

# Scientific mapping analysis of Net Promoter Score (NPS): Supplemental Material

Juan C. Correa  
University of Economics, Prague

This supplemental material aims to provide an open and reproducible report that shows the empirical results obtained for the paper titled: “Balancing the evidence of the Net Promoter Score: The results of a scientific mapping analysis versus an empirical work in the energy sector.” A warning note is that this supplemental material is limited to the scientific mapping analysis, and does not provide any result regarding the empirical analysis of the data retrieved from the Energy sector (as this data was obtained under an anonymity agreement between the research team and the energy supplier company).

Our first step consists of using the raw data set called “NPS.RData” and apply the following series of commands

```
load("~/NPS.RData")
NPS <- data.frame(M)
library(dplyr)

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##   filter, lag

## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union

NPS <- arrange(NPS, desc(TC))
selectedPapers <- filter(NPS, grepl('REICHHELD', CR))
rm(list=setdiff(ls(), "selectedPapers"))
selectedPapers$Against <- NA
balancedPapers <- selectedPapers[, c(1, 6, 53, 37)]
```

Until this point, we now have two data sets (i.e., “balancedPapers” and “selectedPapers”). In “selectedPapers” there are 91 papers. The common attribute among them is that they all cite the paper of Reichheld (2003). In “balancedPapers” we have the same papers included in “selectedPapers”, but it contains only four columns: 1) AU is the column for authors, 2) AB is the column for the abstract of each paper, 3) Against is the column that in which we are going to indicate if the paper provides specific arguments in favor or against the use of NPS (as illustrated below), and 4) TC is the column that contains the number of citations as captured by Web-of-Science database.

## Classification of papers as supporters of NPS

A straightforward way to understand the literature is by differentiating the sample of articles that support the use of NPS from those that do not. Thus, we classified each paper in one of the following two categories. Articles were classified as supporters of the use of NPS if they did not provide any explicit criticism in the abstract (coded as zero); otherwise, they were classified as non-supporters of using NPS (coded as one), like this:

```
balancedPapers$Against <- c(1,0,0,1,1,1,1,0,0,1,
                             1,0,0,0,0,0,0,0,0,0,
                             0,1,0,0,0,0,0,1,0,1,
                             0,0,0,1,0,0,0,1,0,0,
                             0,0,1,0,0,0,0,0,0,0,
                             0,0,1,0,0,0,0,0,0,0,
                             0,0,0,0,1,0,0,1,0,0,
                             0,1,0,0,1,0,0,1,0,0,
                             0,0,0,0,0,0,0,0,0,0,
                             0,0,0,0,1,0,0,0,0,0,
                             0,0,0,0,1,0,0,0,0,0,
                             0,0,0,1,0,0,0,0,0,0,
                             0)
```

After completing this thorough classification, we can proceed with some bibliometric analysis

## Bibliometric Analysis

```
library(bibliometrix)
```

```
## To cite bibliometrix in publications, please use:
##
## Aria, M. & Cuccurullo, C. (2017) bibliometrix: An R-tool for comprehensive science mapping analysis,
##
## http://www.bibliometrix.org
##
##
## To start with the shiny web-interface, please digit:
## biblioshiny()
```

```
results <- biblioAnalysis(selectedPapers, sep = ";")
```

```
S <- summary(object = results, k = 10, pause = FALSE)
```

```
##
##
## MAIN INFORMATION ABOUT DATA
##
## Timespan                2005 : 2020
## Sources (Journals, Books, etc) 80
## Documents                91
## Average years from publication 3.58
## Average citations per documents 5.923
```

```

## Average citations per year per doc      1.041
## References                               2804
##
## DOCUMENT TYPES
## article                                66
## article; early access                   2
## editorial material                       1
## proceedings paper                       21
## review                                  1
##
## DOCUMENT CONTENTS
## Keywords Plus (ID)                      251
## Author's Keywords (DE)                  293
##
## AUTHORS
## Authors                                290
## Author Appearances                      302
## Authors of single-authored documents    11
## Authors of multi-authored documents     279
##
## AUTHORS COLLABORATION
## Single-authored documents                12
## Documents per Author                     0.314
## Authors per Document                     3.19
## Co-Authors per Documents                 3.32
## Collaboration Index                     3.53
##
##
## Annual Scientific Production
##
## Year      Articles
## 2005         1
## 2006         1
## 2008         2
## 2009         1
## 2011         4
## 2013         4
## 2014         6
## 2015         8
## 2016         9
## 2017        11
## 2018        14
## 2019        18
## 2020        10
##
## Annual Percentage Growth Rate 16.59144
##
##
## Most Productive Authors
##
## Authors      Articles Authors      Articles Fractionalized
## 1  LAITINEN MA          3  LAITINEN MA          2.50
## 2  DORCAK P             2  WANG ML           1.33
## 3  DVORAKOVA L          2  INAL Y           1.00

```

## 4	FALTEJSKOVA O	2	KINNEY WC	1.00
## 5	GASTON P	2	KORNETA P	1.00
## 6	JENKINS PJ	2	KRISTENSEN K	1.00
## 7	KRISTENSEN K	2	LEE S	1.00
## 8	MANEERATANA K	2	MITTAL B	1.00
## 9	MCEACHAN JE	2	REICHHELD F	1.00
## 10	POLLAK F	2	ROCKS B	1.00

##

##

## Top manuscripts per citations

##

##	Paper	TC	TCperYear
## 1	KLAUS PP, 2013, INT J MARKET RES	102	12.75
## 2	HAMILTON DF, 2014, BONE JOINT J	41	5.86
## 3	REICHHELD F, 2006, MIT SLOAN MANAGE REV	35	2.33
## 4	SPIESS J, 2014, BELL LABS TECH J	34	4.86
## 5	RANAWEERA C, 2014, J BUS RES	30	4.29
## 6	KEININGHAM TL, 2008, MIT SLOAN MANAGE REV	30	2.31
## 7	DE HAAN E, 2015, INT J RES MARK	27	4.50
## 8	KINNEY WC, 2005, OTOLARYNGOL HEAD NECK SURG	18	1.12
## 9	MUNGER MA, 2013, J AM PHARM ASSOC	16	2.00
## 10	EAST R, 2011, INT J MARKET RES	15	1.50

##

##

## Corresponding Author's Countries

##

##	Country	Articles	Freq	SCP	MCP	MCP_Ratio
## 1	USA	19	0.2159	16	3	0.158
## 2	UNITED KINGDOM	11	0.1250	7	4	0.364
## 3	NETHERLANDS	7	0.0795	4	3	0.429
## 4	AUSTRALIA	5	0.0568	3	2	0.400
## 5	CHINA	4	0.0455	4	0	0.000
## 6	CZECH REPUBLIC	4	0.0455	4	0	0.000
## 7	KOREA	4	0.0455	4	0	0.000
## 8	FINLAND	3	0.0341	3	0	0.000
## 9	FRANCE	3	0.0341	2	1	0.333
## 10	SPAIN	3	0.0341	2	1	0.333

##

##

## SCP: Single Country Publications

##

## MCP: Multiple Country Publications

##

##

## Total Citations per Country

##

##	Country	Total Citations	Average Article Citations
## 1	UNITED KINGDOM	203	18.45
## 2	USA	104	5.47
## 3	NETHERLANDS	74	10.57
## 4	FRANCE	41	13.67
## 5	AUSTRALIA	14	2.80
## 6	KOREA	11	2.75
## 7	CZECH REPUBLIC	10	2.50

```
## 8 CHINA 7 1.75
## 9 FINLAND 5 1.67
## 10 POLAND 5 2.50
```

```
##
##
```

```
## Most Relevant Sources
```

```
##
##
```

Sources

```
## 1 INTERNATIONAL JOURNAL OF MARKET RESEARCH
## 2 MIT SLOAN MANAGEMENT REVIEW
## 3 2011 INTERNATIONAL CONFERENCE ON QUALITY RELIABILITY RISK MAINTENANCE AND SAFETY ENGINEERING (ICQ
## 4 BONE \& JOINT JOURNAL
## 5 INTERNATIONAL JOURNAL OF RESEARCH IN MARKETING
## 6 JOURNAL OF HAND SURGERY-EUROPEAN VOLUME
## 7 JOURNAL OF RETAILING AND CONSUMER SERVICES
## 8 LIBRARY MANAGEMENT
## 9 THERAPEUTIC INNOVATION \& REGULATORY SCIENCE
## 10 2014 INTERNATIONAL CONFERENCE ON TEACHING ASSESSMENT AND LEARNING (TALE)
```

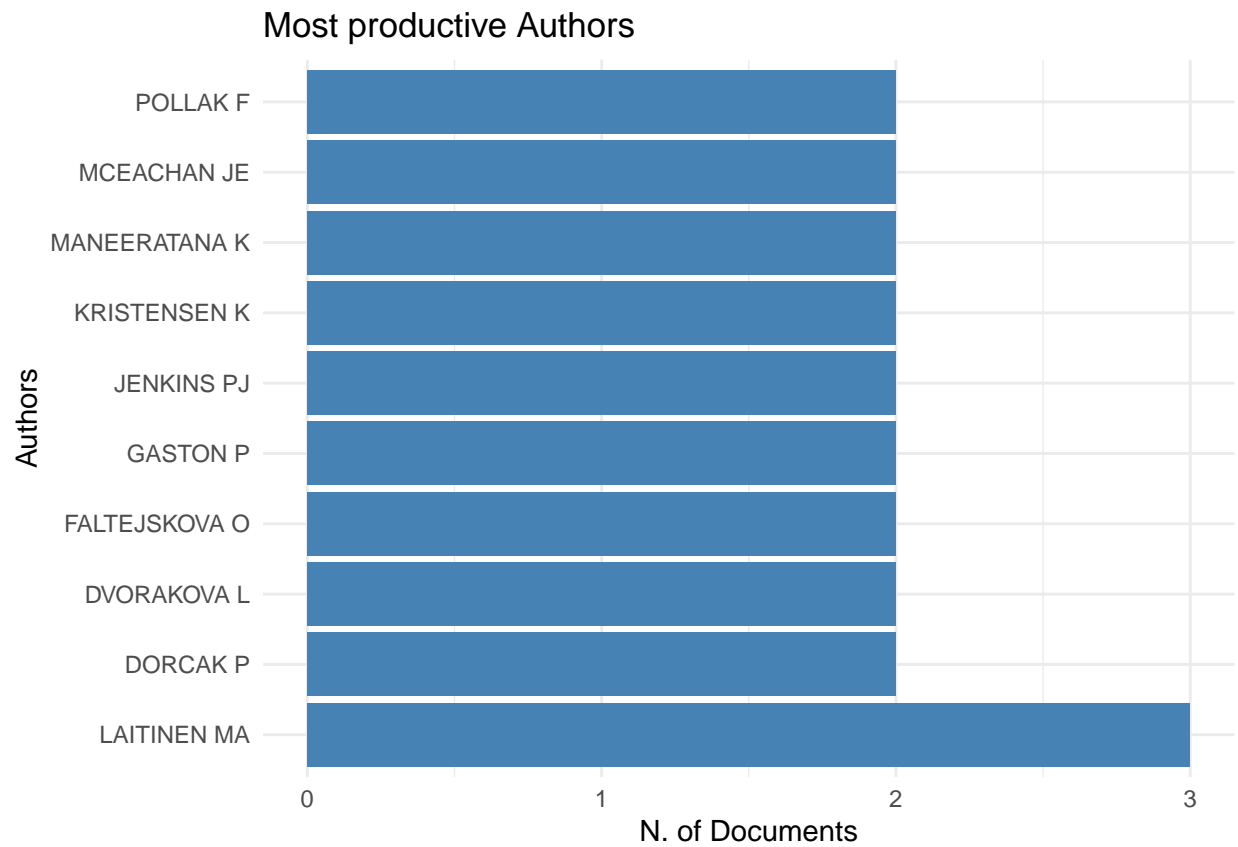
```
##
##
```

```
## Most Relevant Keywords
```

```
##
```

##	Author Keywords (DE)	Articles	Keywords-Plus (ID)	Articles
## 1	NET PROMOTER SCORE	26	SATISFACTION	19
## 2	NPS	12	LOYALTY	13
## 3	CUSTOMER SATISFACTION	9	CARE	7
## 4	SATISFACTION	9	CUSTOMER SATISFACTION	6
## 5	CUSTOMER LOYALTY	8	IMPACT	6
## 6	NET PROMOTER SCORE (NPS)	6	NEED	6
## 7	LOYALTY	5	QUALITY	6
## 8	NET PROMOTER	4	INFORMATION	5
## 9	CUSTOMER EXPERIENCE	3	INTENTIONS	5
## 10	IMPACT ASSESSMENT	3	NET PROMOTER	5

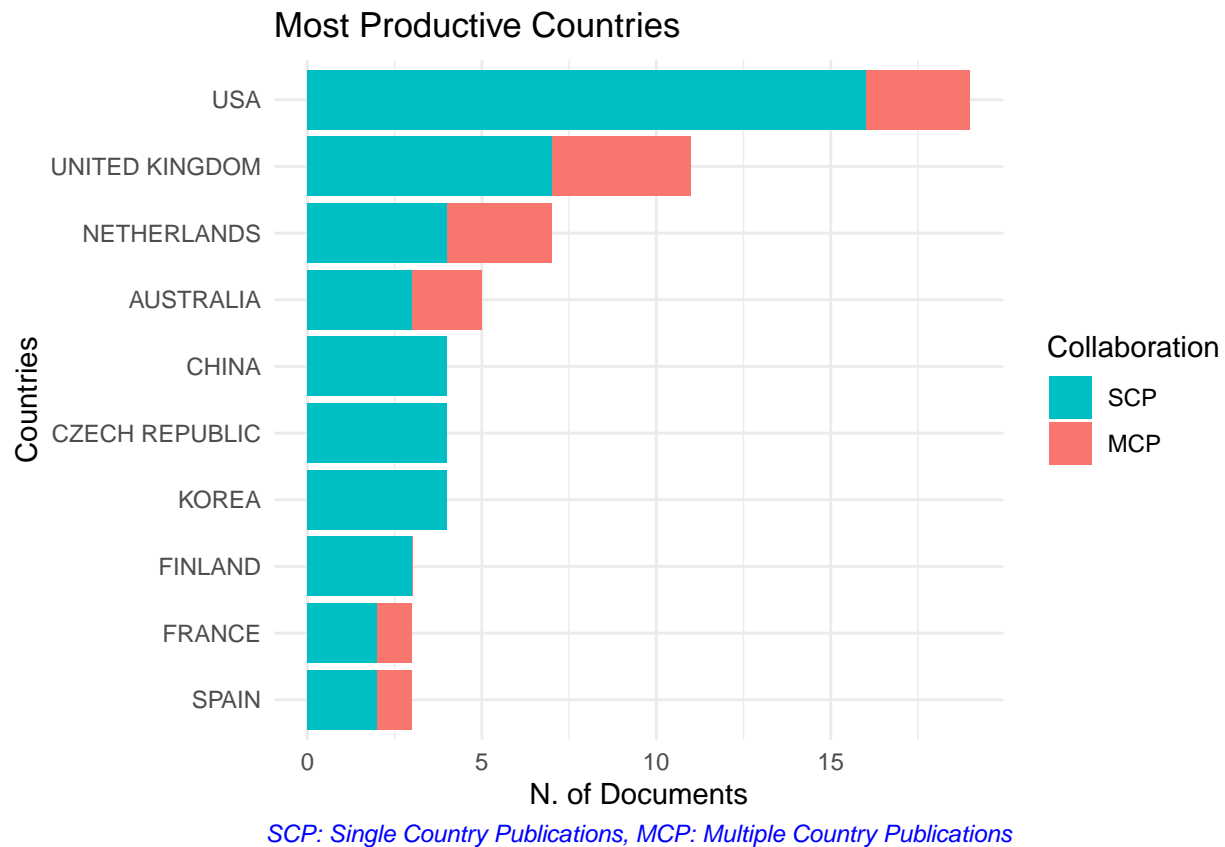
```
plot(x = results, k = 10, pause = FALSE)
```



## Warning: Use of 'xx\$Country' is discouraged. Use 'Country' instead.

## Warning: Use of 'xx\$Freq' is discouraged. Use 'Freq' instead.

## Warning: Use of 'xx\$Collaboration' is discouraged. Use 'Collaboration' instead.



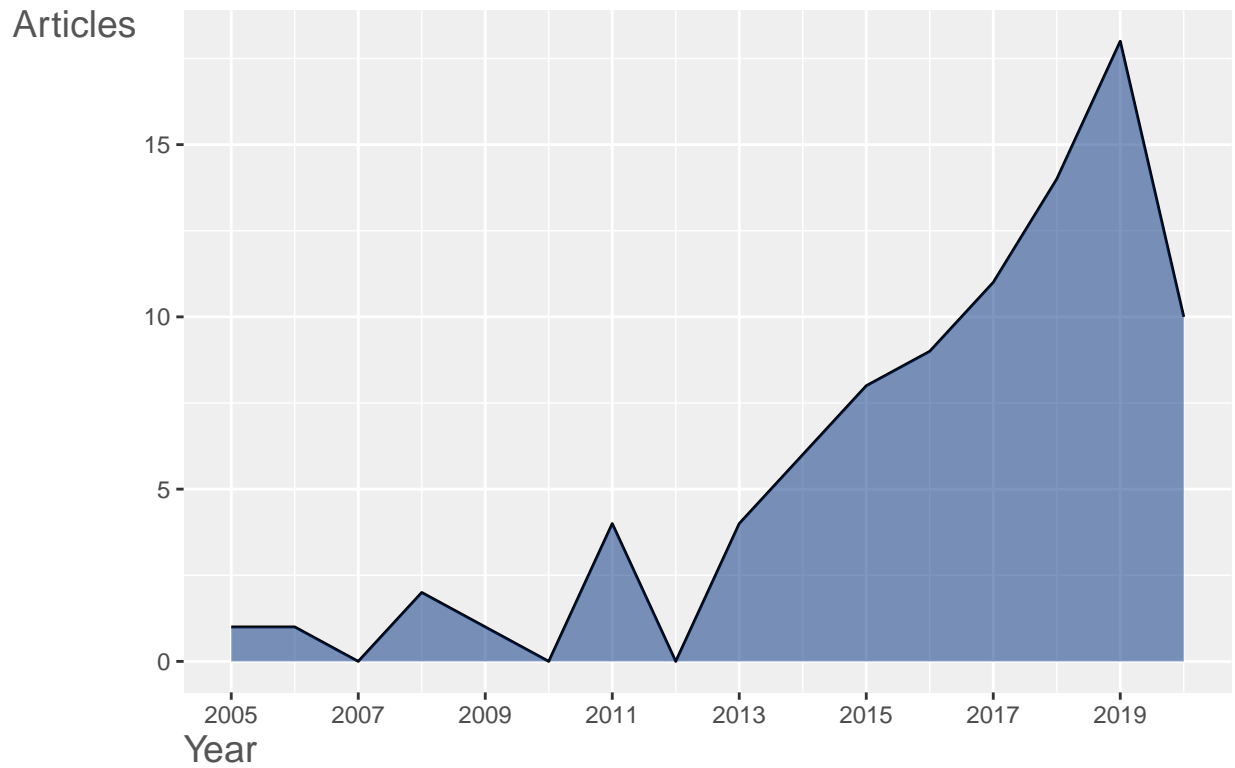
## Warning: Use of 'Y\$Year' is discouraged. Use 'Year' instead.

## Warning: Use of 'Y\$Freq' is discouraged. Use 'Freq' instead.

## Warning: Use of 'Y\$Year' is discouraged. Use 'Year' instead.

## Warning: Use of 'Y\$Freq' is discouraged. Use 'Freq' instead.

# Annual Scientific Production



```
## Warning: Use of 'Table2$Year' is discouraged. Use 'Year' instead.
```

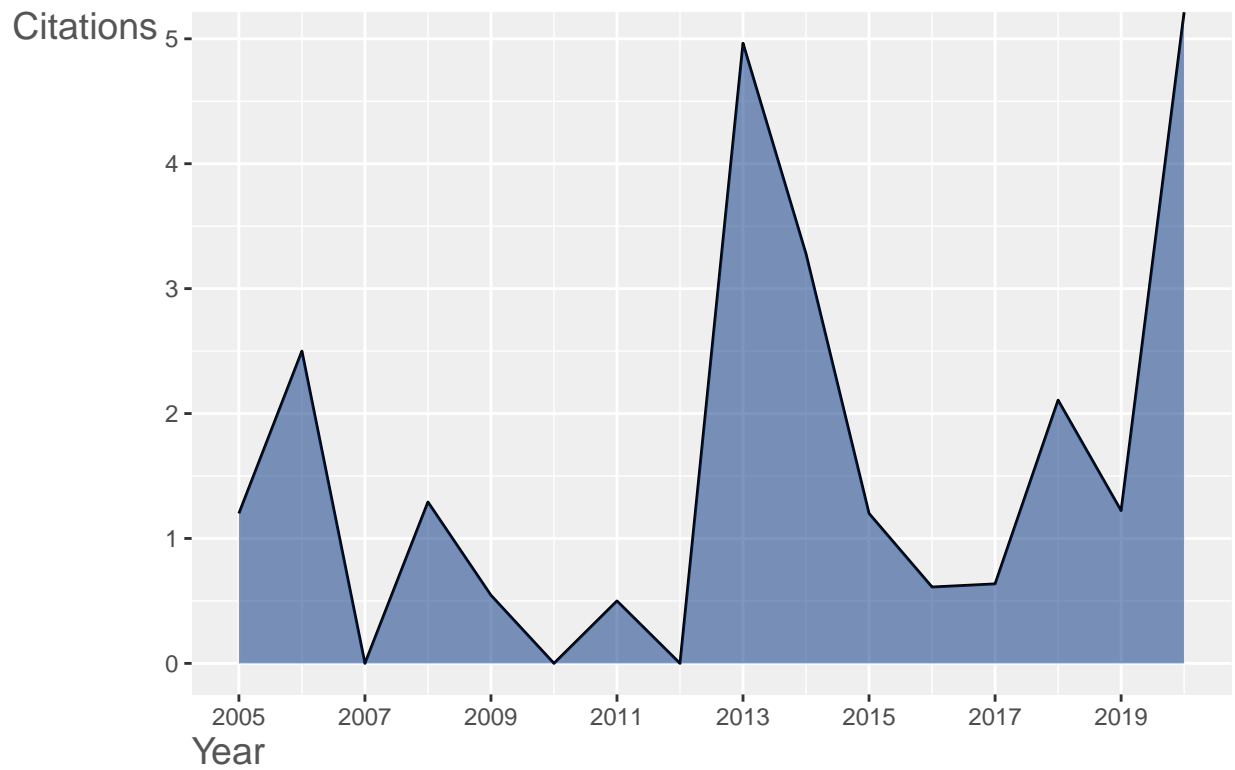
```
## Warning: Use of 'Table2$MeanTCperYear' is discouraged. Use 'MeanTCperYear' instead.
```

```
## Warning: Use of 'Table2$Year' is discouraged. Use 'Year' instead.
```

```
## Warning: Use of 'Table2$MeanTCperYear' is discouraged. Use 'MeanTCperYear' instead.
```



# Average Article Citations per Year



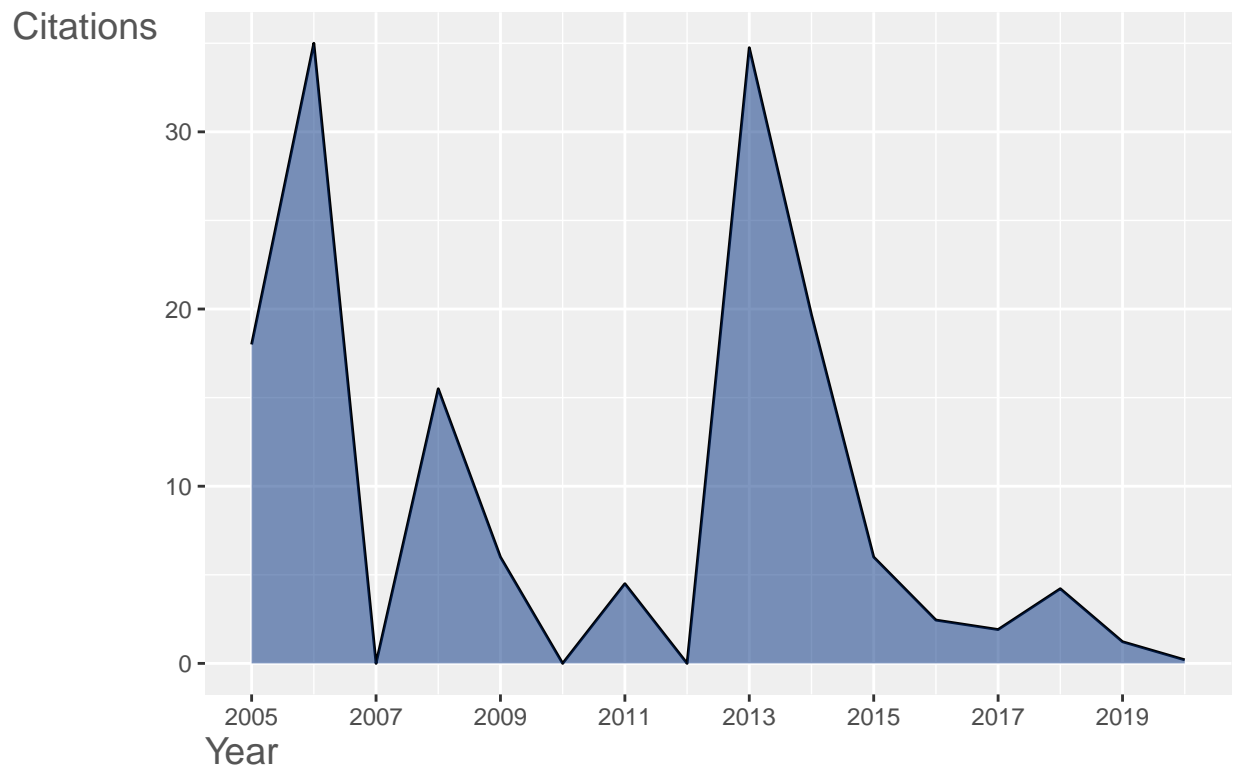
```
## Warning: Use of 'Table2$Year' is discouraged. Use 'Year' instead.
```

```
## Warning: Use of 'Table2$MeanTCperArt' is discouraged. Use 'MeanTCperArt' instead.
```

```
## Warning: Use of 'Table2$Year' is discouraged. Use 'Year' instead.
```

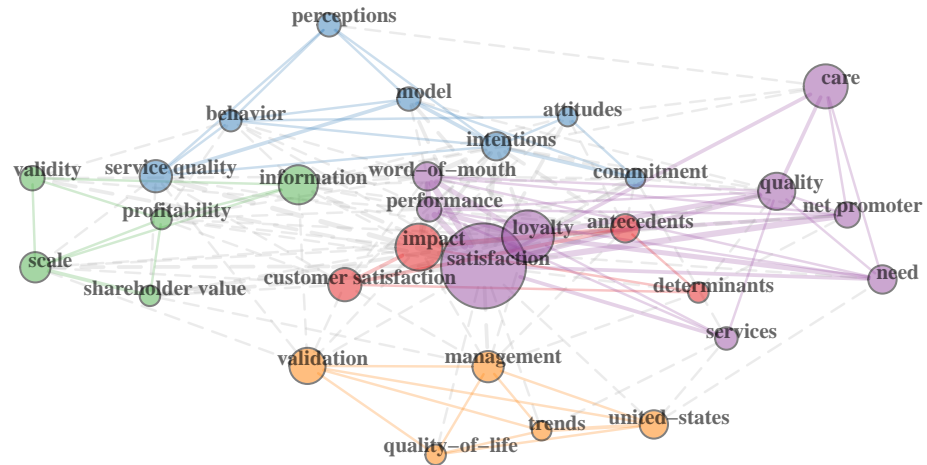
```
## Warning: Use of 'Table2$MeanTCperArt' is discouraged. Use 'MeanTCperArt' instead.
```

# Average Total Citations per Year



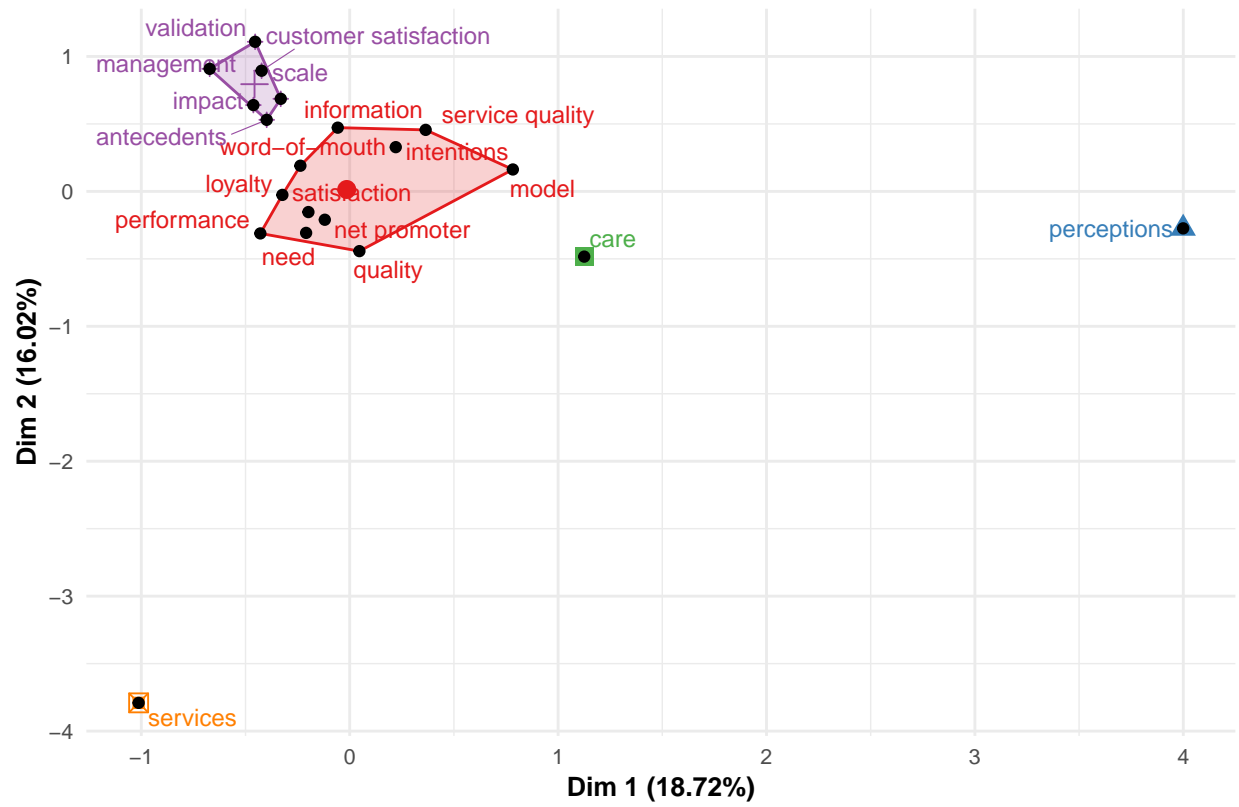
```
NetMatrix <- biblioNetwork(selectedPapers,  
                             analysis = "co-occurrences",  
                             network = "keywords",  
                             sep = ";")  
  
net=networkPlot(NetMatrix,  
                 normalize="association",  
                 weighted=T, n = 30,  
                 Title = "Keyword Co-occurrences",  
                 type = "fruchterman",  
                 size=T,  
                 edgesize = 5,  
                 labels=0.7)
```

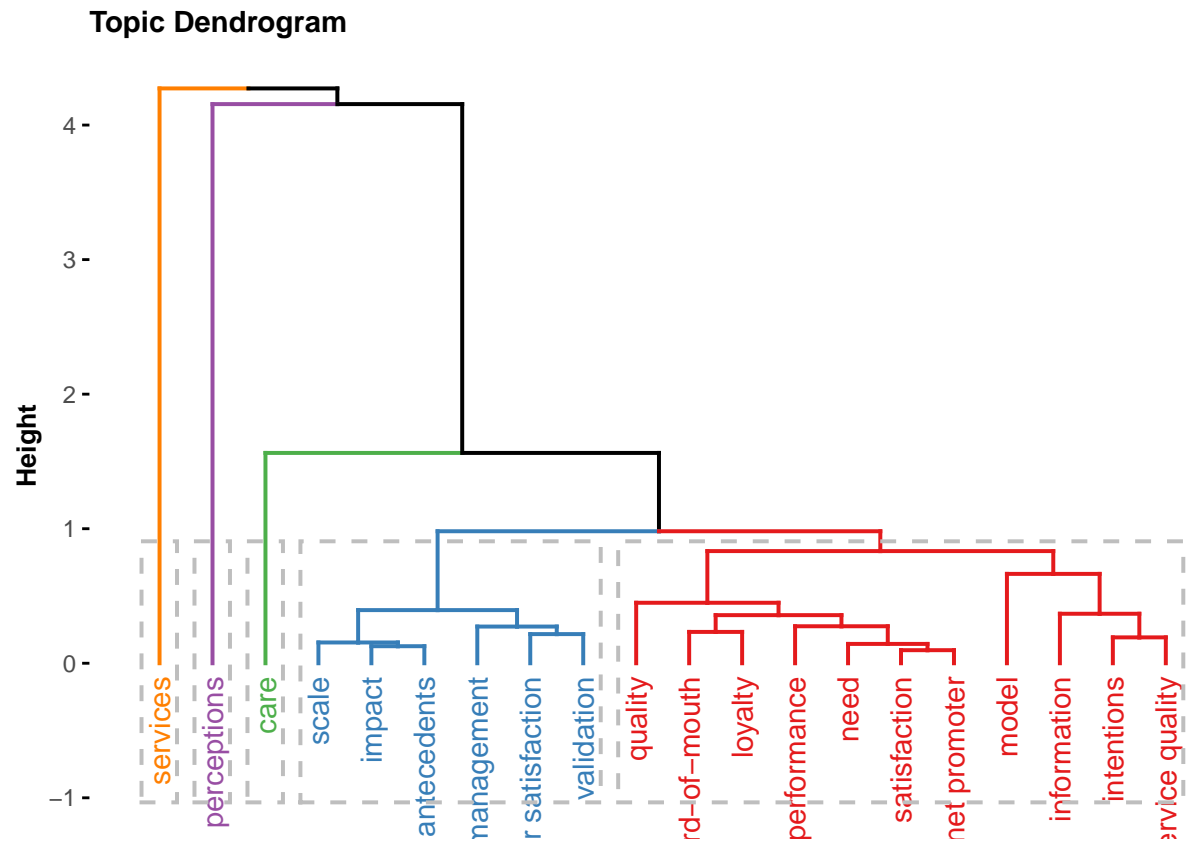
## Keyword Co-occurrences



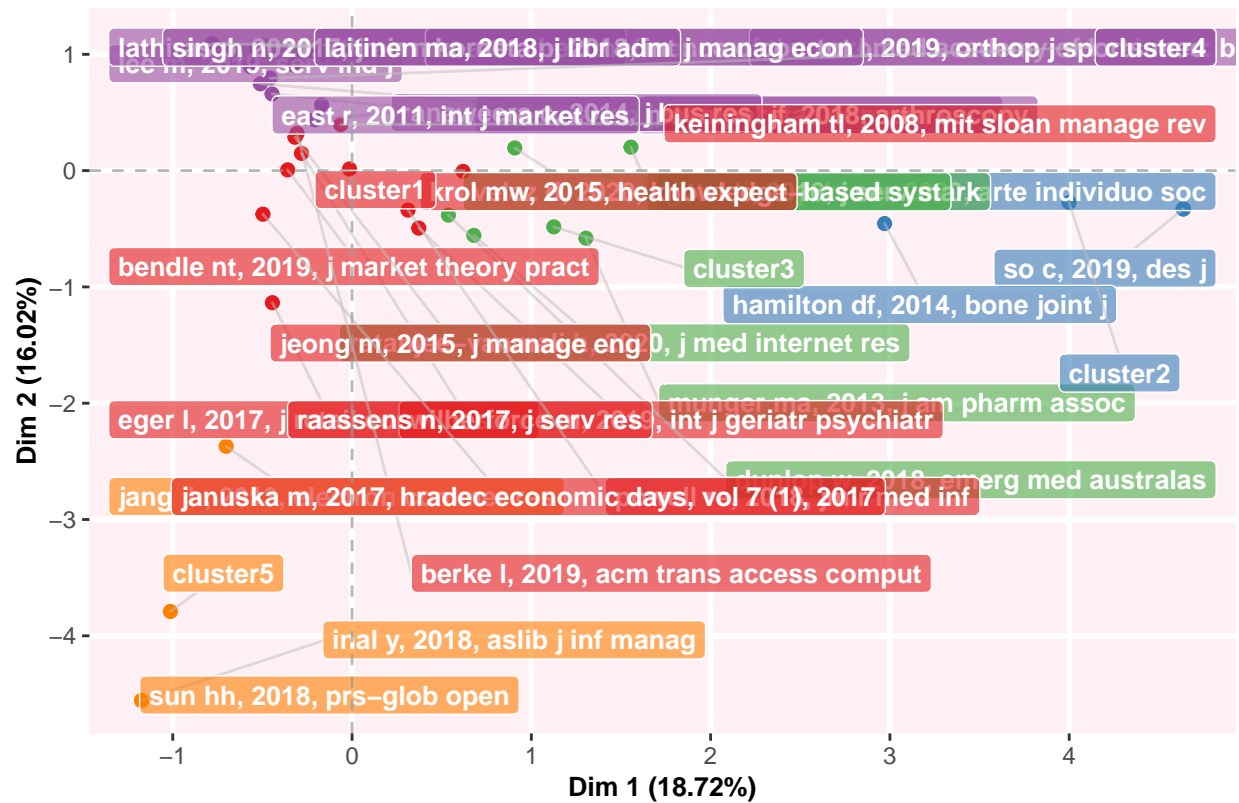
```
CS <- conceptualStructure(selectedPapers,
  field="ID",
  method="CA",
  minDegree=4,
  clust=5,
  stemming=FALSE,
  labels=10,
  documents=10)
```

Conceptual Structure Map – method: CA

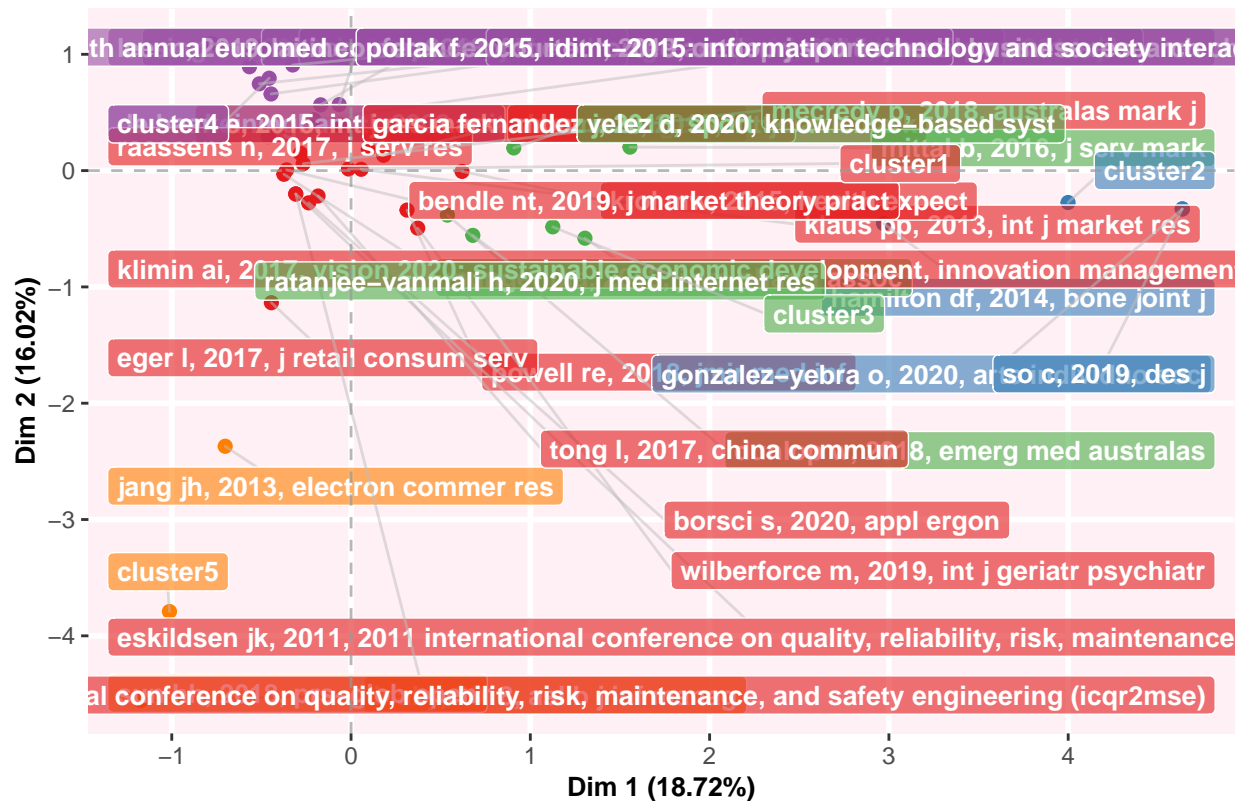




Factorial map of the documents with the highest contributes



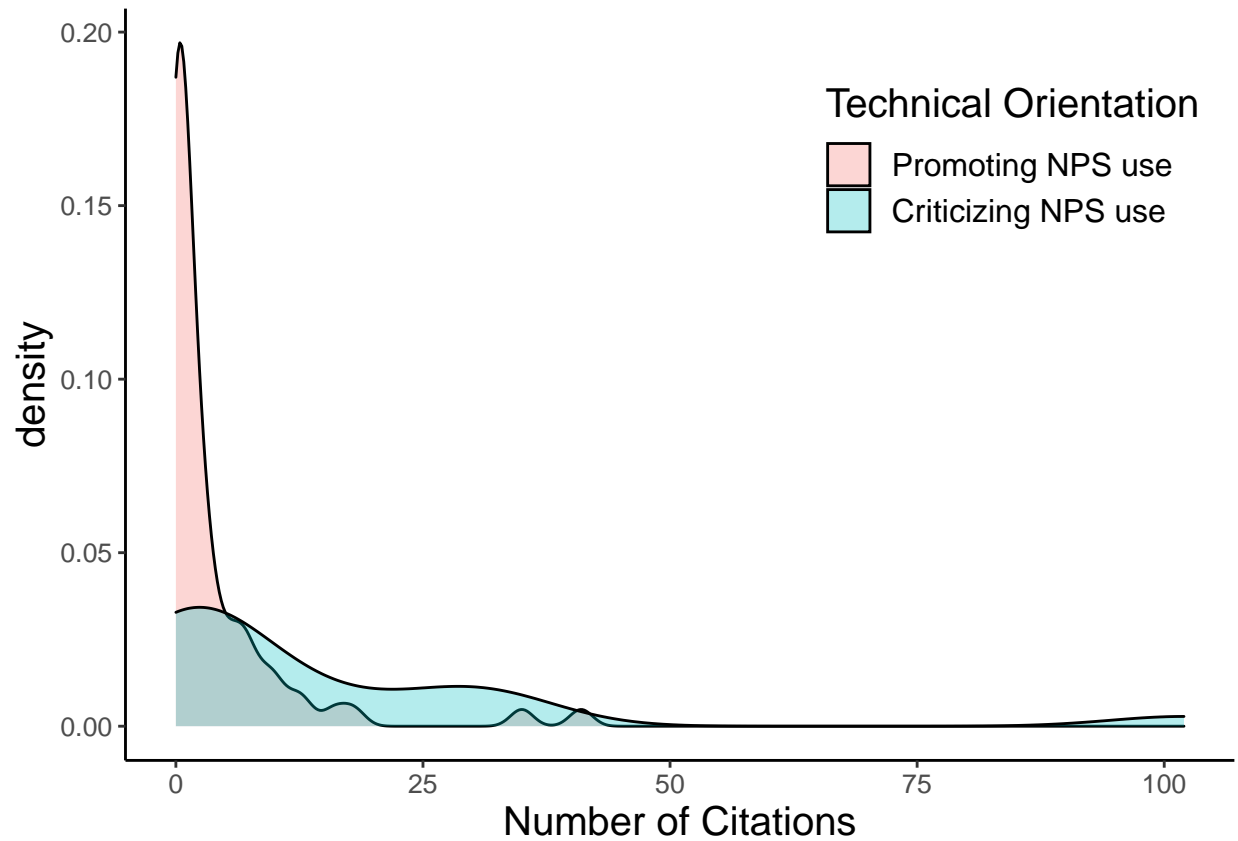
Factorial map of the most cited documents



The structure of keywords co-occurrence network is depicted. This network resulted from using the keywords that appeared in each paper analyzed. The size of each node is proportional to the frequency of appearance of each word in the list of keywords extracted from the bibliometric sample. Straight lines that connect pairs of nodes represent the frequency any couple of keywords occurred at the same time across the papers analyzed. Another interesting result is the organization of topics illustrated as a clustered topics dendrogram. In this plot, topics are arranged as individual branches whose similarity was calculated as the Euclidean distance between the vectors that represent the set of keywords appearing in each paper.

```
library(ggplot2)
p <- ggplot(balancedPapers,
            aes(x=TC, fill=as.character(Against))) + geom_density(alpha=0.3) + theme_classic() +
xlab("Number of Citations") +
theme(text = element_text(size=15),
      axis.text.x = element_text(size = 10),
      axis.text.y = element_text(size = 10))

p + theme(legend.position=c(x=0.8, y=0.8)) +
scale_fill_discrete(name = "Technical Orientation", labels = c("Promoting NPS use", "Criticizing NPS use"))
```



In this last Figure, it can be seen the statistical distribution of citations for both the papers that promote the use of NPS for practical purposes and those that criticize it. It can be seen that papers that provide critical arguments against the use of NPS for practical purposes tend to be more cited than those documents that promote the use of NPS without precautions.