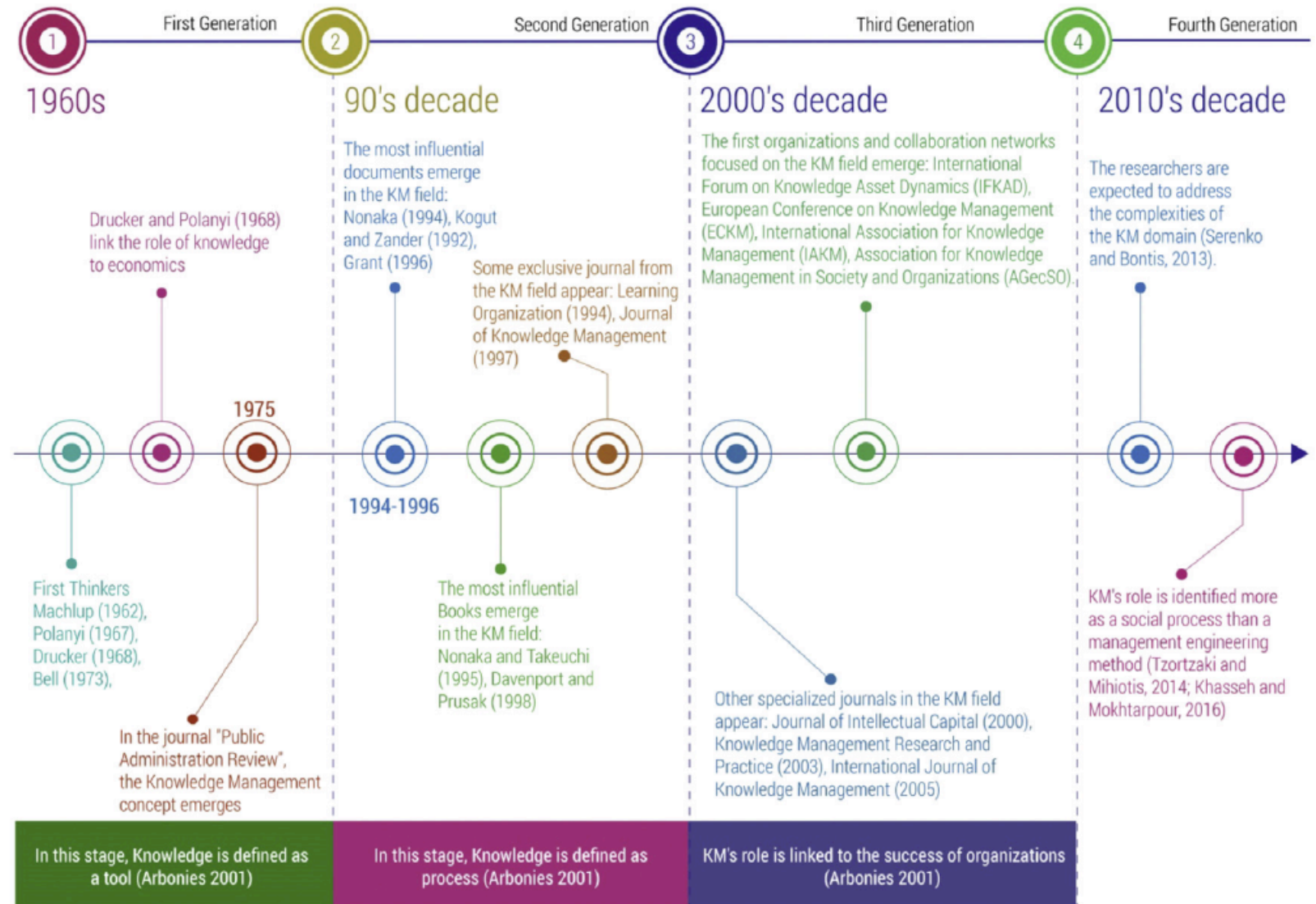# The Topics Dynamics in Knowledge Management Research

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KMO-2019

Four generations in KM development

First Generation — 1960s

First Thinkers Machlup (1962), Polanyi (1967), Drucker (1968), Bell (1973),

Drucker and Polanyi (1968) link the role of knowledge to economics

1975 — In the journal "Public Administration Review", the Knowledge Management concept emerges

In this stage, Knowledge is defined as a tool (Arbonies 2001)

Second Generation — 90's decade

The most influential documents emerge in the KM field: Nonaka (1994), Kogut and Zander (1992), Grant (1996)

1994-1996

The most influential Books emerge in the KM field: Nonaka and Takeuchi (1995), Davenport and Prusak (1998)

Some exclusive journal from the KM field appear: Learning Organization (1994), Journal of Knowledge Management (1997)

In this stage, Knowledge is defined as process (Arbonies 2001)

Third Generation — 2000's decade

The first organizations and collaboration networks focused on the KM field emerge: International Forum on Knowledge Asset Dynamics (IFKAD), European Conference on Knowledge Management (ECKM), International Association for Knowledge Management (IAKM), Association for Knowledge Management in Society and Organizations (AGecSO).

Other specialized journals in the KM field appear: Journal of Intellectual Capital (2000), Knowledge Management Research and Practice (2003), International Journal of Knowledge Management (2005)

KM's role is linked to the success of organizations (Arbonies 2001)

Fourth Generation — 2010's decade

The researchers are expected to address the complexities of the KM domain (Serenko and Bontis, 2013).

KM's role is identified more as a social process than a management engineering method (Tzortzaki and Mihiotis, 2014; Khasseh and Mokhtarpour, 2016)

Gaviria-Marin, M., Merigó, J. M., & Baier-Fuentes, H. (2019). Knowledge management: A global examination based on bibliometric analysis. *Technological Forecasting and Social Change, 140,* 194-220.
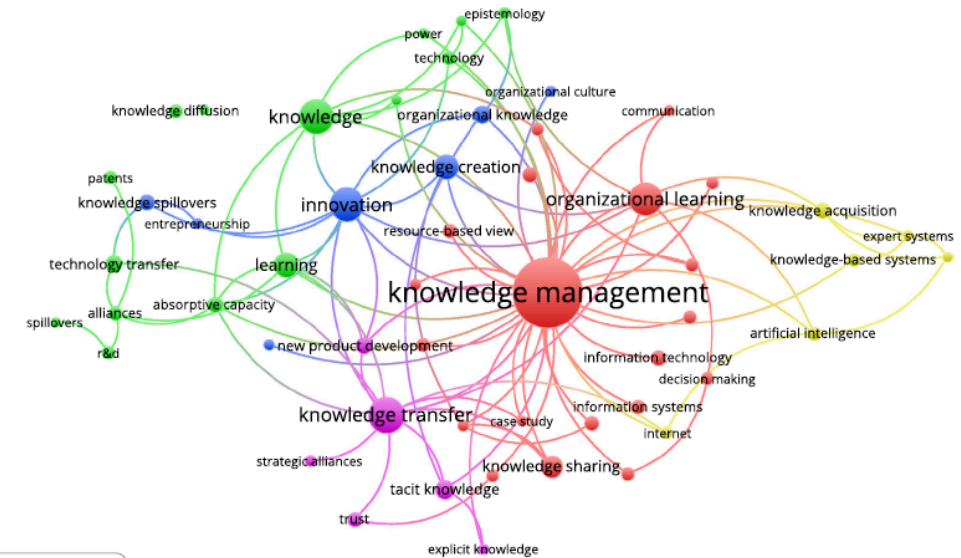
Bibliometric analysis

Performance analysis

... bases on quantitative metrics such as the number of citations and helps to identify most influenced journals, papers, and authors.

Science mapping

Spatial representation of how different scientific actors are related to one on another.

Topics of research, their dynamics, and relation

Main problem is topic identification

Gaviria-Marin, M., Merigó, J. M., & Baier-Fuentes, H. (2019). Knowledge management: A global examination based on bibliometric analysis. *Technological Forecasting and Social Change*, *140*, 194-220.

Topic modeling

A topic is a special terminology of the subject area, i.e. a set of words often co-occur in texts related to a given subject area.

Probabilistic topic modeling is based upon the idea that documents are mixtures of topics, where a topic is a probability distribution over words.

$p(w|t)$ is the probability (frequency) of the word w in the topic t.

$p(t|d)$ is the probability (frequency) of the topic t in document d.

The topic model automatically detects latent topics by the observed frequencies of words in the documents

$$p(w|d) = \sum_{t \in T} p(t|d)p(w|t).$$

LDA - Latent Dirichlet Allocation
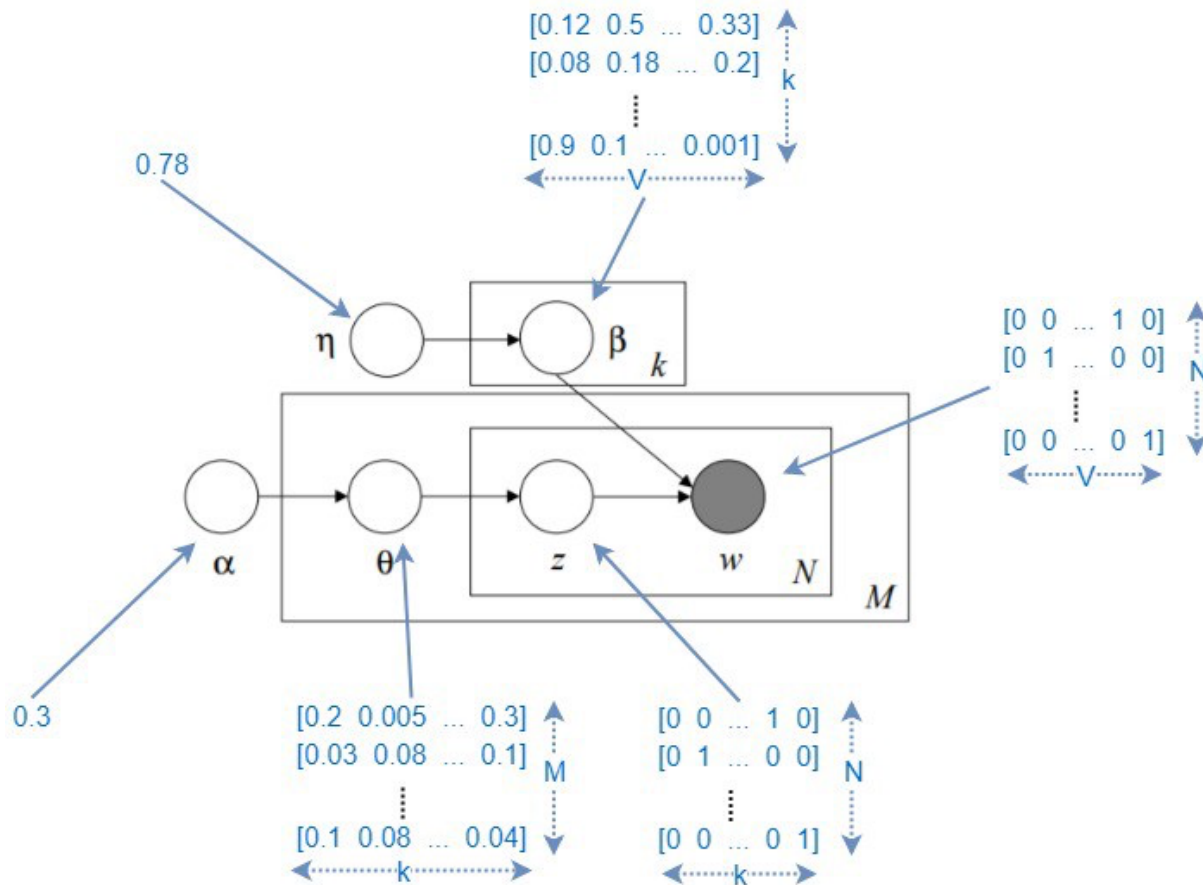
- Unsupervised Learning Method;
- Amount of topics should be given.

Research Data

Rank	Title	Publications in 2010 – 2018	Abbr
1	Journal of Knowledge Management	640	JKM
2	Journal of Intellectual Capital	322	JIC
3	The Learning Organization	258	TLO
4	Knowledge Management Research & Practice	342	KRP
5	Knowledge and Process Management: The Journal of Corporate Transformation	216	KPM
6	VINE: The Journal of Information and Knowledge Management Systems	88	VIN
7	International Journal of Knowledge Management	168	IJK
	Total	**2058**	

Serenko, A., Bontis, N. (2017). Global ranking of knowledge management and intellectual capital academic journals: 2017 update. *Journal of Knowledge Management* 21(3), 675-692.

Number of publications in 2010-2018
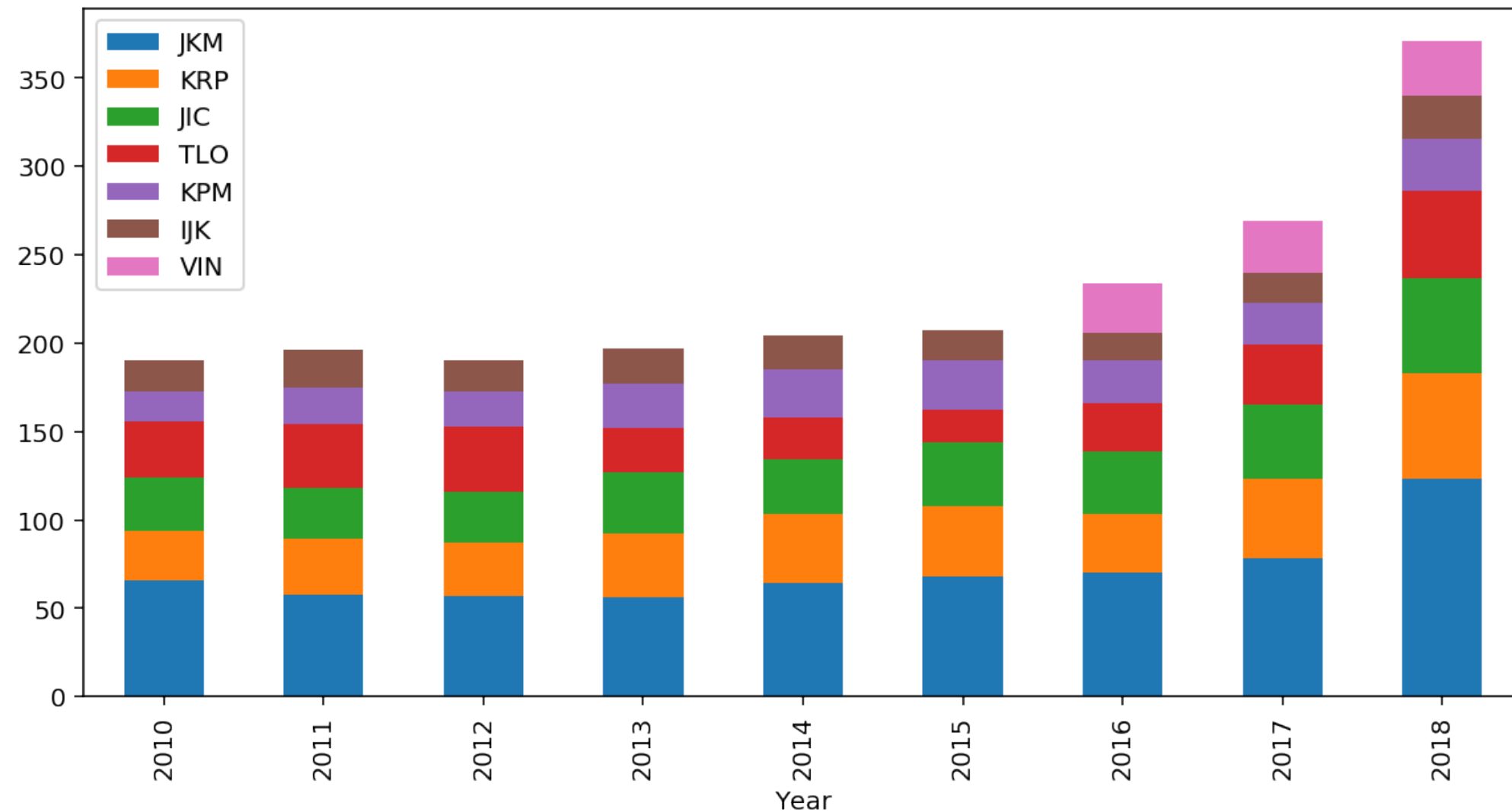
Pre-processing workflow
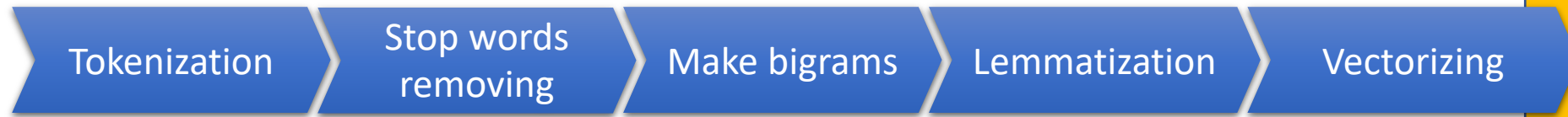
Tokenization	Stop words removing	Make bigrams	Lemmatization	Vectorizing
Transforming abstracts to lists of words.	Removing common and frequently appearing words.	Combining two words often found together.	Transforming words in standard form.	Computing frequencies of words in documents.

Words (300)

Documents (2508)

```
[[0, 0, 0, ..., 1, 0, 0],
 [0, 0, 0, ..., 0, 0, 0],
 [0, 0, 0, ..., 0, 4, 0],
 ...,
 [0, 0, 0, ..., 0, 0, 0],
 [1, 0, 0, ..., 0, 0, 0],
 [0, 0, 1, ..., 0, 0, 0]]
```

Sparsity = 14.25%

The number of topics
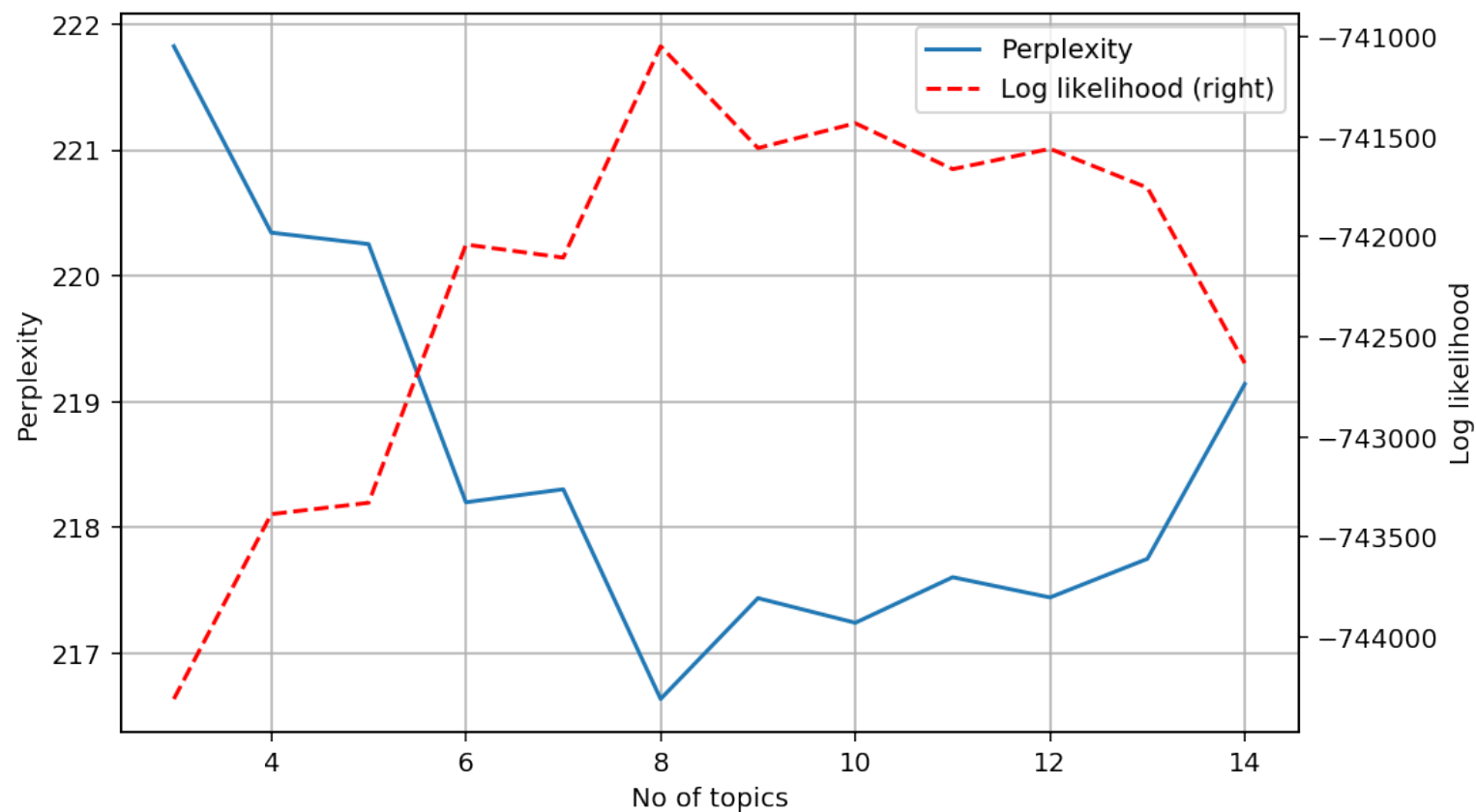
Perplexity:

$$P(D) = \exp\left[\frac{1}{2}\sum_{d\in D}\sum_{w\in d} n_{dw}\ln p(w|d)\right]$$
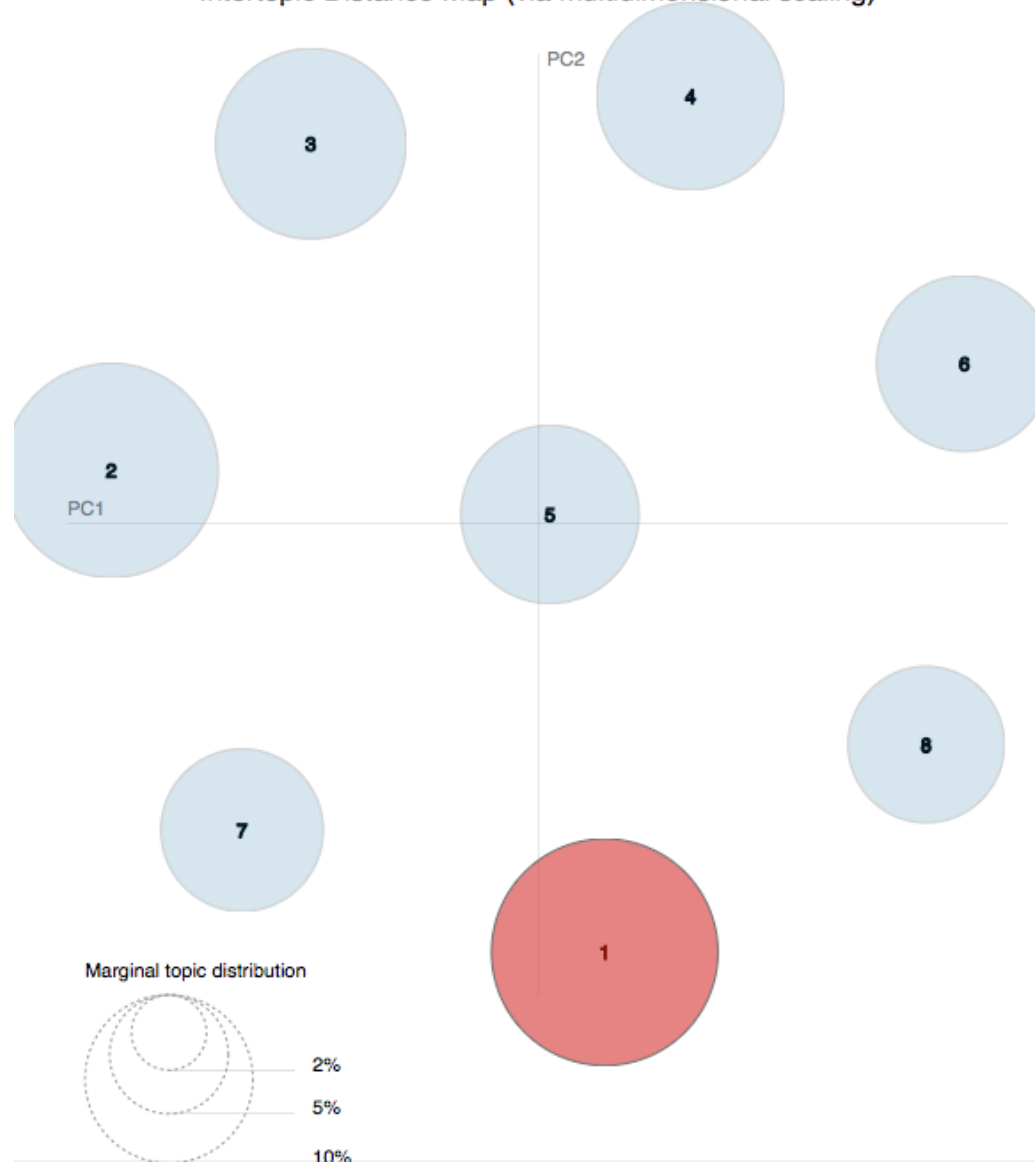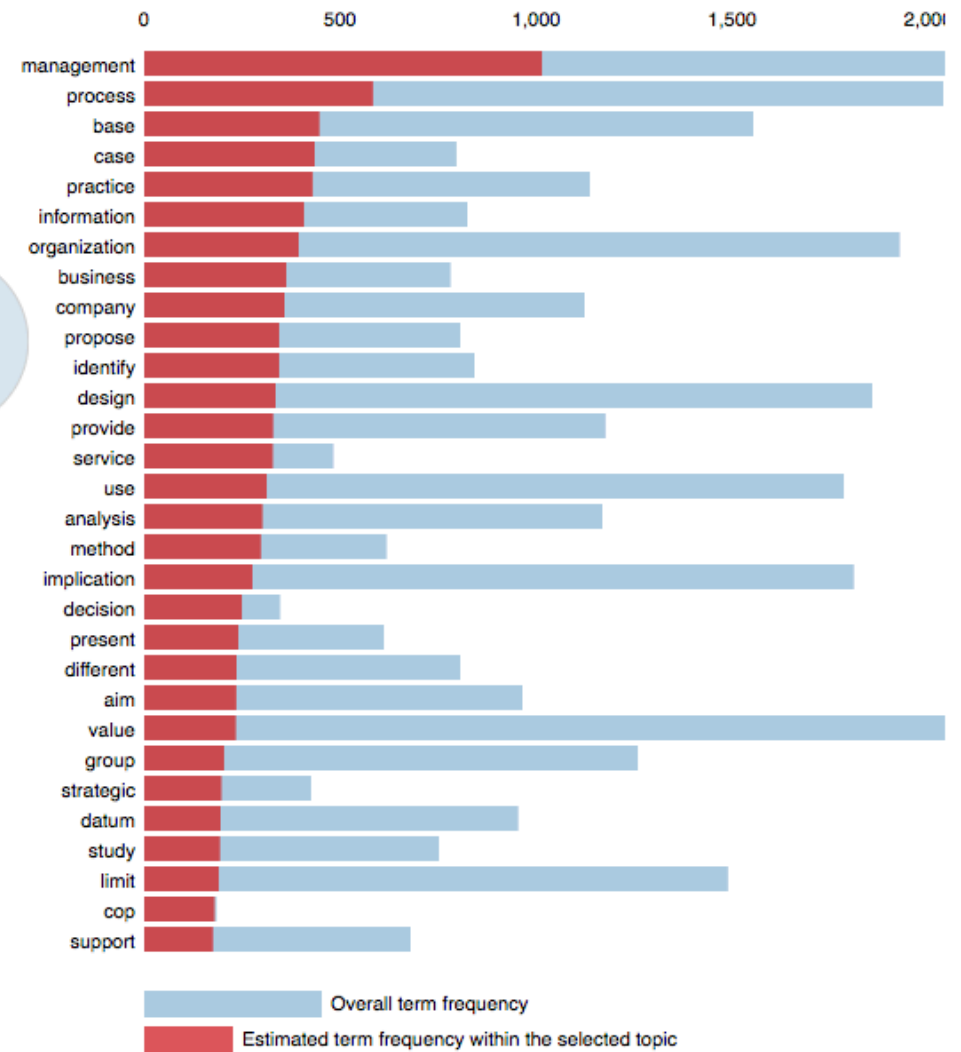
Sievert, C., Shirley, K.: LDAvis: A method for visualizing and interpreting topics. In: Proceedings of the Workshop on Interactive Language Learning, Visualization, and Interfaces, pp. 63–70, Association for Computational Linguistics (2014).
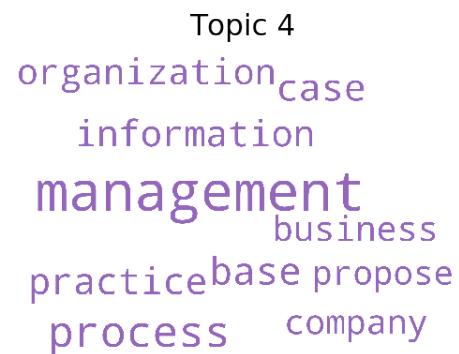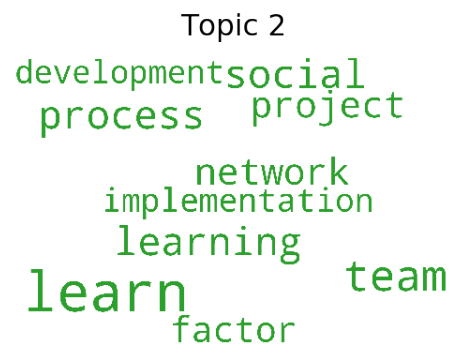
Topic No	Docs
0	161
1	126
2	271
3	230
4	470
5	213
6	373
7	214

Topics Popularity and Impact

Let θ_{dt} be a proportion of topic t in document d ($0 \leq \theta_{dt} \leq 1$). So,

$$\hat{\theta}_t = \frac{1}{|D|} \sum_{d \in D} \theta_{dt}$$ is the overall popularity of topic across all documents,

$$\hat{\theta}_t = \frac{1}{|D_y|} \sum_{d \in D_y} \theta_{dt}$$ is the topic popularity in year y, here D_y is the number of documents published in year y.

Let C_d be a number of citations of document d and $C = \sum_{d \in D} C_d$. Then

$$\hat{\imath}_t = \frac{1}{C} \sum_{d \in D} \theta_{dt} C_d$$ is the overall impact of the topic,

$$\hat{\imath}_t = \frac{1}{C_y} \sum_{d \in D_y} \theta_{dt} C_d$$ is the impact of the topic in year y.

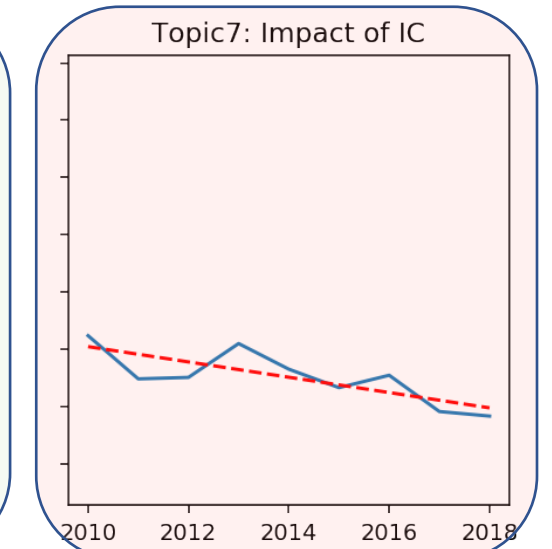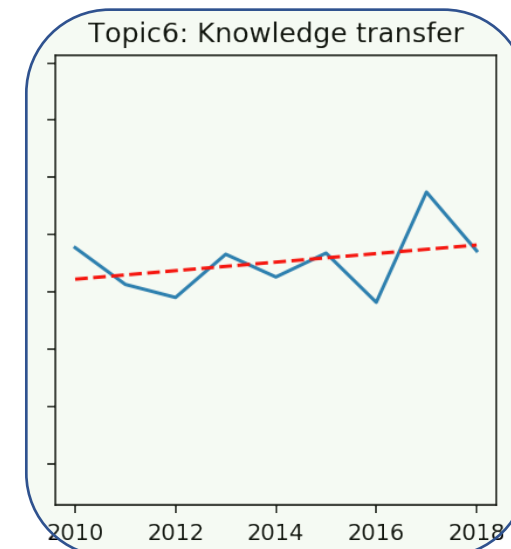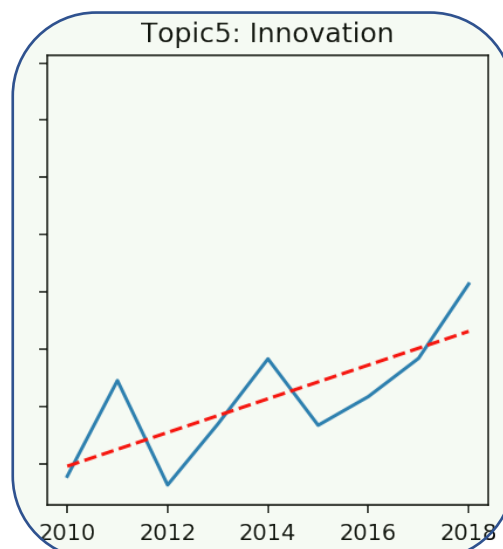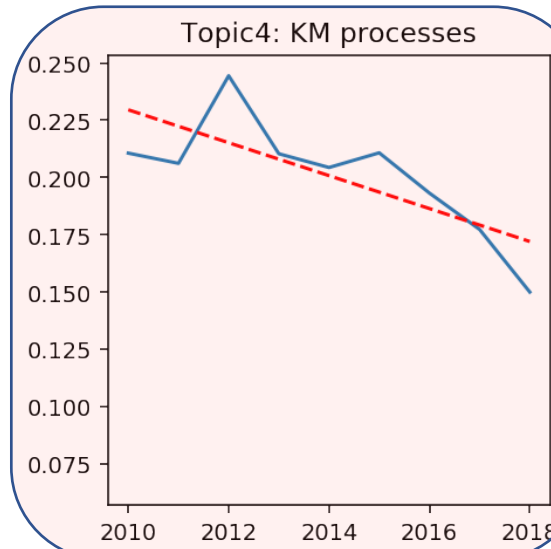# Topics popularity and impact by year
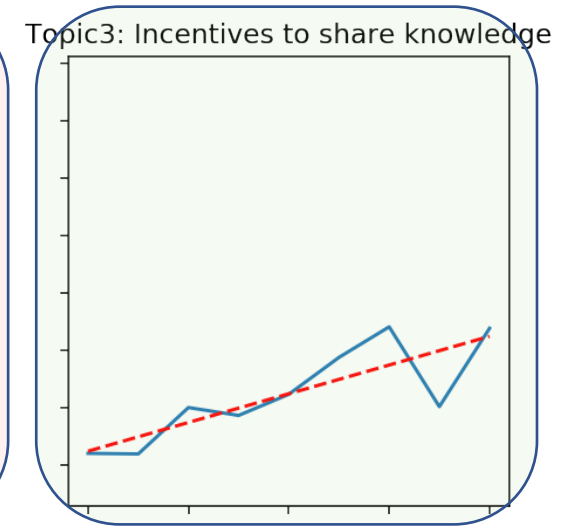

$$trend = \alpha + \beta * y$$

Topics popularity and impact trends

Topic	Description	Most representative paper	Popularity		Impact	
			Overall	Trend	Overall	Trend
0	Capabilities based on IC	[23]	0.083	0.0015	0.101	-0.0020
1	General issues of KM	[24]	0.085	-0.0005	0.094	0.0009
2	OL processes	[25]	0.135	-0.0059	0.101	-0.003
3	Incentives to share knowledge	[26]	0.109	0.0063	0.121	0.0022
4	KM processes	[27]	0.195	-0.0072	0.163	-0.0055
5	Innovation	[28]	0.109	0.0074	0.091	0.0052
6	Knowledge transfer	[29]	0.164	0.0019	0.167	0.0110
7	Impact of IC	[30]	0.111	-0.0033	0.153	-0.0087

Topics popularity and impact trends

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Topics popularity

Topics impact
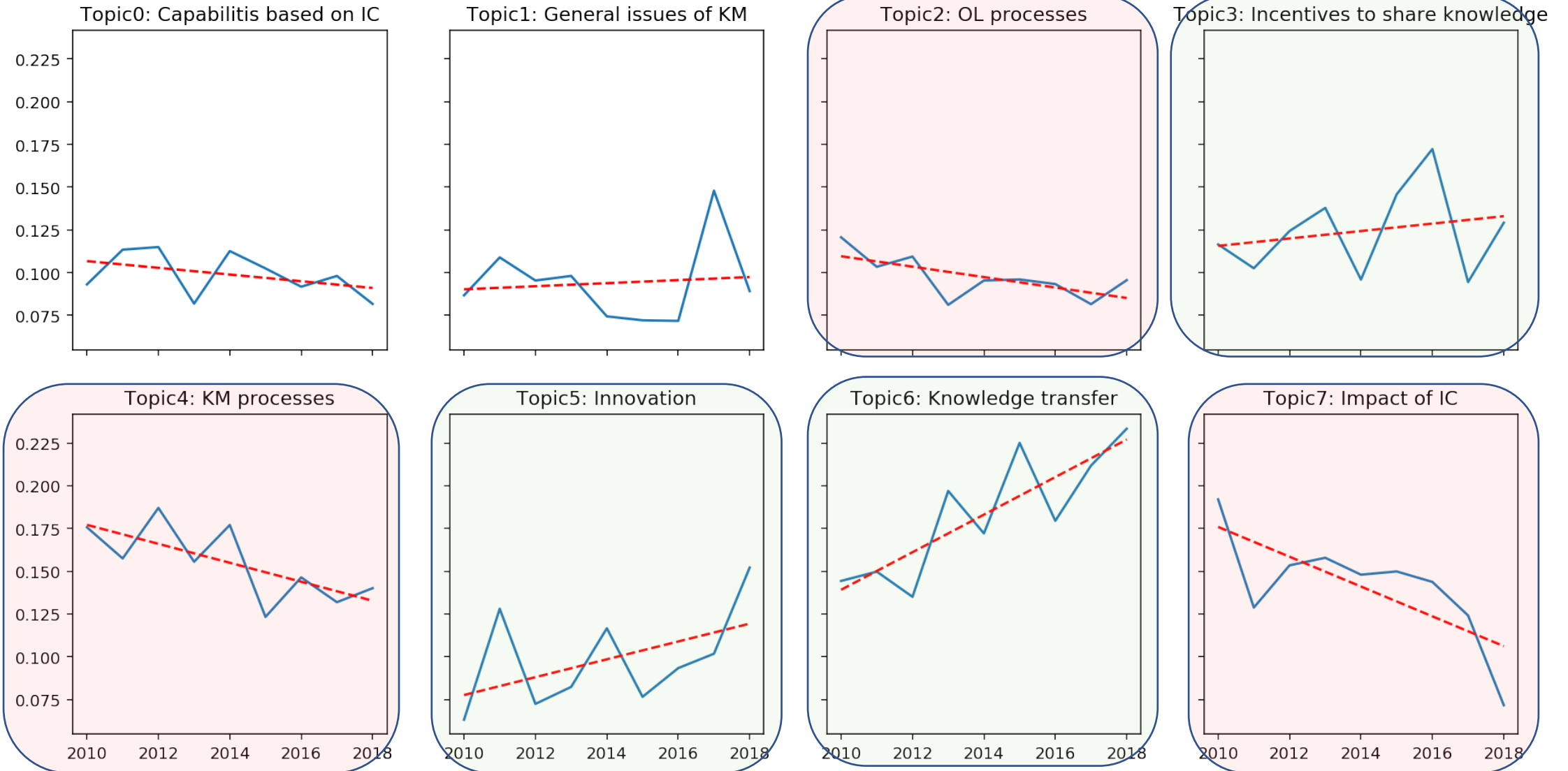
Leading journals

Source	Capabilitis based on IC	General issues of KM	OL processes	Incentives to share knowledge	KM processes	Innovation	Knowledge transfer	Impact of IC	Avg citation
International Journal of Knowledge Management	0.0315	0.0758	0.104	0.118	0.124	0.102	0.0452	0.0158	4.536
Journal of Intellectual Capital	0.385	0.0365	0.0288	0.0269	0.0747	0.0638	0.15	0.607	16.683
Journal of Knowledge Management	0.236	0.367	0.259	0.462	0.294	0.347	0.339	0.198	17.342
Knowledge Management Research and Practice	0.19	0.153	0.264	0.116	0.172	0.241	0.126	0.0603	6.231
Knowledge and Process Management	0.0782	0.0819	0.0792	0.0663	0.217	0.174	0.0437	0.0363	5.454
The Learning Organization	0.0425	0.259	0.223	0.134	0.0686	0.0456	0.249	0.0579	7.397
VINE Journal of Information and Knowledge Management Systems	0.0376	0.0274	0.0418	0.0767	0.0496	0.0253	0.048	0.0241	1.614

Source	Capabilitis based on IC	General issues of KM	OL processes	Incentives to share knowledge	KM processes	Innovation	Knowledge transfer	Impact of IC	Avg cit. (2017)
International Journal of Knowledge Management	0.0224	0.0644	0.0474	0.137	0.096	0.0715	0.0319	0.0191	0.765
Journal of Intellectual Capital	0.299	0.0341	0.019	0.0248	0.087	0.0376	0.188	0.621	5.810
Journal of Knowledge Management	0.376	0.327	0.239	0.432	0.298	0.457	0.273	0.235	5.949
Knowledge Management Research and Practice	0.148	0.0913	0.279	0.107	0.162	0.25	0.141	0.0478	2.311
Knowledge and Process Management	0.0604	0.0818	0.0614	0.0747	0.183	0.112	0.0306	0.00928	1.417
The Learning Organization	0.00736	0.341	0.288	0.092	0.035	0.0165	0.279	0.00787	4.265
VINE Journal of Information and Knowledge Management Systems	0.0871	0.06	0.0665	0.132	0.139	0.0557	0.0573	0.0596	1.828

Representative paper for each topic (dominated topic ~ 1.0)

	Topic	Paper	Cited
0	Capabilitis based on IC	Kamukama N., Ahiauzu A., Ntayi J.M. (2011) Competitive advantage: Mediator of intellectual capital and performance. *Journal of Intellectual Capital*, 12:1	56
1	General issues of KM	Nobre F.S., Walker D.S. (2011) A dynamic ability-based view of the organization. *International Journal of Knowledge Management*, 7:2	9
2	OL processes	Cauwelier P., Ribière V.M., Bennet A. (2016) Team psychological safety and team learning: a cultural perspective. *The Learning Organization*, 23:6	1
3	Incentives to share knowledge	Rutten W., Blaas - Franken J., Martin H. (2016) The impact of (low) trust on knowledge sharing. *Journal of Knowledge Management*, 20:2	26
4	KM processes	Minonne C., Turner G. (2012) Business Process Management-Are You Ready for the Future?. *Knowledge and Process Management*, 19:3	22
5	Innovation	Wang C., Han Y. (2011) Linking properties of knowledge with innovation performance: The moderate role of absorptive capacity. *Journal of Knowledge Management*, 15:5	34
6	Knowledge transfer	Massaro M., Dumay J., Garlatti A. (2015) Public sector knowledge management: A structured literature review. *Journal of Knowledge Management*, 19:3	35
7	Impact of IC	Zéghal D., Maaloul A. (2010) Analysing value added as an indicator of intellectual capital and its consequences on company performance. *Journal of Intellectual Capital*, 11:1	164

Conclusion

- Popularity and impact of topics focused on the practice of KM and OL also as on the effect of IC decline.

- Topics, what focus on the social aspects of KM (knowledge transfer, incentives to share knowledge, and innovation), grow in terms of popularity and impact.

- Current KM research more focus on social aspects that support knowledge sharing than the engineering of managerial systems.

- The topic analysis is a promising approach to the study of research fields.

Questions?