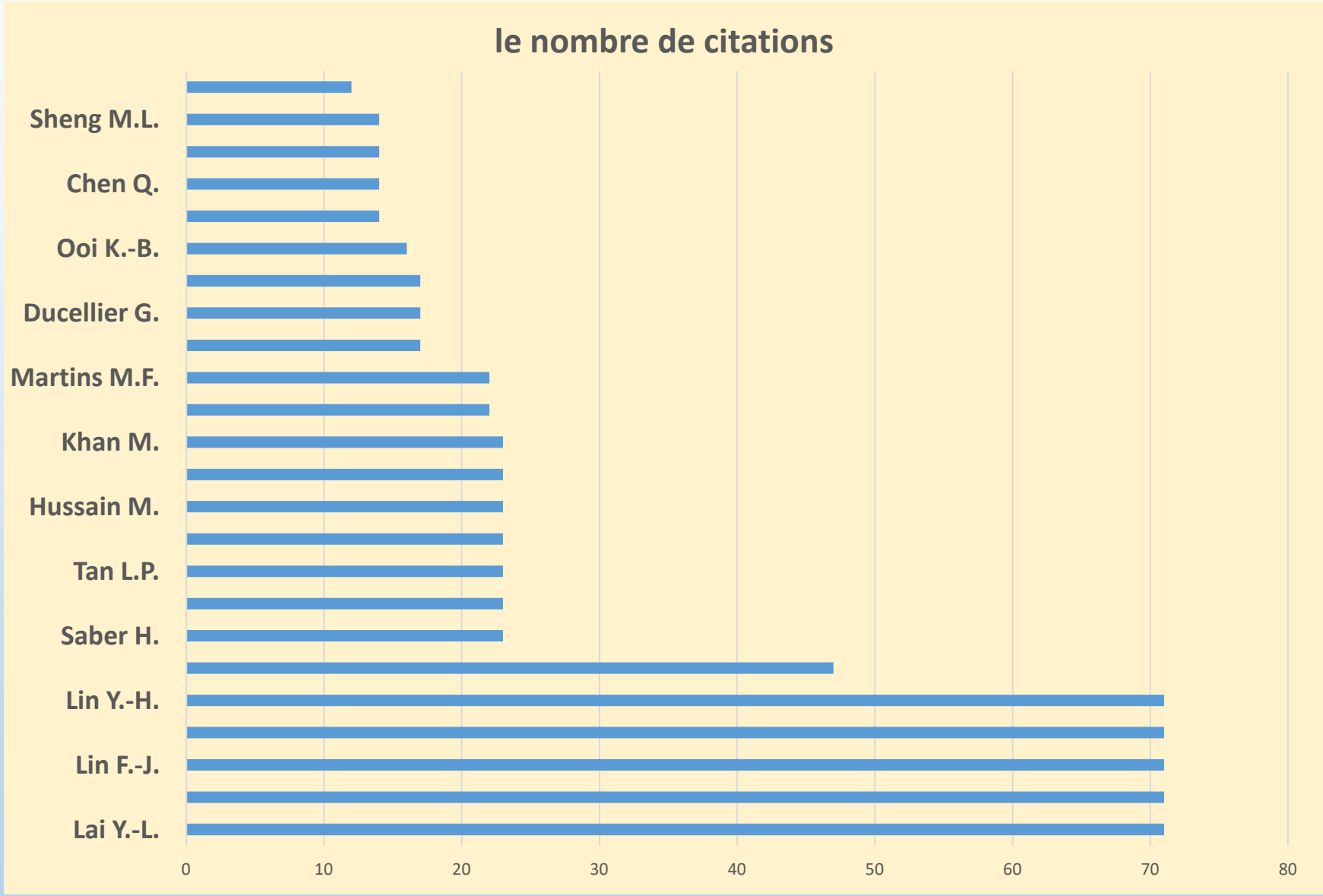
Number of articles per laboratory

La liste des laboratoires	le nombre artice	
Business Management Department, Faculty of Commerce, Damanhour University, Damanhour, Egypt	2	
Operations and Information Management Department, Effat College of Business, Effat University, Jeddah, Saudi Arabia	2	
University of Massachusetts Amherst, Department of Mechanical and Industrial Engineering, Amherst, MA 01003, United States	2	
Universidad Distrital Francisco José de Caldas, Bogotá, Colombia	2	
University of Zielona Góra, Zielona Góra, Poland	2	
Technical University of Berlin, Volkswagen AG, Germany	2	
'Lucian Blaga' University of Sibiu, Sibiu, Romania	2	
School of Applied Sciences, Cranfield University, Cranfield, Bedford, MK43 0AL, United Kingdom	2	
D.J. Sanghvi College of Engineering, Ville Parle, Mumbai, 400056, India	2	
M.H. Saboo Siddik College of Engineering, Byculla, Mumbai, 400008, India	2	
Department of Business, Consumer Sciences and Quality Management, Bucharest University of Economic Studies, Bucharest, 010374, Romania	1	
Human Resources Department, T-Bank, Istanbul, Turkey	1	
Department of Business Administration, Yeditepe University, Istanbul, Turkey	1	
Department of Innovation Management, University of Applied Sciences Ludwigshafen Am Rhein, Ludwigshafen am Rhein, Germany	1	
Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, Bangi, Selangor 43600, Malaysia	1	
Management, Birla Institute of Technology Mesra, Ranchi, Jharkhand, India	1	
Indian Institute of Coal Management, Ranchi, Jharkhand, India	1	
Informatics Management, Astra Manufacturing Polytechnic, Jl. Gaya Motor Raya No.8, Jakarta, 14330, Indonesia	1	
Autonomous University of Ciudad Juárez, Mexico	1	
Department of Industrial Engineering, Autonomous University of Ciudad Juárez, Mexico	1	
Universidad de Valencia, Spain	1	
National Council for Science and Technology, Mexico	1	
Department of Marketing and Management, Macquarie University, Sydney, NSW, Australia	1	
Department of Business Law, Faculty of Law Education Business and Arts, Charles Darwin University, Darwin, Australia	1	
Department of Mechanical Engineering, University of Auckland, 20 Symonds Street, Auckland, 1142, New Zealand	1	
Callaghan Innovation, 69 Gracefield Road, Lower Hutt, 5010, New Zealand	1	
Department of Computer Science, National Polytechnic School of Oran, Oran, Algeria	1	

3- Number of citations per criterion per article

les articles	le nombre de citations
Lai Y.-L., Hsu M.-S., Lin F.-J., Chen Y.-M., Lin Y.-H.,"The effects of industry cluster knowledge management on innovation performance",2014,"Journal of Business Research"	**71**
Martín-de Castro G.,"Knowledge management and innovation in knowledge-based and high-tech industrial markets: The role of openness and absorptive capacity",2015,"Industrial Marketing Management"	**47**
Hussain M., Ajmal M.M., Khan M., Saber H.,"Competitive priorities and knowledge management: An empirical investigation of manufacturing companies in UAE",2015,"Journal of Manufacturing Technology Management"	23
Tan L.P., Wong K.Y.,"Linkage between knowledge management and manufacturing performance: a structural equation modeling approach",2015,"Journal of Knowledge Management"	22
Gonzalez R.V.D., Martins M.F.,"Mapping the organizational factors that support knowledge management in the Brazilian automotive industry",2014,"Journal of Knowledge Management"	22
Assouroko I., Ducellier G., Boutinaud P., Eynard B.,"Knowledge management and reuse in collaborative product development - A semantic relationship management-based approach",2014,"International Journal of Product Lifecycle Management"	17
Ooi K.-B.,"TQM practices and knowledge management: a multi-group analysis of constructs and structural invariance between the manufacturing and service sectors",2015,"Total Quality Management and Business Excellence"	16
Sheng M.L., Hartmann N.N., Chen Q., Chen I.,"The synergetic effect of multinational corporation management's social cognitive capability on tacit-knowledge management: Product innovation ability insights from Asia",2015,"Journal of International Marketing"	14
Al-Sa'di A.F., Abdallah A.B., Dahiyat S.E.,"The mediating role of product and process innovations on the relationship between knowledge management and operational performance in manufacturing companies in Jordan",2017,"Business Process Management Journal"	12
Marques C.S., Leal C., Marques C.P., Cardoso A.R.,"Strategic Knowledge Management, Innovation and Performance: A Qualitative Study of the Footwear Industry",2016,"Journal of the Knowledge Economy"	12

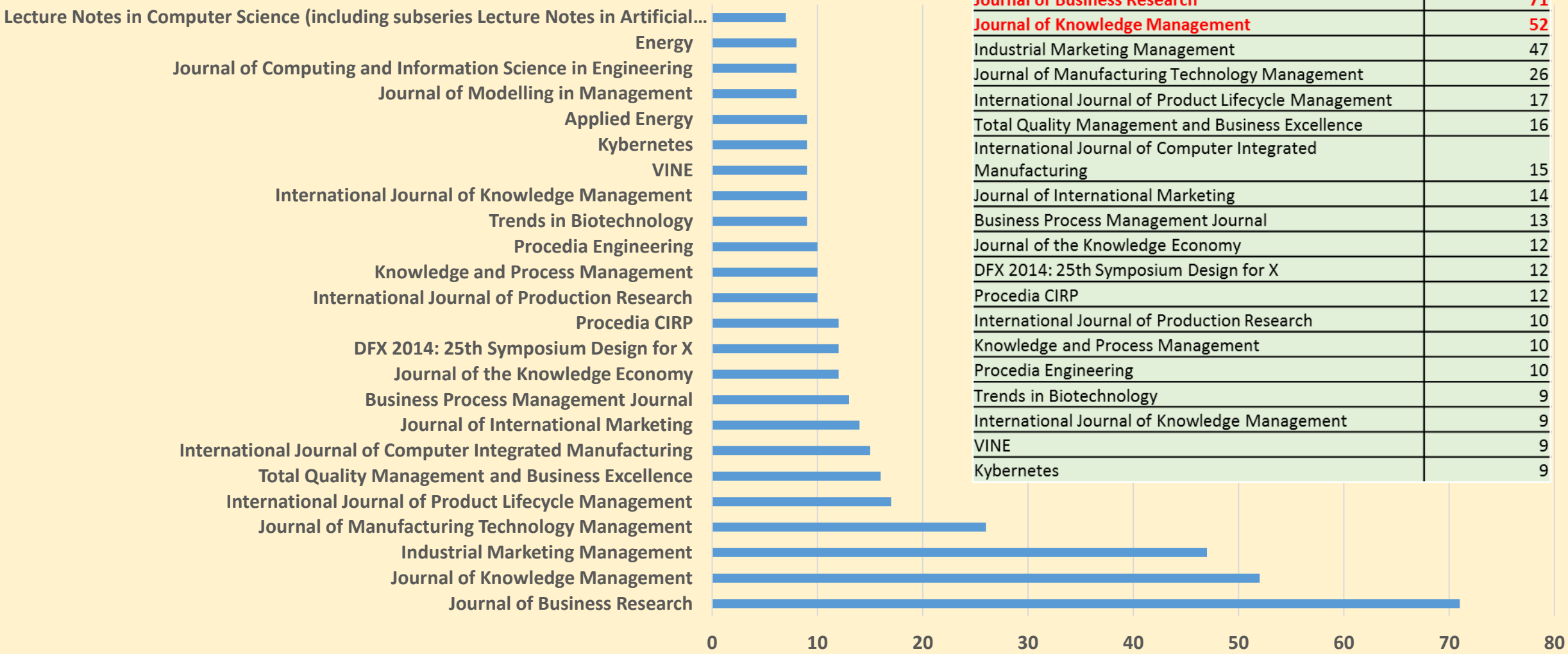
Number of citations per author



les auteurs	le nombre de citations
Lai Y.-L.	71
Hsu M.-S.	71
Lin F.-J.	71
Chen Y.-M.	71
Lin Y.-H.	71
Martín-de Castro G.	47
Saber H.	23
Eynard B.	23
Tan L.P.	23
Wong K.Y.	23
Hussain M.	23
Ajmal M.M.	23
Khan M.	23
Gonzalez R.V.D.	22
Martins M.F.	22
Assouroko I.	17
Ducellier G.	17
Boutinaud P.	17
Ooi K.-B.	16
Hartmann N.N.	14
Chen Q.	14
Chen I.	14
Sheng M.L.	14

Number of citations per journal

le nombre de citations

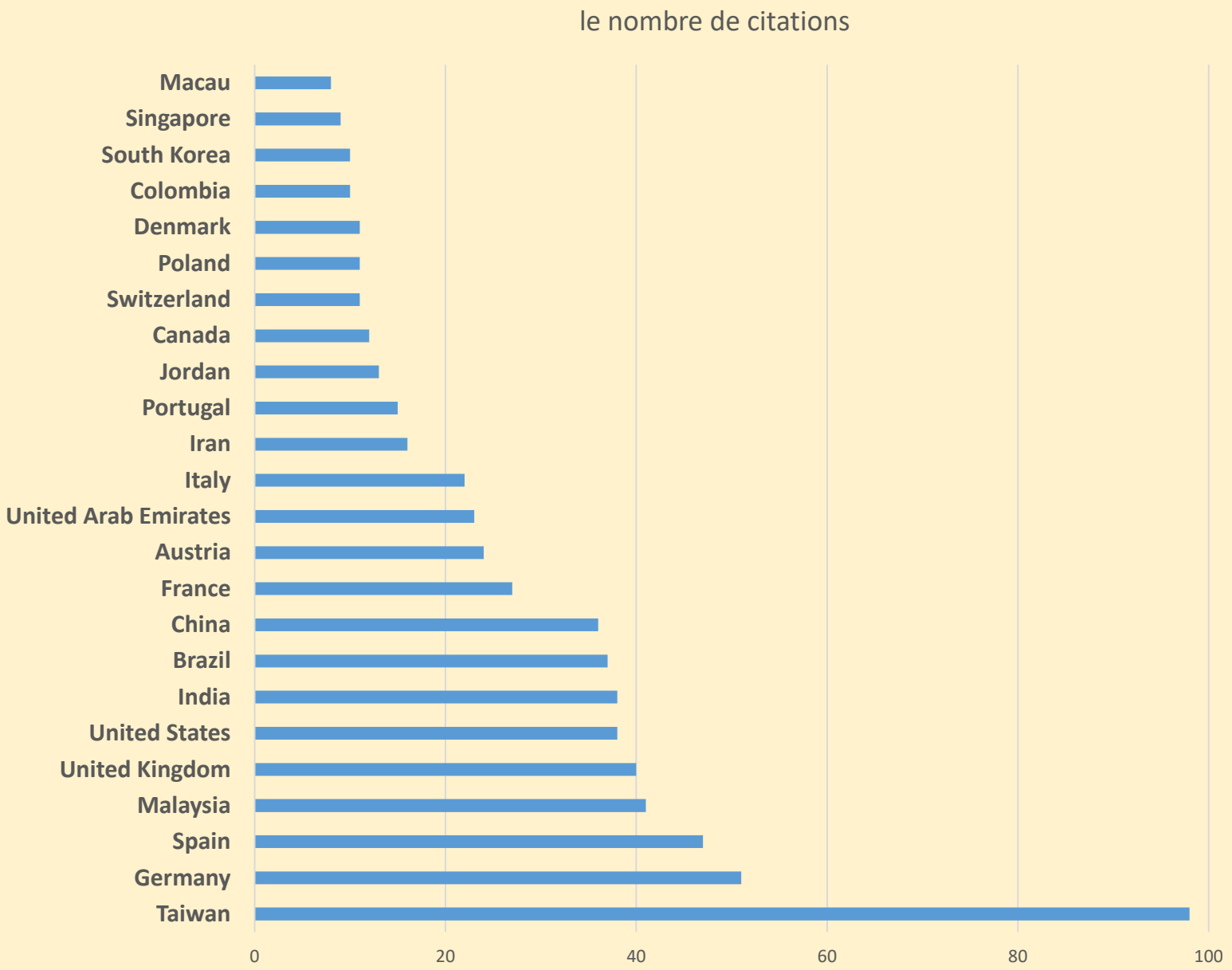


La liste des journaux	le nombre de citations
Journal of Business Research	71
Journal of Knowledge Management	52
Industrial Marketing Management	47
Journal of Manufacturing Technology Management	26
International Journal of Product Lifecycle Management	17
Total Quality Management and Business Excellence	16
International Journal of Computer Integrated Manufacturing	15
Journal of International Marketing	14
Business Process Management Journal	13
Journal of the Knowledge Economy	12
DFX 2014: 25th Symposium Design for X	12
Procedia CIRP	12
International Journal of Production Research	10
Knowledge and Process Management	10
Procedia Engineering	10
Trends in Biotechnology	9
International Journal of Knowledge Management	9
VINE	9
Kybernetes	9

Nombre de citations par laboratoire

La liste des laboratoires	le nombre de citations
Feng Chia University, 100, Wen-Hwa Rd., Taichung City 40724, Taiwan	71
Feng Chia University, Taichung, Taiwan	71
Department of Business Administration, Feng Chia University, Taichung, Taiwan	71
Department of Asia-Pacific Industrial and Business Management, University of Kaohsiung, Kaohsiung, Taiwan	71
Department of Leisure and Recreation Management, Asia University, Taichung, Taiwan	71
Business Administration Department, Complutense University of Madrid, Spain	47
Nonaka Centre for Knowledge and Innovation, CUNEF Business School, Spain	47
College of Business Administration, Abu Dhabi University, Abu Dhabi, United Arab Emirates	23
Department of Manufacturing and Industrial Engineering, Universiti Teknologi Malaysia, Skudai, Malaysia	22
School of Applied Science, State University of Campinas, Limeira, Brazil	22
Department of Production Engineering, São Carlos Federal University, São Carlos, Brazil	22
Department of Mechanical Systems Engineering, Université de Technologie de Compiègne, CNRS - UMR7337 - Roberval, CS 60319, rue du Dr. Schweitzer, Compiègne, 60203, France	17
CADeSIS, Bat. B, 37 rue Adam Ledoux, Courbevoie, 92400, France	17
Institut Charles Delaunay - CNRS UMR 6281 - LASMIS, Université de Technologie de Troyes, CS 42060, Troyes Cedex, 10004, France	17
Linton University College, Mantin, Malaysia	16
Department of Marketing, Shidler College of Business, University of Hawai'i at Manoa, United States	14
School of Management, National Taiwan University of Science and Technology, Taiwan	14
University of California, Berkeley, CA, United States	14
Department of Marketing, School of Management, National Taiwan University of Science and Technology, Taiwan	14
Department of Economics, Sociology and Management & CETRAD Research Unit, University of Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, 5000-801, Portugal	12
University of Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, 5000-801, Portugal	12
Department of Business Management, The University of Jordan, Amman, Jordan	12
Friedrich-Schiller-Universität Jena, Institut für Informatik, Ernst-Abbe-Platz 2, Jena, 07742, Germany	11
CAS Software AG, CAS-Weg 1-5, Karlsruhe, 76131, Germany	11

Number of citations per country



La liste des pays	le nombre de citations
Taiwan	98
Germany	51
Spain	47
Malaysia	41
United Kingdom	40
United States	38
India	38
Brazil	37
China	36
France	27
Austria	24
United Arab Emirates	23
Italy	22
Iran	16
Portugal	15
Jordan	13
Canada	12
Switzerland	11
Poland	11
Denmark	11
Colombia	10
South Korea	10
Singapore	9
Macau	8

5- Scientometric indexes of the authors

I-10 index

La liste des auteurs	I10-index
Eynard B.	1
Gonzalez R.V.D.	1
Tan L.P.	1
Wong K.Y.	1
Al-Sa'di A.F.	1
Abdallah A.B.	1
Dahiyat S.E.	1
Marques C.S.	1
Leal C.	1
Marques C.P.	1
Cardoso A.R.	1
Ooi K.-B.	1
Hussain M.	1
Ajmal M.M.	1
Khan M.	1
Saber H.	1
Martín-de Castro G.	1
Sheng M.L.	1
Hartmann N.N.	1
Chen Q.	1
Chen I.	1
Lai Y.-L.	1
Hsu M.-S.	1
Lin F.-J.	1

H index

La liste des auteurs	H-index
Eynard B.	2
Richter A.	2
Kifor C.V.	2
Sivri S.D.	2
Krallmann H.	2
Shirouyehzad H.	2
Popescu D.I.	1
Yildirmaz H.	1
Atilla Öner M.	1
Herrmann N.	1
Sarina T.	1
Garrick J.	1
Wang Y.	1
Blache R.	1
Zheng P.	1
Xu X.	1
Vernadat F.B.	1
Chan F.T.S.	1
Molina A.	1
Nof S.Y.	1
Panetto H.	1
de Guimarães J.C.F.	1
Severo E.A.	1
de Vasconcelos C.R.M.	1

G index

La liste des auteurs	G-index
Paszek A.	3
Tan L.P.	3
Wong K.Y.	3
Krishnamurty S.	2
Zhang C.	2
Wang Y.	2
Eynard B.	2
Gonzalez R.V.D.	2
Gao J.	2
Eddy D.	2
Richter A.	2
Mageswari S.D.U.	2
Bouras A.	2
Wittbrodt P.	2
Nicolaescu S.?.	2
Kifor C.V.	2
Sivri S.D.	2
Krallmann H.	2
Shirouyehzad H.	2
Laukemann A.	2
Binz H.	2
Roth D.	2
Wang L.	2
Chen Y.-Y.	2

Application of scientometry on Knowledge Management (KM) in Industry 4.0

4. INDUSTRY

Definition of INDUSTRY 4.0

Industrie 4.0 refers to the intelligent networking of machines and processes for industry with the help of information and communication technology *(Plattform Industrie 4.0)*

4.
INDUSTRY

Definition of INDUSTRY 4.0

Year	Nb	Country	Nb	Authors and co-authors	Nb
2019	3	Germany	2	Arifiani, L., Budiastuti, I.D., Erika, W.K.	1
2018	2	Australia	1	Jermsittiparsert, K., Boonratanakittiphumi, C.	1
2017	1	Austria	1	Neumann, G., Evangelista, P.	1
2016	0	Colombia	1	Sarina, T.	1
2015	1	Finland	1	Cárdenas, L.J.A., Ramírez, W.F.T., Rodríguez Molano, J.I.	1
2014	0	Indonesia	1	Möllenstädt, O.	1
		Italy	1	Brandl, P., Aschbacher, H., Hösch, S.	1

4. INDUSTRY

Souces by indexes: N, CS, SJR and SNIP

Source title	Nb	N	CS	SJR	SNIP
International Journal of Engineering and Advanced Technology	1	2011	0.10	-	-
International Journal of Innovation, Creativity and Change	1	2013	0.20	0.187	0.306
Proceedings of the European Conference on Knowledge Management, ECKM	1	1999	-	-	-
The Palgrave Handbook of Knowledge Management	1	2018	-	-	-
Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	1	1937	1.06	0.283	0.713
CEUR Workshop Proceedings	1	1989	0.32	0.166	0.301
Mensch und Computer 2015 - Workshop	1	2015	-	-	-

4.
INDUSTRY

Affiliations of the authors of KM and industry 4.0

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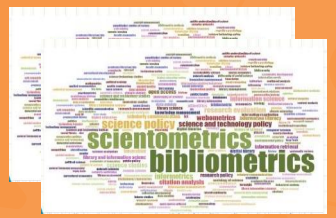
Universidad Distrital Francisco José de Caldas, Bogotá, Colombia.	1
Department of Marketing and Management, Macquarie University, Sydney, NSW, Australia.	1



4. INDUSTRY

Keywords Frequencies in Articles

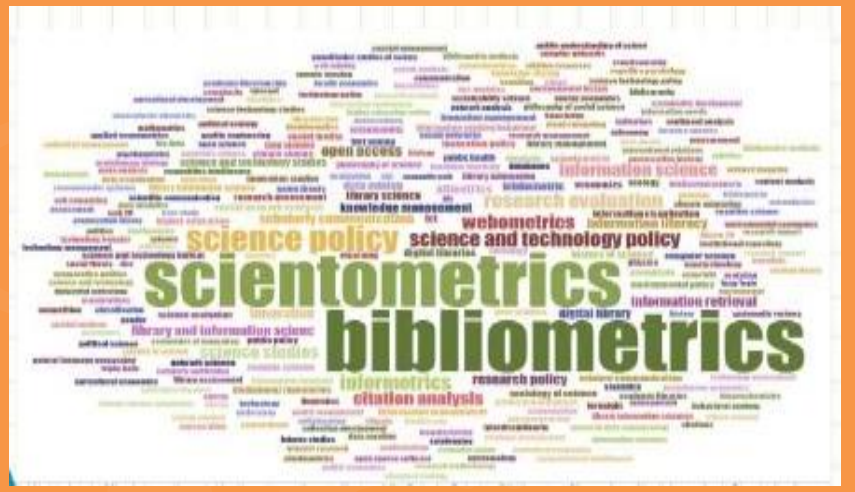
Keyword	Nb	Keyword	Nb	Keyword	Nb
Knowledge management	4	Data mining	1	Logistics	1
Industry 4.0	3	Degree of flexibility	1	Logistics and supply chain management	1
Supply chain	2	Digital technologies	1	Market situation	1
Academic literature	1	Disruption technology	1	Productivity improvements	1
Big data	1	Effective management	1	Service innovation	1
Big data analytics	1	Fundamental tools	1	Supply chain management	1
Business innovation	1	Information flows	1	Supply chains	1
Comparative advantage	1	Internet of things	1	Technological solution	1
Competitive advantage	1	Literature-based analysis	1	Thailand	1

Conclusion

To this end, we developed a scientometric knowledge management platform through which we were able to calculate the scientometric indexes relating to a request to SCOPUS, to facilitate research and monitoring of productivity and collaboration between the authors of knowledge management in industry and industry 4.0.

The application remains extensible to contain other clues and calculations and for other queries.

This application is only valid for Excel files extracted from SCOPUS or similar format.


science policy
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information science
knowledge management
information retrieval
research policy
citation analysis
informetrics


4.0
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Thank you